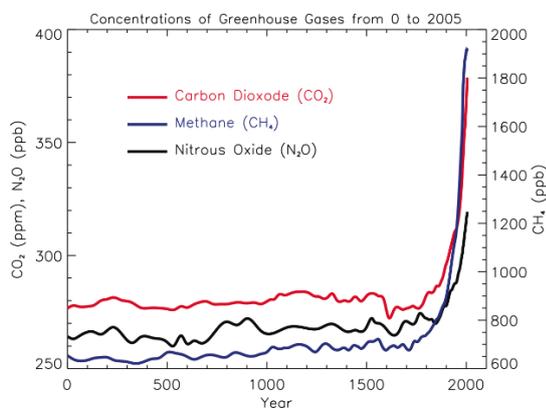


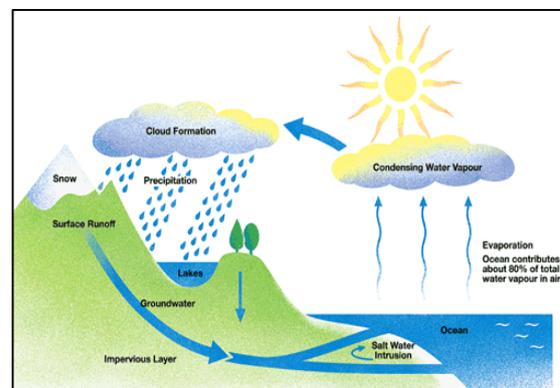
Prediction of climate change for Godalming and flooding implications

(Based on a short talk given by Alan Hamilton of Greening Godalming at a public meeting on 'Climate change and future flooding risk for Godalming' held in St Peter and St Paul's church, Godalming on Friday 21st November 2014.)

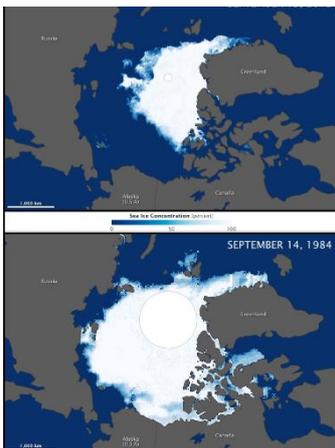
The basic arguments are covered first, followed by notes on six aspects of the subject that may be a cause for debate or concern. Concentrations of greenhouse gases are increasing in the atmosphere, having an insulating effect and causing atmospheric and oceanic warming. One consequence is greater evaporation from the oceans. Overall the world is becoming a warmer and wetter place.



Increases in concentration of some greenhouse gases in the atmosphere over the last 2000 years. Note the very sharp increases from the time of the beginning of the Industrial Revolution.



The water cycle: in general, a warmer climate will lead to more evaporation from the ocean, and thus more rainfall.



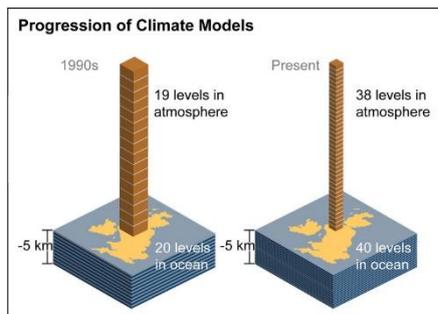
Changes in the maximum extent of summer ice in the Arctic. More water and less ice means more solar radiation will be absorbed. This will influence the pattern of oceanic currents in the North Atlantic.

There can be complications that can cause local irregularities, even resulting in local cooling. Summer ice in the Arctic is declining rapidly in extent and (by extrapolation) will be entirely absent within decades. A consequence will be a different energy budget in the Arctic, as more solar radiation is absorbed (by more absorbent water replacing reflecting ice). This is likely to cause changes in the flow of currents in the North Atlantic, perhaps displacing the Gulf Stream southwards and resulting in an anomalously cold climate in the British Isles.

The winter rainfall in the southeast of England in 2013-2014 was the highest ever recorded. The jet stream remained stationary over the British Isles for a long time, resulting in one lower pressure system after

another passing our way, bringing exceptional rainfall. The jet stream is a fast moving band of air at high altitude in the atmosphere, marking the meeting place of sub-tropical and polar air. The British Isles lie close to the meeting point of these two air masses, so that where the jet stream will exactly be in the future can be a difficult matter to judge, contributing to uncertainties in the prediction of climate change.

One way that scientists predict the future climate is by developing models that divide



This diagram shows changes in the sizes of blocks in the atmosphere and in the oceans used in calculations of climate change by the Met Office. Using a smaller block size has resulted in the prediction that there will be more intense summer thunderstorms by 2100, resulting in more flooding.

the atmosphere and oceans into blocks and calculate how much mass or energy moves between them under different scenarios. More refined models use smaller sizes of blocks. Current climate predictions for the south of England for 2100 by the UK's Met Office and the Intergovernmental Panel on Climate Change (IPCC) are that temperatures will be warmer, there will be increased rainfall in the winter with an increased risk of flooding, and summer rainfall will be reduced, but still with an increased risk of flooding, because of more severe localised thunderstorms.

Flooding in Godalming in the winter of 2013-4 was the worst that has ever been known. Of course, one event does not mean a trend, but the flooding is in line with predictions of climate change for Godalming. This is one example of an extreme weather event - such events are becoming more frequent all over the world - as also predicted by climate change models.



Christmas Day in Godalming, 2014.

An opportunity for community groups to influence management of the River Wey

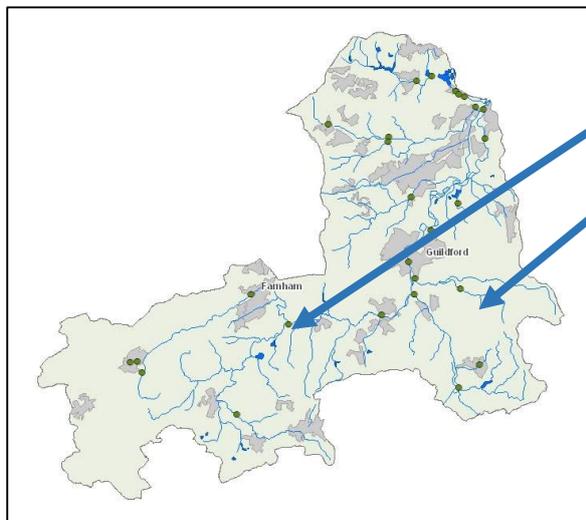
A catchment approach to managing water management is required under the EU's Water Framework Directive (2000). Member states of the EU (like the UK) are required to adopt its directives. The government chose the River Wey as a catchment to trial the catchment approach in 2012. A Wey Landscape Partnership was organised to help influence the work. The first annual conference of the partnership was held on 12 June 2014 in Woking and attended by a range of concerned professional and community groups (including Greening Godalming).

A draft of a River Wey Catchment Vision was produced by the partnership and comments invited. Greening Godalming examined this draft and submitted some comments, as follows (these points were not mentioned in detail at the October meeting in Godalming):

1. No account is taken of climate change in relation to possible future flooding. **Greening Godalming recommends that aspects of the draft vision dealing with flooding be revised, taking account of predicted climate change.**
2. The principal remark in the draft on flood risk is: *“Extreme weather, existing buildings in floodplains and limited funding mean flood incidents in Surrey can't be stopped.”* **Greening Godalming recommends that this statement be revisited taking a more proactive attitude to containing flood risk, and the sooner the better (easier and cheaper).**
3. It is noted that the main measure mentioned to reduce flood risk in the draft is through increasing water storage in the catchment through restoration of flood plains. While supporting this, **Greening Godalming points out that flood plains represent only a very small part of the total catchment and urge that a whole catchment approach to water management be taken in relation to reducing flood risk** (as well as local measures). An analysis of the effects on flood risk of all major types of land use in the catchment is recommended, with a view to the Environment Agency ('responsible for main river flooding') being able to assess steps needed to reduce flood risk in the future. It was recommended that the agency feed information into planning processes, so that flood risk in the catchment can be well managed in relation to other developments in the catchment over the years.

It is suggested that there are three ways to mitigate flooding: controls of the channel (weirs, dredging), flood defences and whole catchment management. Greening

Godalming's comments on the draft catchment vision relate especially to whole catchment management.

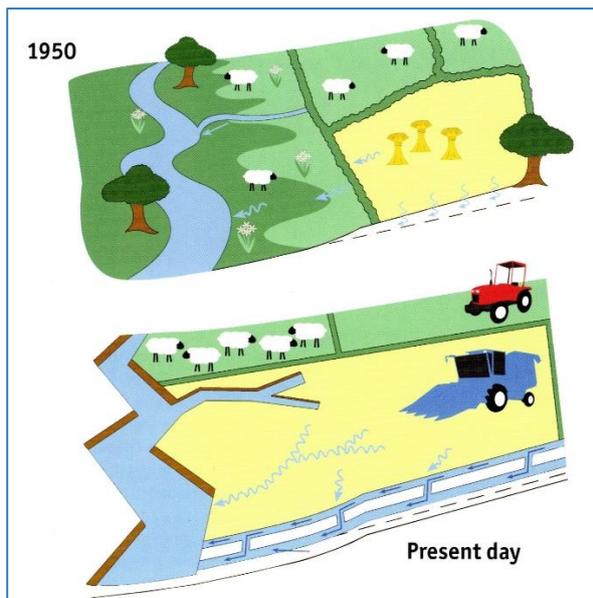


Farnham

Godalming

Catchment of the River Wey. Much of the catchment above Godalming is rural, with extensive areas of farmland and considerable areas of forestry too. There are some substantial towns, notably Farnham and Alton. How the rural and urban land is managed in the catchment will have an effect on flood risk for Godalming.

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The way that the land is used has been changing, for instance with more building of houses, a trend predicted to continue.

The figure refers to the case of agriculture. Field size has increased over the years and soils often left bare in winter. Such soils can form a surface crust that is poorly permeable to water. The result is less infiltration of water into the soil when it rains and increased immediate runoff with the potential to quickly swell rivers, adding to the risk of flooding. Managing water using a catchment approach should take account of such effects.

Six aspects of the climate change debate that may be causes of concern

1. **'Climate sceptics' versus 'climate believers'**. People can be divided about belief in climate change - between 'believers' and 'sceptics'. On the face of it, this is rather strange, given that the scientific consensus is clear that humans are significantly influencing the climate of our planet. Other scientific theories (such as those associated with chemistry, astronomy or wildlife) do not divided the public in the same way. Maybe it is because of our familiarity with the weather

and climate that makes some of us give so much weight to our own views in the face of the established scientific position.

The climate is of course very complex and much remains understood. People can form opinions on the basis of their own expertise and experiences, perhaps stating ‘they haven’t properly taken account of cloud cover’, ‘I have been measuring temperatures in my back garden for 30 years and it’s not changing like they say’, and so on. It is because of the complexity of the subject -- and also the extreme seriousness of climate change (if true), that the United Nations has organised the International Panel on Climate Change (IPCC), with hundreds of expert scientists charged with coming up with the most likely scenarios of how the climate is changing. The consensus IPCC position is very clear: man-made climate change is happening and will cause very major problems for humankind unless tackled - and the earlier the better. On the question of statements such as those above, it’s highly likely that **if you’ve thought of it, so will IPCC too**. Our own Met Office is in solid agreement with IPCC about the reality of human-made climate change.

2. **“Many things influence climate, so we can’t do much about the human-made type”**. It is of course true that many things do influence the climate (and there is much we don’t know), but this is no reason not to act to tackle adverse forces where this is possible. After all, if one suffers from an illness with two causes, one treatable and the other not, surely it often makes sense to treat the one that can be influenced, even though no treatment is possible for the other.
3. **“You eat meat and drive a car, so why should we take what you say seriously?”**
We all make compromises in life, balancing up different things – for instance, the business of living and having fun, against responsibility. The same will be true of how the catchment of the River Wey is managed. It will be a balance between different objectives, for instance taking action to mitigate flooding, versus encouraging agriculture or forestry for the food and wood we need, and no doubt having fun too - such as boating on the river.
4. **“It’s only few degrees different in temperature – that will be rather nice.”**
Answer: even a small change of climate will have a major effect on many people’s lives, given that we are packed so tightly into our small country (and into the world). There is not much room to manoeuvre geographically - infrastructure such as cities are where they are, and so on.

5. **“It’s a responsibility of the government - there’s little we in Godalming can do about flooding.”** There are of some things that can be done about flooding locally, but overwhelmingly managing a catchment like that of the River Wey requires coordination of actions based on the best scientific evidence. Government needs to take a lead.

6. **“There’s not enough money to take long-term actions for the environment - let’s wait until times are better.”** Delaying taking action on the environment is a standard argument made in rich and poor countries alike - it seems there is never a good time to act. Of course, there can be a balance to be struck between economic activity and the environment, but in the end human activities have to fit into the realities of the environment. Improvements to alleviate flooding along the River Wey should start soon working in a steady coordinated way based on a scientifically well-founded vision of what the catchment would best look like from the point of view of mitigating flooding.