



European Centre for
Environment & Human Health

Climate change impacts on health and wellbeing in Cornwall, SW England, 2050-2080: estimated costs and proposed adaptation policies

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ADAPTtoCLIMATE, Nicosia, March 2014



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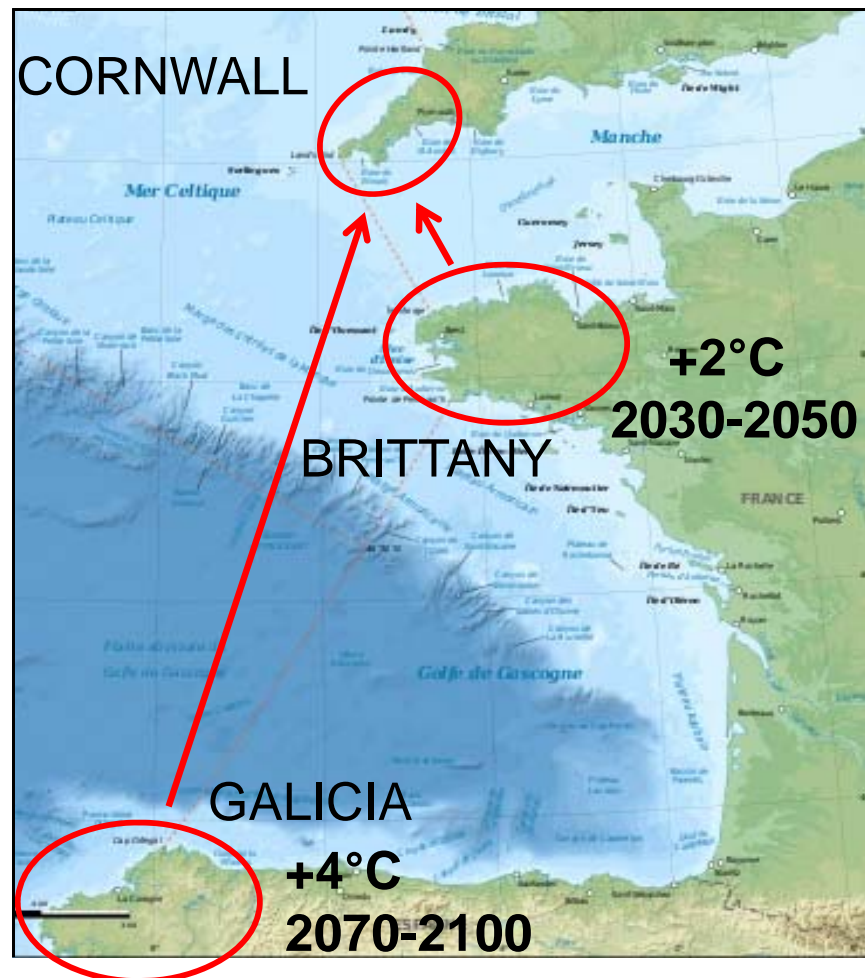
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Cornwall will experience a gradual climatic warning

To have a better understanding of how the Cornish climate will be, regions can be found with similar climates now to what Cornwall will experience over the next 100 years

Cornwall will experience a gradual climatic warning:

- in ~30 yrs, the Cornish climate will resemble the current Breton climate
- In ~80 yrs, the Cornish climate may resemble the current Galician climate



~2030 slightly drier summers

more hours of sunshine, though will always be less than BZH or GAL due to latitude

~2070 summer rainfall decreased by ~50%

Impacts of climate change on human health and wellbeing

Lyme Disease Action



HUMAN HEALTH

CLIMATE CHANGE

DIRECT IMPACTS

- possible increase in winter deaths
- more heatwave related deaths
- increased dangers from storms and flooding

INDIRECT IMPACTS

- higher average temperature
- more variable winters
- hotter summers
- summer droughts
- increase in extreme events
- change in precipitation
- altered cloudiness
- food quality (less plant N content, 'new' pests)
- water quality (scarcer resource, used more)
- hayfever (possibly made worse in drier climate)
- asthma (aggravated by increased surface O₃)
- via particulates (PM10) – worse at higher t°
- increase in diseases (e.g. lyme disease)
- algal blooms (decomposition of large quantities produce Hydrogen Sulfide, as seen in Brittany)

Flash floods, Scotland, BBC



Drought, England, Guardian



17/07/11

12/06/11

NOTES: list not exhaustive
not all causal links are shown

Notes on scope

Excess winter cold deaths

not included in the analysis – recent research shows it is unlikely that climate change will result in fewer deaths despite generally warmer winters; especially as more volatile temperatures and extreme cold spells are also expected; health costs could nonetheless decrease so long as the current preventative measures continue

Water availability

unlikely to be a serious issue for Cornwall - South West Water do not envisage any shortage issues for Cornwall over the medium term; over the longer term, investment (reservoir capacity) will be needed mainly as a result of population growth and likely increased agricultural water usage

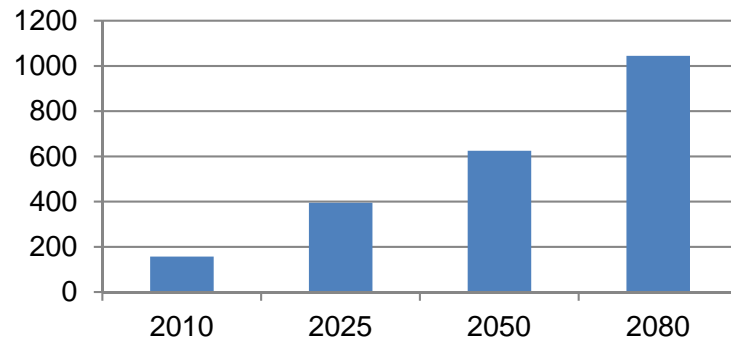
Food security

unlikely to be a serious issue for the UK – domestic production will continue to be insufficient to feed the UK's population but, unless the UK economy suffers serious decline, purchase of food from our European partners and globally will continue to make up the difference (**globally**, food security will primarily hit the poorest in the developing world, those least responsible for anthropogenic climate change)

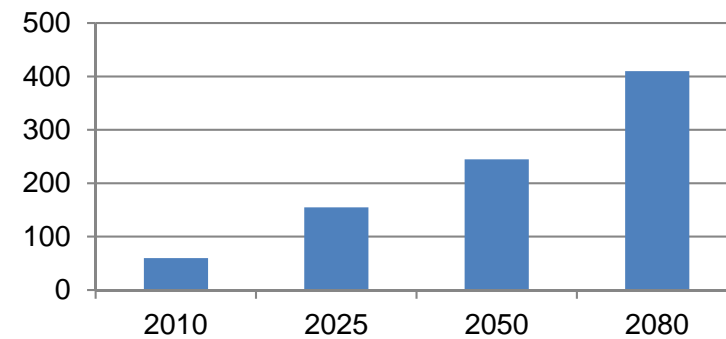
Mid estimate for annual average number of residents affected by flooding in Cornwall

MH = Mental Health

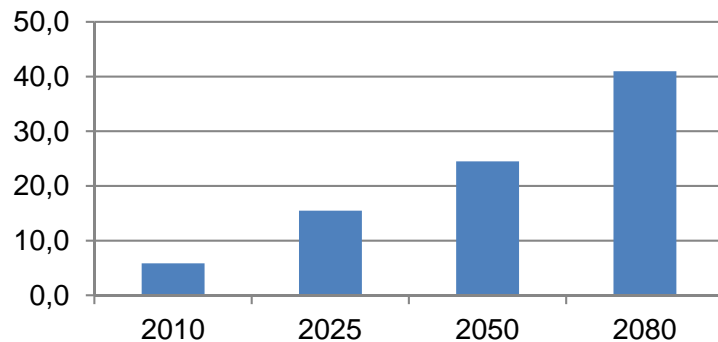
flooded



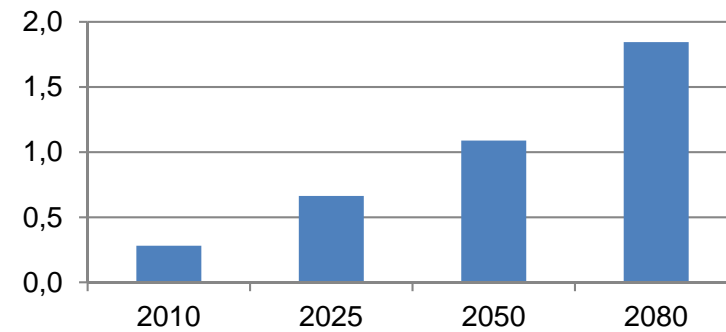
MH issues



injuries

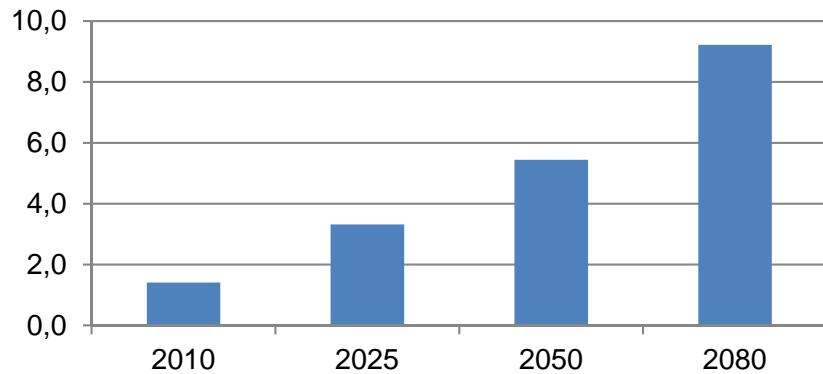


deaths

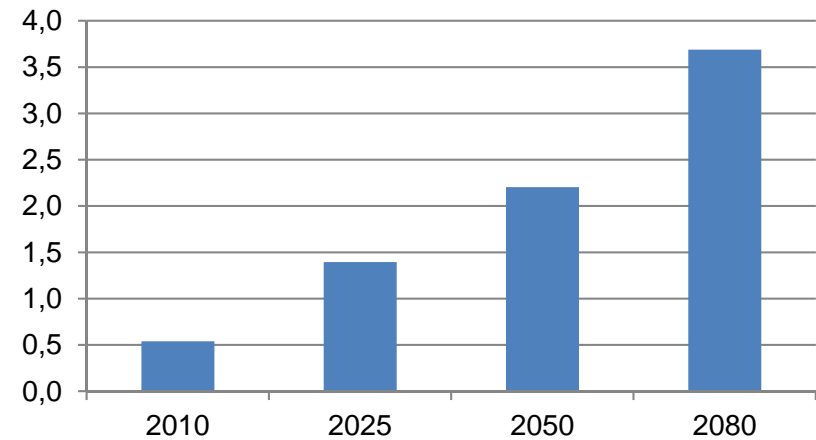


Mid estimate for annual average monetized losses by flooding in Cornwall

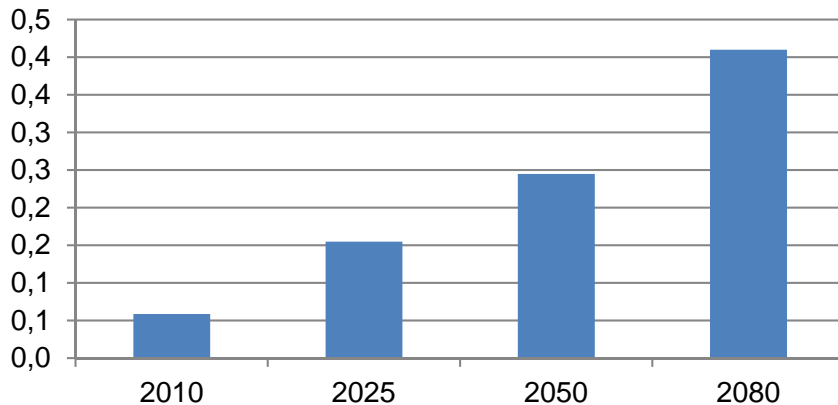
lost lives £Mn



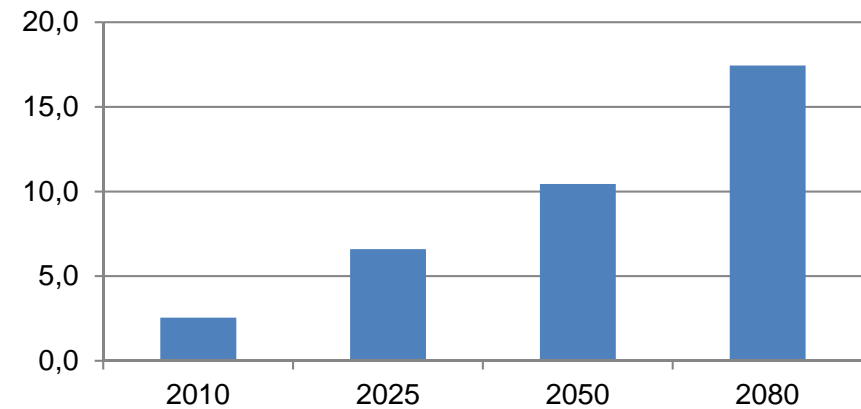
MH costs £Mn



injury losses £Mn

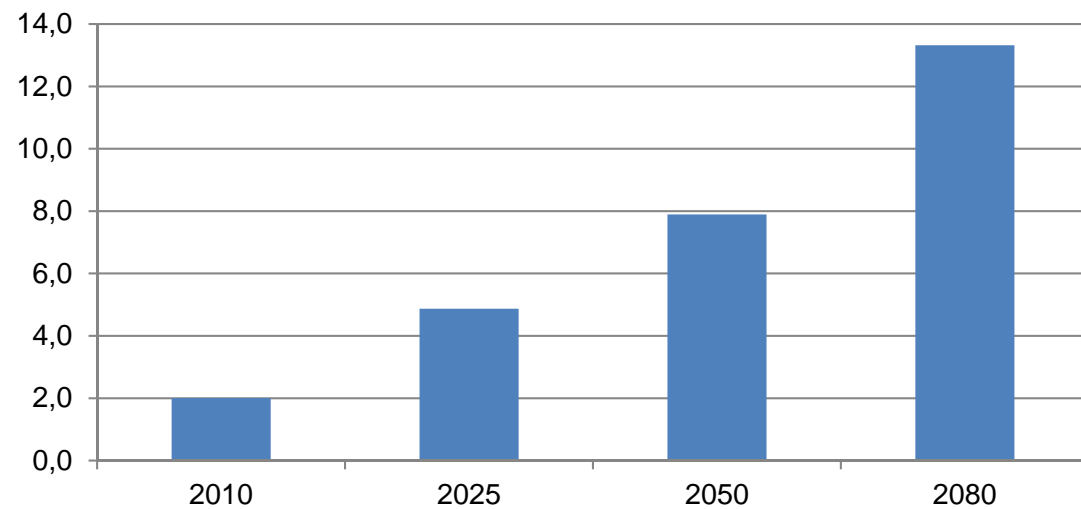


property losses £Mn

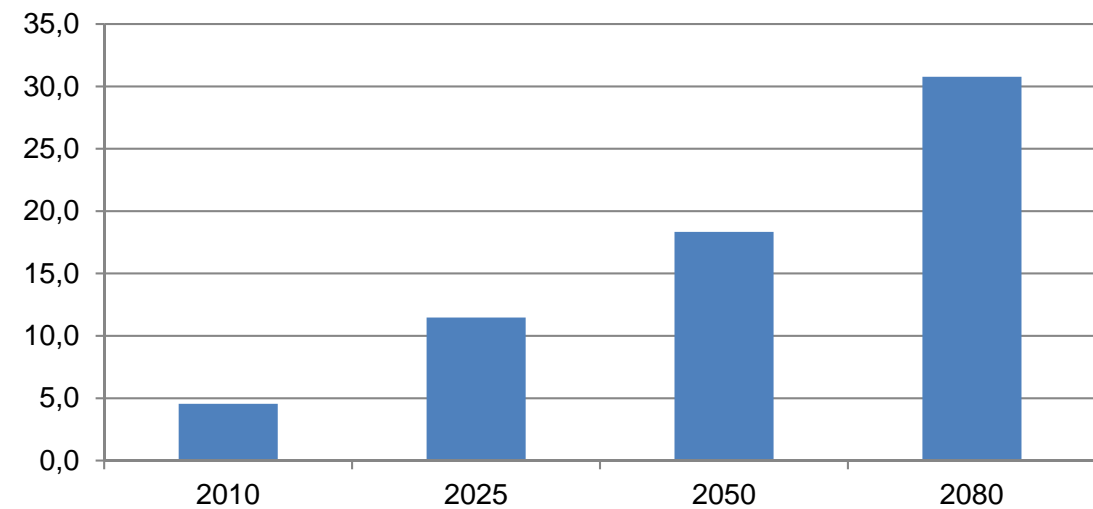


Mid estimate for annual average monetized health and total losses by flooding in Cornwall

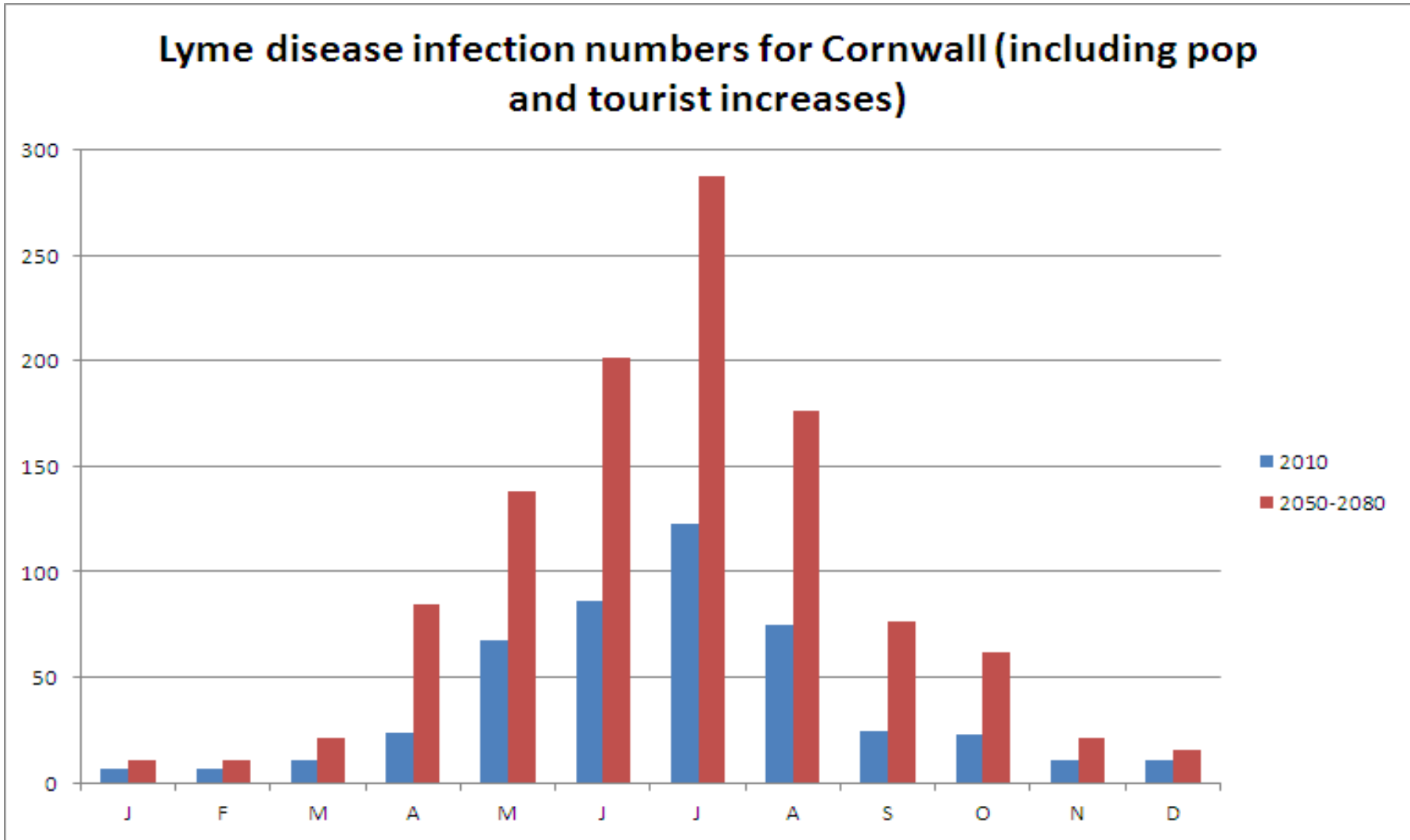
ALL HEALTH COSTS £Mn



ALL LOSSES £Mn



By 2080, the expected annual losses due to flooding will amount to around £30 Mn, with health impacts accounting for nearly half of this.



Based on mid-values for true extent of Lyme disease incidence, it is estimated that health costs for Cornwall are **£1.75Mn** annually.

Taking all relevant climate change impacts into account, it is predicted that the health costs will increase to **£4.15Mn** per year.

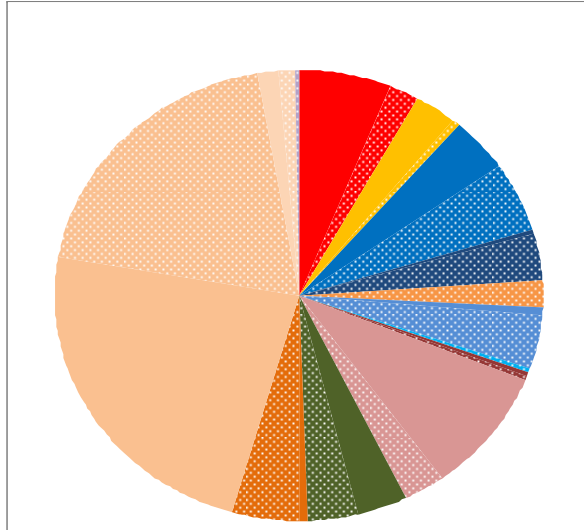
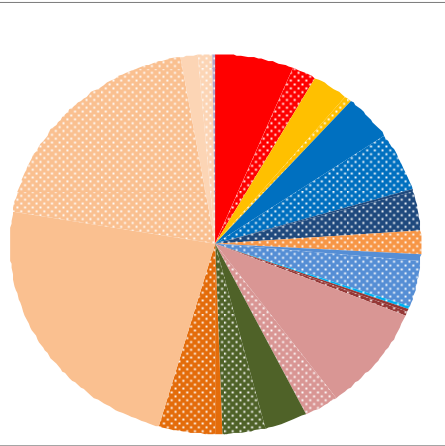
INCLUDES	
longer tick season	
higher tick density	
increased outdoor activity	
increased local population	
increased tourist numbers	

Cost of Weather Related Impacts on Health

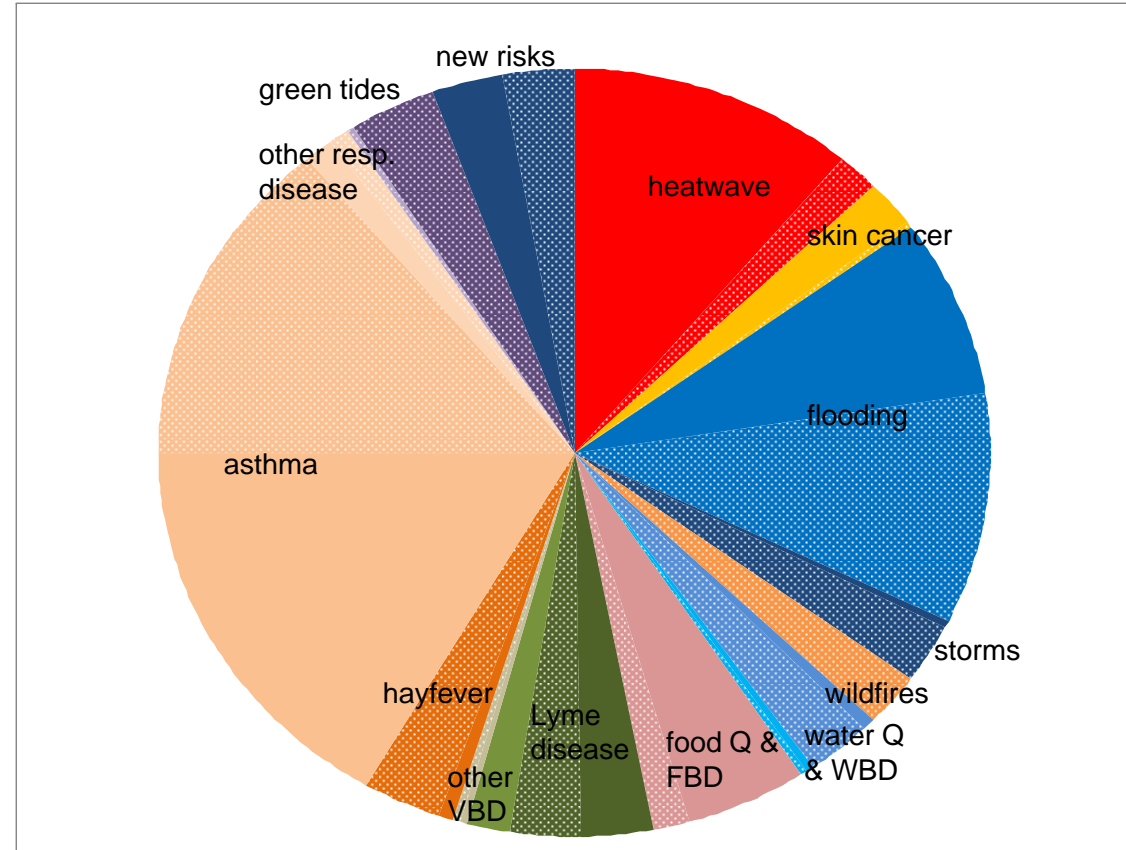
current cost **£52Mn**

cost 2050-2080 **£67Mn**



cost 2050-2080 **£144Mn** incl. climate change impacts



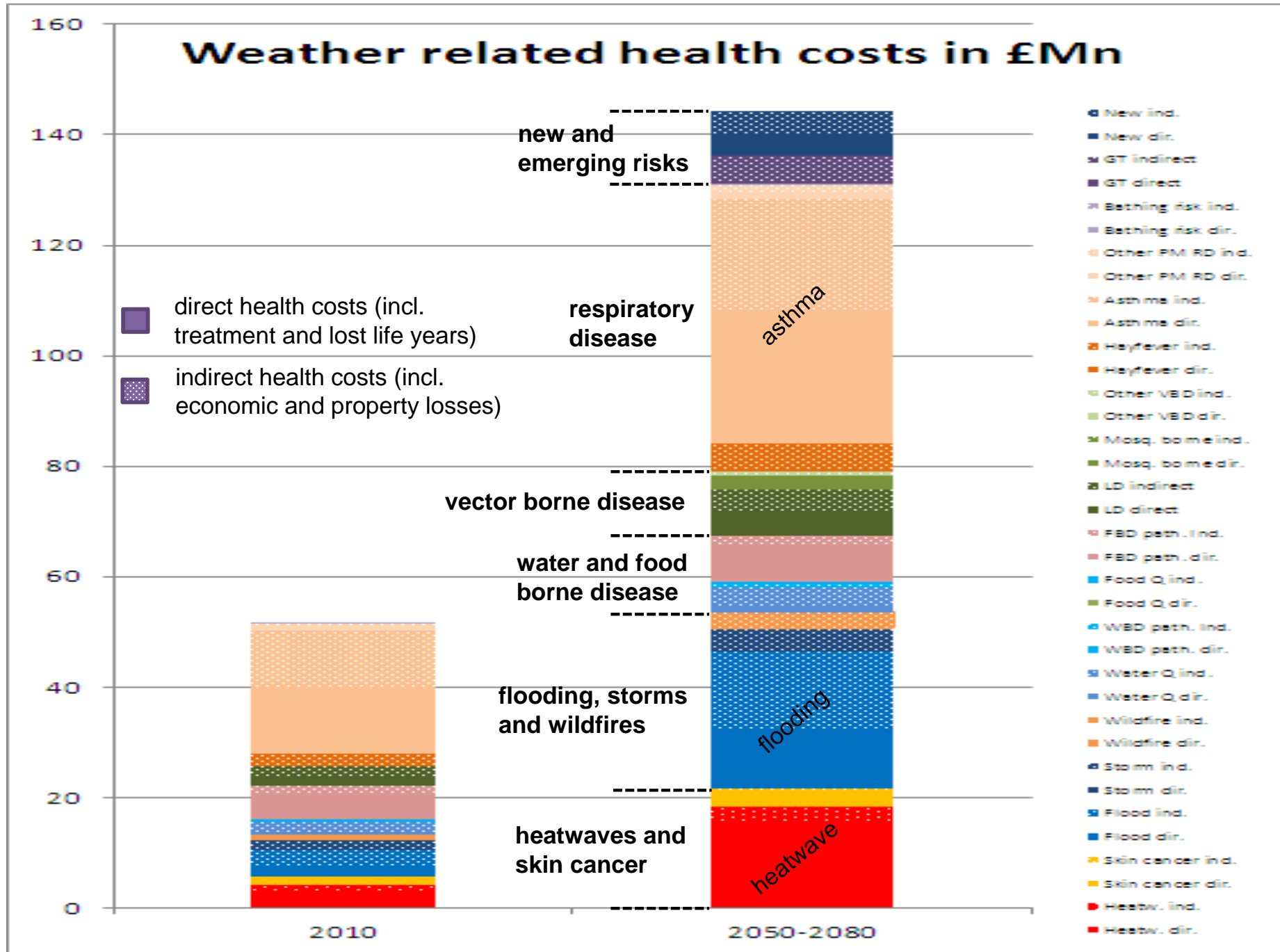
assuming a 30% increase in population and no change in climate



assuming a 30% increase in population and impacts of climate change (warming of 2-4 °C)

-  direct health costs (incl. treatment and lost life years)
-  indirect health costs (incl. economic and property losses)

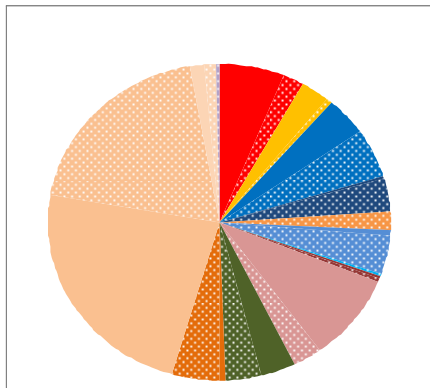
Cost of Weather Related Impacts on Health



Additional Cost of Weather Related Impacts on Health by 2050-2080



additional cost 2050-2080 **£15Mn**

assuming no climate change impact



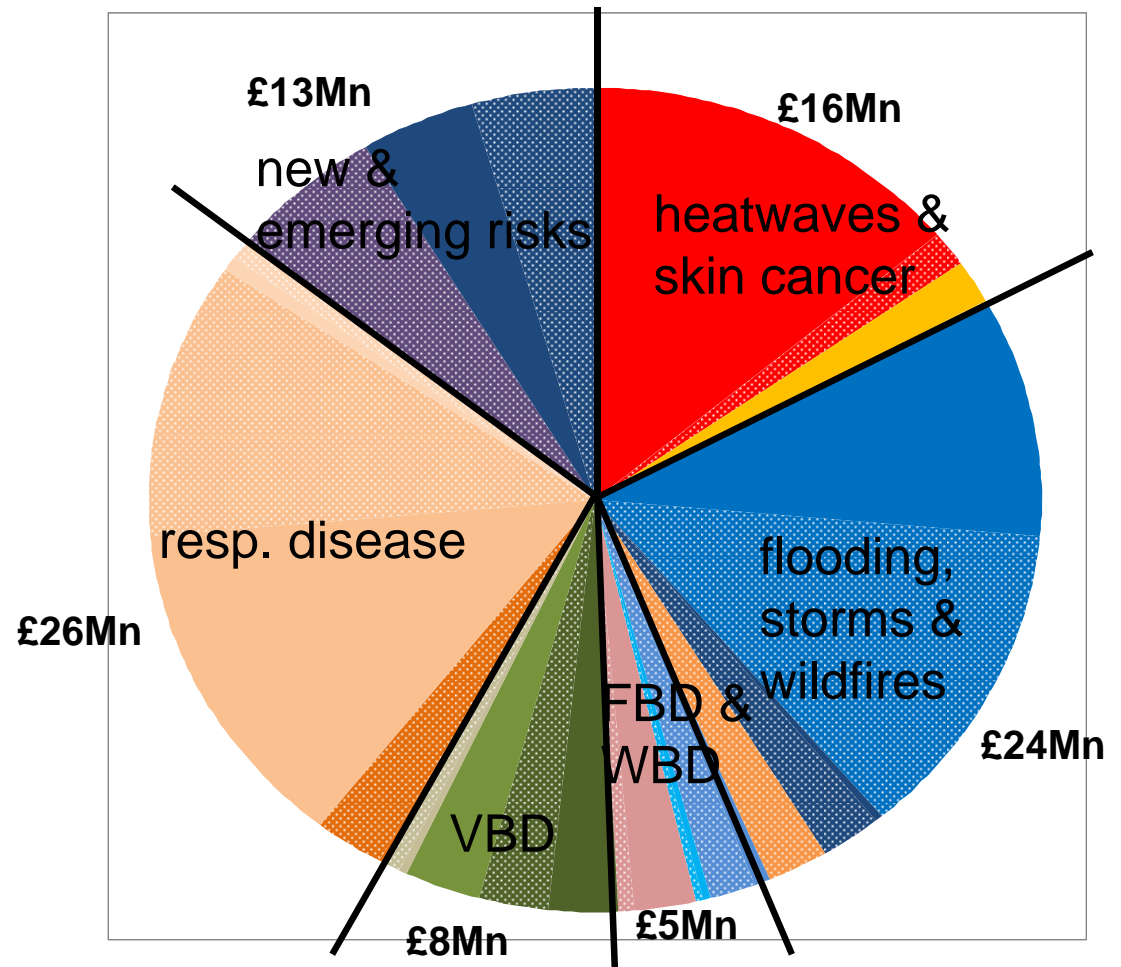
assuming a 30% increase in population and no change in climate

By 2050-2080, the increase in weather related health costs will be 6 times higher as a result of climate change than they would otherwise have been.

-  direct health costs (incl. treatment and lost life years)
-  indirect health costs (incl. economic and property losses)

additional cost 2050-2080 **£93Mn**

including climate change impact



assuming a 30% increase in population and impacts of climate change (warming of 2-3 °C)

Table 1: Impact of climate change on health and wellbeing in Cornwall: probability, magnitude and confidence of estimated increase in health costs.

Health impact	Probability of increase	Magnitude of increase	Confidence in magnitude
Heatwaves	certain	5.0	high
Skin cancer	probable	2.1	high
Winter excess deaths	unlikely	1.0	medium
Flooding	certain	5.3	medium high
Storms	possible	2.3	medium
Wildfires	probable	3.0	medium
Drought (mental health)	probable	2.0	low
Water quality	probable	2.3	medium
Water borne disease	highly probable	3.9	medium
Food quality	probable	1.5	medium
Food borne disease	probable	1.4	medium high
Tick borne disease	highly probable	2.4	medium high
Mosquito borne disease	(highly) probable	NA	low medium*
Other vector borne disease	possible /probable	NA	low*
Hayfever	highly probable	2.0	medium
Asthma	highly probable	2.0	low medium
Other respiratory disease	probable	2.0	low medium
Green tides	possible/probable	NA	low medium*
New risks	probable	NA	very low*

The comparison refers to the expected climate change impacts on health by 2050-2080 compared to current levels. *where the magnitude of increase is not applicable (NA), confidence is provided for the future estimated health costs.

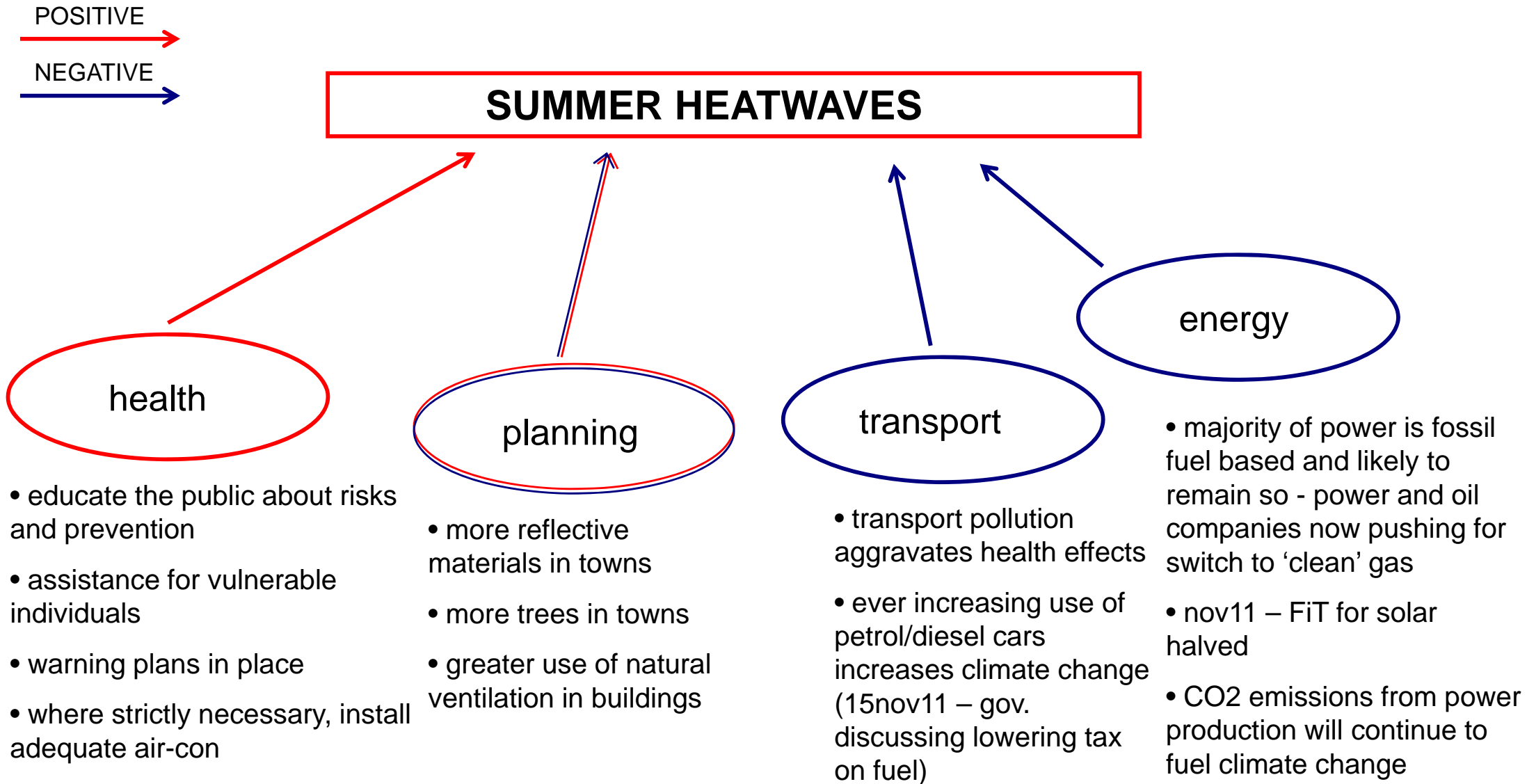
Adaptation to climate change in Cornwall – priority areas from a cost-benefit perspective

EXAMPLE

LOW	MEDIUM	HIGH
<p>ALGAL BLOOMS</p> <p>WILDFIRES</p> <p>NEW RISKS</p>	<p>COASTAL FLOODING</p> <p>RIVER / FLASH FLOODING</p> <p>STORMS</p> <p>HAYFEVER</p> <p>ASTHMA</p> <p>PM10 RELATED RESPIRATORY DISEASE</p>	<p>VECTOR BORNE DISEASES</p> <p>WATER BORNE DISEASES</p> <p>FOOD BORNE DISEASES</p> <p>WATER QUALITY</p> <p>SUMMER HEATWAVES</p>

NOTE: as knowledge progresses, priorities will change (e.g. new risks)

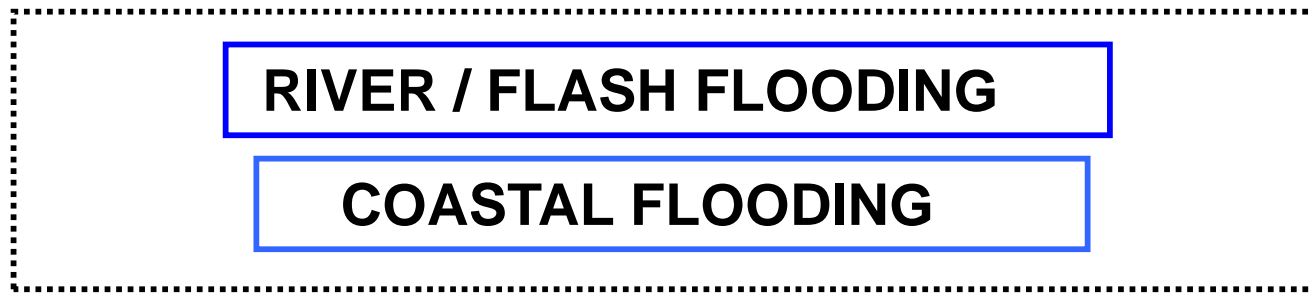
Policy areas affecting health impacts of summer heatwaves



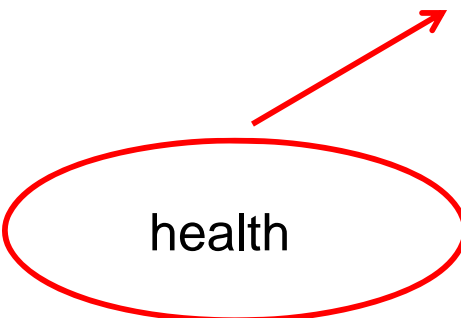
Note: only key policy areas highlighted

Policy areas affecting health impacts of flooding

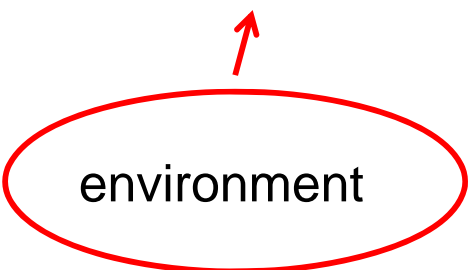
POSITIVE
NEGATIVE



in addition, both energy and transport infrastructures are often in at flood risk areas ...



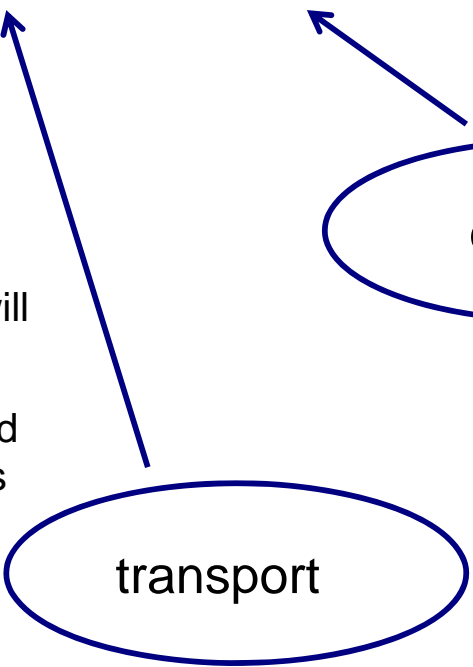
- have emergency plans ready
- have adequate capacity to cope (esp. if some is affected)
- disease monitoring



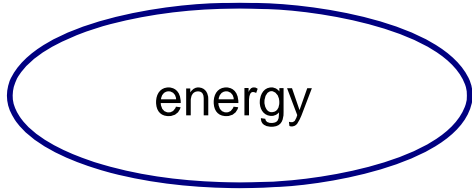
- protection of natural defences will alleviate flood risk
- protection of natural habitats and water catchments could limit risks



- where necessary increase defences
- limit building in at risk areas
- ensure there's back-up infrastructure



- ever increasing use of petrol/diesel cars increases climate change (15nov11 – gov. discussing lowering tax on fuel)



- majority of power is fossil fuel based and likely to remain so - power and oil companies now pushing for switch to 'clean' gas
- nov11 – FiT for solar halved
- CO2 emissions from power production will continue to fuel climate change

Note: only key policy areas highlighted

Summary of policies aimed at limiting the negative impact of climate change on human health and wellbeing

HEALTH, CLIMATE CHANGE AND ENVIRONMENTAL SUSTAINABILITY POLICIES

- protecting ecosystem services
- limiting pollution (e.g. nitrogen)
- reducing CO₂ emissions
- conserving biodiversity
- prioritising public transport
- increasing energy efficiency
- land use (water catchment, carbon sink)
- coastal protection

THESE POLICIES ARE OFTEN IN CONTRADICTION WITH OTHER GOVERNMENT POLICIES

- ENERGY POLICY

possibly new coal power stations
certainly more gas power stations

- TRANSPORT POLICY

big increase in aviation
no clear vision for rail
city tram networks often blocked

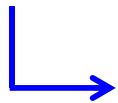
IN CONFLICT

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IN CONFLICT

How to improve the workability of climate change and sustainability policies?

- (1) Climate change mitigating policies should be set at the national, EU or preferably the UN level (as it is a global issue)
- (2) National policies need to be better integrated with one another (e.g. energy, transport and environment)
- (3) At the local level, policy contradictions should be identified and minimised (if possible, eliminated)
- (4) At the local level, policies should be focussed on adapting to and coping with climate change (in addition to following national mitigation requirements)



- focus on the medium term: how will the local climate look in 10, 20, 50 yrs?
- what will be the likely direct and indirect impacts on the environment?
- what will be the likely impacts on human health and wellbeing?
- are there places in Southern Europe with a similar climate now to what is expected to occur for the locality in the future?
- what can be learnt from such places?
- what additional impacts might occur for which there is currently no equivalent?
- put in place policies to minimise the impacts of a changing environment.
- be flexible about what could happen, be prepared to change course!

Southern Europe vineyards



Examples of key policies to limit the impact of climate change on human health and well being

NATIONAL (more general)

(1) policies to limit the extent of climate change (not making it worse)

(2) policies to mitigate climate change (could actions be taken to counteract the causes of climate change?)

(3) educating about the risks and challenges associated with the changing environment

LOCAL (more specific)

(1) land use policies to protect local ecosystem services (e.g. water quality) and minimise flooding risk

(2) improvements to sea defences if viable

(3) have systems in place to deal with heatwaves and other extreme events

(4) transport policies: reduce traffic pollution further

(5) be prepared for increased levels of warm weather related diseases

(6) be prepared for new risks (e.g. algal blooms releasing toxic gases)

(7) educate the public about new or more common health risks

Climate change and sustainability policies can reduce the impacts of climate change on human health and wellbeing

The crucial factors in determining the level of success of these policies will be:

- (1) a good understanding of what climate change will mean
- (2) ongoing commitment to respond to climate change
- (3) focus the response to climate change at the local level
- (4) retain flexibility in the response to climate change to adapt to changing conditions

Of course, climate change may also bring positives to a local area, warmer weather could increase agricultural possibilities (new crops) and in some areas could increase tourism opportunities (e.g. South West coast).

Adapting to the new environmental and climatic conditions will take effort but should be readily achievable with the correct focus.



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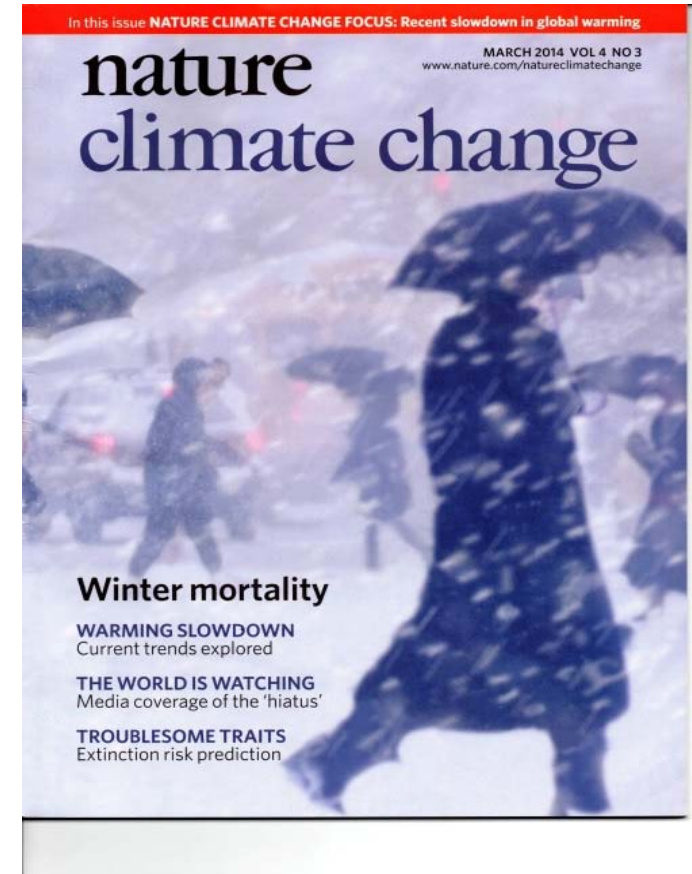
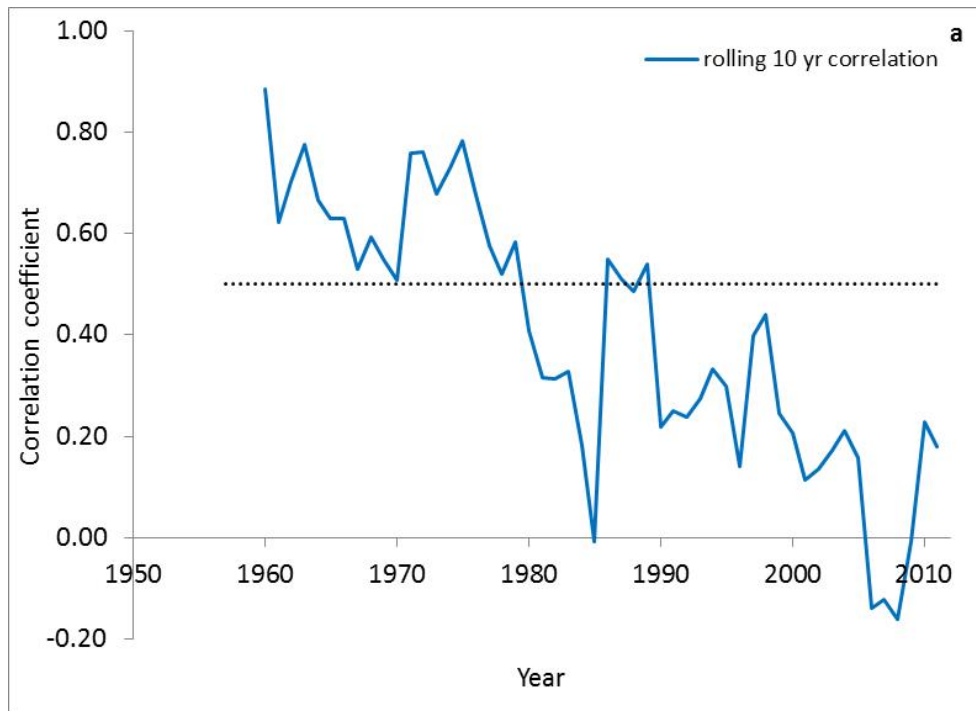
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back-up

Recent work shows that no evidence exists that excess winter deaths will fall as winters warm with climate change

- Staddon P et al. (2014) *Nature Climate Change* 4: 190-194

Rolling 10 year correlations between excess winter deaths and the number of winter days < 5°C



Panel 1: Mitigation and adaptation – clarification of meanings

There is much confusion about the meaning of MITIGATION and ADAPTATION in relation to climate change and the two terms are often used interchangeably.

Mitigation is about minimising or slowing down climate change.

Climate change is already occurring and will continue to progress

There are actions we can take to make climate change less fast and less large

Mitigation aims to control a global phenomenon

Adaptation is about preparing for and coping with climate change.

Climate change is already having impacts on the environment and humans

Societies must therefore take steps to adapt to the changing climate

The adaptive capacity of a community, institution or country is their capacity to adapt flexibly

Adaptation must be defined and actioned at the local level