Media Briefing

May 2005

Friends of the Earth

CLIMATE CHANGE IMPACTS

The changes we are witnessing to our climate are unprecedented and the impacts are therefore difficult to predict. Scientists have used computer modelling to investigate what might happen as global warming increases, providing an insight into the likely effects.

The UK Climate Impacts Programme (UKCIP) has made a set of predictions about the likely impacts of climate change using a computer model based on natural variation and human influence, and in some parts of the country, further research has been commissioned by regional development agencies.

Overall, the British Isles is expected to be protected from much extreme weather because of the Atlantic Ocean, but scientists have said that we can expect significantly more rain in the winter and spring months; greater extremes of heat and drought, storms and wind and even more intense cold.

Some impacts will be felt more strongly in certain regions. Droughts are expected to increase in the south, especially in the summer. The north and west are more likely to suffer from abundant and intense rainfall. Severe flooding will occur because of the combination of sea level rise with high tides and changes in winds.

Soils, particularly clay soils, react to erratic rainfall causing subsidence damage, and some coastal land will be lost to the sea or invaded by salt water.

According to the Environment Agency, some low-lying coastal land will certainly be abandoned to the sea, or become impossible to farm as salt water invades the soil and groundwater. This is potentially of major economic importance as half of Britain's prime agricultural land is below the five metre contour and much of it could be lost to sea or salt.

Many of Britain's large industrial plants—from oil refineries to nuclear power stations—are concentrated on the coast which is vulnerable to rising tides. These may have to be moved or defended. Some of the country's largest landfill sites are on former coastal marshes and at risk from rising sea levels.

REGIONAL IMPACTS

East of England

Contact:
Press Office**: 020 7566 1649**

26-28 Underwood Street London N1 7JQ
Media contact 020 7566 1649 (24 hour) Fax 020 7490 0881 Email press@foe.co.uk Website www.foe.co.uk

The East of England has 480 km of coastline and 565 Sites of Special Scientific Interest (SSSIs), all of which will be vulnerable to the impacts of rising temperatures, with an increase of three to five degrees Celsius predicted by 2080.

Winters will be wetter, with rainfall increasing up to 30 per cent. Summer rainfall is expected to decrease by 45-60 per cent compared with current patterns. Storm activity is likely to increase, as are flooding incidents. Sea levels on the Essex coast are expected to rise by 22 to 82cm by 2080.

The East of England is an important region for agriculture (76 per cent of land use), and practices will have to change significantly in order to cope with the longer growing season and the reduced soil moisture in summer. Challenges exist in ensuring water resources and quality.

The region also faces considerable challenges in flood risk management – with the Environment Agency already investing some £53 million in improving flood defences in the region. The coast is vulnerable to rises in sea level, storm surges, and saline intrusion as well as 'coastal squeeze' as coastal habitats are squeezed against hard sea defences.

The intensely agricultural Fens area lies below sea level and is already artificially drained. The rise in sea levels is likely to result in coastal and fluvial flooding and saline intrusion, which will in turn impact on agriculture affecting the salinity and moisture of the soil.

The southern part of the region has been earmarked for extensive development, providing housing to the north of London as well as around Stansted airport. This increased demand for water resources will add to pressure on what is already a dry area. Landscapes and habitats are also likely to be affected by reduced water availability and temperature rises. There is a risk of subsidence on clay soils.

The Thames Gateway region is particularly vulnerable to broader coastal changes, as well as being affected by business and housing developments. As a sub-region it is particularly vulnerable to water resource deficiencies, sea level rise, and fluvial flooding. It is also likely to be at risk from subsidence.

According to the East of England Regional Assembly report on "Living with Climate Change": "*The impacts of climate change in the East of England are likely to have significant economic and operational implications for local authority services and on infrastructure provision in the region*."

The East of England aims to produce 14 per cent of energy from renewable sources by 2010.

For more information, see also:
Living with climate change, East of England Regional Assembly - www.eera.gov.uk
Environment Agency: www.environment-agency.gov.uk/regions/anglian/830408/842762/842911/870148/?lang=_e&version=1&amp

East Midlands
The East Midlands region also has a significant agricultural sector, employing some 40,000 people on a mix of upland grazing, livestock farming and mixed and arable farming in the more fertile areas.

Climate change will bring hotter drier summers to the region, forcing more farmers to rely on irrigation to water crops. Water supplies will be even more stretched than they are at present. Excessive rain will also pose challenges.

Temperatures and rainfall patterns in the East Midlands have already changed in the last 100 years,

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with sea levels rising up to 2mm per year on the East Coast. The UK Climate Impacts Change Programme (UKCIP) has predicted that the Midlands' climate will continue to get warmer and wetter, with more storms and flooding in the winter and more droughts in the summer.

According to the Environment Agency, by 2050:
Annual mean temperatures in the East Midlands could rise by up to 2.3ºC, with increases greater in the south of the region; winter rainfall could increase by up to 13 per cent; summer rainfall could decrease by up to 18 per cent. Sea levels on the East Coast could rise by up to 83cm

By 2080 average annual temperatures may increase by up to 5ºC; summer rainfall may decrease by up as much as 60 per cent and winter rainfall may increase by up to 30 per cent.

Evidence suggests that rising river temperatures in the East Midlands may already be contributing towards a decline in fish populations.

Agricultural land is expected to suffer from erosion and shrinkage. The types of agricultures and crops grown will change, as will the threat from pests with insects such as the Colorado Beetle entering the region.

Changes to the coastal region will affect wildlife, with likely adverse impacts on wading birds.

For more information see www.ukcip.org.uk/climate_change/by_location.asp

West Midlands
The West Midlands is an important agricultural area with 70 per cent of the land used for farming. Many farmers rely on irrigation to water crops, but with the recent trend of hotter drier summers there may be shortages in future water supplies and potential adverse environmental impacts.

Like the rest of Central England, the West Midlands is expected to become wetter in the winter and drier in the summer. There will be a higher risk of extreme weather events such as storms, floods and droughts.

With greenhouse gas emissions continuing, it is predicted that by 2050 annual mean temperatures could rise by up to 2.5ºC, with more warming in Warwickshire and the south east of the region than in Shropshire and the north.

Sea levels on the west coast could rise by as much as 83cm. Soil moisture is expected to fall by up to 35%. By 2080, annual temperatures may increase by up to 4.5 degrees C and summer rainfall decrease by as much as 50 per cent.

Areas such as the Vale of Evesham will be at increased risk of drought, soil damage. Subsidence is expected to cause problems, rivers and their ecosystems will be affected, and some endangered species, such as butterbur and sundew, will be under even greater threat as they suffer habitat loss. Flooding will cause a range of problems including drainage, particularly in Birmingham which is not expected to cope with the more severe storms.

The changing temperatures and rainfall could impact on the types of agriculture in the region which is currently mixed between arable, horticulture and livestock. There could be a reduction in yields of fruit, vegetables and cereals that do not have as much water during the growing period. Other crops may flourish due to higher temperatures and increased carbon dioxide in the atmosphere. Higher temperatures could increase the risk of pests and diseases in arable and horticultural crops.

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For more information see www.ukcip.org.uk/climate_change/by_location.asp
www.environment-agency.gov.uk/commondata/acrobat/11__20_810787.pdf

North East
According to the Environment Agency, climate change means more extreme weather events in the North Eastern region. There is also evidence of changes in sea level.

Across the whole of the North East and Yorkshire regions, more than 18,000 people live in areas at risk of flooding and it is expected that ever more people will be affected in the future. More than £7million a year is spent protecting people and property from flooding in the North East region.

A major study of climate change in the North East suggested that by 2080 average temperatures will have risen by between 1.5 and 4 degrees C. Summer rainfall is expected to fall by between 15 and 50 per cent. Sea levels are expected to have risen by up to 66 cm and the growing season be lengthened by up to 100 days. These changes in turn will affect the severity of flood impacts, agricultural practices, water availability, wildlife habitats and air quality.

Flooding is already an issue in the region with flash flooding becoming more common as a result of increased intense rainfall. In July 2001 a thunderstorm at Hexham, in Northumberland, a monitoring station that had been in place for 30 years, was washed away.

Beaches such as Alnmouth, in Northumberland, are eroding rapidly. Predictions suggest that coastal property may be damaged. Further predictions include that cliff and beach erosion may further increase, as will costs of maintaining sea defences.

Predictions suggest that important habitats will also be damaged,such as the relic alpine heath habitats in upper Teesdale. Flat Sedge, Varigated Horsetail, Wood Cranesbill, Bog Rosemary, Cloudbury and the Large Heath Butterfly are all expected to become less common in the region.

Coastal habitats will also be affected, with reed beds and sand dunes adversely affected. There will also be a migration of new species into the region. Fish populations will also be affected severely.

There are several initiatives in the region to manage climate change with, for example, the city of Newcastle aiming minimise greenhouse gas emissions and efforts to invest in projects that save the equivalent amount of carbon dioxide.

For more information see www.ukcip.org.uk/climate_change/by_location.asp
www.northeastassembly.gov.uk/global/assets/documents/asset20030521085108.pdf

North West
The North West region will suffer from the impacts of rising temperatures, with agriculture covering 80 per cent of the region. Rising sea levels are also seen as a serious threat as the region's coastline is generally low-lying, and urbanised in the south. Some 95,000 people live in the coastal floodplain, which is also the base for much of the region's industry and some of its tourist attractions.

Modelling suggests that by 2080, without action to tackle carbon dioxide emissions, temperatures could rise by between 1° and 5° centigrade in the region. Winter rainfall is expected to rise by 30 per cent and summer rain decrease by 50 per cent. There would be substantially less snow fall than at present. Sea levels could rise by as much as 67 cm - in Liverpool sea levels have risen by 6cm in the last 50 years.

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The rural uplands of the North West (ranging from the Cumbrian mountains to the Forest of Bowland, the Western and Southern Pennines, and the Peak District fringes) are home to species which are highly specialised to suit the region's cold, maritime climate. Despite the potential for northward migration, certain species could be under threat from changes in climati c conditions.

Because of the shallow sea bed, the North West has been identified as a key potential site for offshore wind development in the UK. In 2001 37 per cent of the electricity generated from wind power in England came from wind farms across the region.

For more information see www.ukcip.org.uk/climate_change/by_location.asp

Yorkshire and Humberside
According to the Environment Agency, climate change means more extreme weather events in Yorkshire and Humberside region, as well as an increase in winter rainfall. Sea levels are expected to rise by up to 66 cm. Average mean temperatures are expected to increase by between 1.5 to 4.5 degrees Celsius by 2080.

Torrential downpours have already led to flooding in some parts of the region and in 2004 in Headingley, 182 mm of rain was recorded for one month, compared to an average of 78 mm.

Many of the region's homes, businesses and settlements lie within the flood plain and so will face an increased risk of flooding as a result of increased rain fall and rising sea levels. Patterns of flooding are expected to change over the next 50 years with larger and longer duration of winter floods. Rather than individual floods lasting a few days, there may be a "flood season" with high river flows for weeks or months derived from higher groundwater and runoff inputs.

The coast is particularly vulnerable to a changing climate in terms of rising sea levels, changing patterns of tidal flooding and coastal erosion and the warming of sea waters. Coastal changes are expected to effect fish populations.

There is expected to be a loss of coastal land due to increased erosion rates and flooding. There will be a loss of internationally important inter-tidal habitat and an increased risk of tidal flooding. There will be an Increased fire risk on heathlands affecting areas such as the North Yorks Moors.

Agriculture in the region will also need to change, and is likely to result in higher demands for water due to higher irrigation demand, particularly for potatoes, and increased demand nationally for seasonal salad products.

Heritage sites, like York Minster and Bolton Abbey are extremely fragile and could be damaged by extreme weather conditions, including drought, flooding and water-logging.

For more information see www.ukcip.org.uk/climate_change/by_location.asp
www.yhassembly.gov.uk/p_contentDocs/307_1.pdf
www.yorkshire-forward.com/images/1467.pdf

South West
The South West Climate Change Impacts Partnership (SWCCIP) has produced a report describing the climate change scenarios projected for the region which predicts that climate change will mean summers become hotter and drier, placing greater strain on the region's water resources and altering natural habitats.

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Winters will become wetter, resulting in increased flash flooding and storm damage, with potential implications for historic buildings as well as homes, businesses and infrastructure.

Relative sea level will continue to rise and extreme sea levels will be experienced more frequently. This will lead to an increased risk of coastal flooding, affecting sea defences, beaches, harbours, homes, businesses, infrastructure, archaeological sites, maritime heritage and biodiversity, and resulting in coastal erosion becoming an increasing problem.

Climate change is already having an impact and the region is expected to become 1.0 to 2.5°C warmer and winters up to 15% wetter by 2060. The risk of flooding is expected to increase and occasional storm surges will become more frequent.

A report published by the South West Observatory predicts significant pressure on native species of flora and fauna. The golden plover has already stopped breeding in the region because of mild winters. National rarities such as Cornish heather and the smooth snake may even be lost. Some ecosystems will require special protection, such as the Dorset heaths which will possibly become tinderboxes in the long, hot, dry summers.

Nearly 20 per cent of England's ancient woodlands are in the South West region. Their fragmentation means that some species will be unable to migrate resulting in the loss of biodiversity. Because the region's coastal waters are on the boundary between warm southern and cool northern seas they are very abundant in species, but even small changes in temperature can have significant changes in marine ecosystems.

The cost of mitigating the negative impacts of changing weather patterns, not least of building the necessary coastal defences, will be substantial. Buildings, bridges, power transmission lines, transport and heritage including archaeological sites are vulnerable to the impacts of climate change.

For more information see:
www.southwest-ra.gov.uk/hottopics/downloads/ENV-strat-main.pdf

www.ukcip.org.uk/climate_change/by_location.asp

South East
Average temperature and sea levels have already risen in the South East region. The whole region is at major risk of the impacts of climate change. Rising sea levels and an increase in the frequency of storms will be combined with an increased risk of summer droughts.

Rainfall received in the South East is the lowest of all UK regions and the region has less water available per person than Spain or Greece. The region is highly dependent on groundwater for its drinking water supplies. Water resources are already stretched with limited opportunities to take more water from groundwater sources without damaging the environment.

Many major centres of population are situated on coastal flood plains and are highly vulnerable to floods and extreme weather events. A number of the "Growth Areas" designated for more development will require new development on floodplains. Plans to greatly increase housing in the region will impact on our climate.

Politicians have expressed concern that emissions from the housing sector "*could constitute more than 55 per cent of the UK's target for carbon emissions in 2050, nearly doubling the current 30 per cent contribution.*" (Environmental Audit Committee, Housing: Building a Sustainable Future, First Report of Session 2004-05, House of Commons).

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Pressure for more housing and other developments also means that transport, the fastest growing source of greenhouse gases in the UK, is expected to grow.

The South East Climate Change Partnership estimates that by 2080 summer temperatures will have risen by 2-6 degrees Celsius and winter rainfall is expected to increase by up to 30 per cent. This would mean 40 - 100 days of extra days of plant growth per year.

Sea level rises will mean more pressure on coast lines. Planning will have to take account of more likely extreme and distressing events and seek to protect sensitive areas, both natural and built environments. The severe flooding faced by residents of Sussex and Kent in autumn 2000 demonstrated the personal, social and economic costs associated with such events.

Across southern England, estuaries and low coastal land could be inundated. Eroding cliffs will retreat ever faster as rising tides and more vigorous waves and storms rip at their exposed faces.

Hotter drier summers will put the oak and beech woodland in the South East at risk. The Sussex water meadows may also be adversely affected. Redshanks, Lapwings and other wading birds will increasingly find their habitats threatened, due to sea level rise and hot summers drying up land.

For more information see:
www.ukcip.org.uk/climate_change/by_location.asp`

www.climatesoutheast.org.uk/

London and the Thames Basin
The Thames basin region is densely populated and heavily urbanised, dominated by Greater London.
It has some of the lowest rainfall in the UK, with an average of 690mm per year. Water resources are already stretched with 70 per cent of the population dependent on groundwater sources.

The area is currently protected from rising sea levels by the Thames Barrier, and is expected to be able to cope with maximum sea level rises up to 2030, but not necessarily with winter storm surges..

Average temperatures in the region are likely to see some of the highest increases rising by 2-6 degrees Celsius by 2080. Summer rainfall is expected to fall by 15 – 60 per cent by 2080, with winter rain levels increasing by up to 30 per cent.

www.ukcip.org.uk/climate_change/by_location.asp`

Wales
The UK Climate Impacts Programme predicts that Wales will get warmer with temperatures rising by 1-3 degrees Celsius by 2080. Winter rainfall is expected to increase by 7 – 24 per cent, but will fall in the summer months. Sea levels are expected to rise by 18 – 79 cm.

There may be difficulty providing adequate water supplies for parts of Wales during dry summers by 2025 posing challenges for the water industry. Eighteen of the 43 supply zones could go into water deficit over the next 25 years in dry summers, and may need an increase in the number and capacity of reservoirs.

A significant amount of the Welsh coast lies less than one metre above current sea level. When rising sea level is coupled with storm surges at sea of up to 1.9m the frequency of flooding of low-

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lying areas is expected to increase. There may be a ten-fold increased risk in flooding by 2090.

Much low lying coastal land in Wales is critical for its importance economically, for habitation, agriculture, tourism, or for its natural habitats.

The coastal and lowland zones, estuaries (Dee, Severn), saltmarshes and sand dunes (Morfa Harlech) will be affected by storms and sea level rise, and in many cases managed retreat may be too expensive.

Important raised bogs at Cors Erdrreiniog and Cors Tregaron could dry out without artificial maintenance. Heather moorland, blanket bog and oak woodland are all vulnerable to changes in soil condition.

Forest, which covers 12% of Wales, will be damaged by an increased frequency of storms and high winds, and the spruce aphid may survive better over warm winters to cause more damage the next year. Forest fires may be more frequent in dry summers.

See: www.ukcip.org.uk/resources/location/default.asp?region_id=11

Northern Ireland

Northern Ireland is expected to get warmer and wetter, with an increased likelihood of sever winter gales. Temperatures are predicted to rise by 2 – 4 degrees Celsius by 2080. Summer rainfall may decrease by up to 45 per cent, while winter rainfall is expected to increase by up to 30 per cent.

Sea levels are predicted to rise by 13 - 74 cm by the 2050s with rapid change to the nature of Northern Ireland's coastal areas.

The fishing industry is vulnerable to the predicted effects of climate change because seasonal cycles of fish reproduction are temperature dependent and sensitive to small changes in temperature over relatively short time scales. Fishing communities in coastal areas and those dependent on sport angling will be most affected.

The overall increase in rainfall, particularly intense rainfall, is expected to have an effect on flooding, water quality and the stability of exposed slopes.

The unique ecology of Northern Ireland is likely to be changed as a result of the temperature changes, with a potential invasion of more southerly, warmth-loving species replacing the cold-adapted species at the southernmost edge of their ranges. Impacts on the biodiversity of the region's raised bogs and blanket bogs are not likely to be severe.

Agriculture is Northern Ireland's most important industry. Under the predicted climate changes most land will remain in pasture or silage production although increased warmth may encourage a more mixed agriculture including spring-sown cereals.

There is a risk of new diseases being introduced into Northern Ireland (as a result of increased rain and relative humidity favouring the transmission of infection), and a possible increase in rodent-borne diseases.

Northern Ireland is heavily dependent on its transport links to the UK and Europe, and so is vulnerable to increased disruption or costs as a result of bad weather. Some modern high-speed

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vessels cannot operate in conditions as severe as those accommodated by more traditional heavy displacement ferries. More severe winter weather conditions, even if they occur less frequently than at present, will have an impact upon ferry timetables.

See: www.ukcip.org.uk/resources/location/default.asp?region_id=12

www.ukcip.org.uk/resources/publications/documents/Northern_Ireland.pdf

www.ukcip.org.uk/climate_change/location_details.asp?region_id=12

Useful links
UK Climate Impacts Programme:
www.ukcip.org.uk/climate_change/default.asp

www.ukcip.org.uk/climate_change/by_location.asp

Environment Agency:
www.environment-agency.gov.uk/yourenv/639312/

Intergovernmental Panel on Climate Change
www.ipcc.ch/

United Nations Framework Convention on Climate Change
http://unfccc.int/2860.php

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