



Flooding: information sheet

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1. FLOODING – AN OVERVIEW

The European Union Flood Directive defines flood as ‘a temporary covering by water of land not normally covered by water’



What causes flooding?

Flooding can occur from the natural processes of heavy rain, tidal surges and raised groundwater levels, among others. It can also result from interference with the natural drainage processes, such as changes to river channels, increased run-off from land or blocked sewerage systems and culverts. In extreme weather conditions, rivers, streams and drainage systems reach their capacity and the ground becomes saturated. Water gathers and the natural boundaries, for example embankments, can no longer retain the water, resulting in the banks overflowing. This overflowing water follows the path of least resistance, settling in low-lying areas and flooding them.

Why is flooding a problem?

It is a problem for many people posing a risk to health, safety and wellbeing. It can cause loss of life, damage to property and possessions, loss of business and jobs, affect critical infrastructure such as electricity and water supply systems. In rural locations it can lead to destruction of crops and loss of livestock.



Are there any positives?

The answer to this is very subjective. It could be argued that in the UK it is unlikely to be seen as a positive occurrence. The UK is a densely populated island with a lot of industry, farms, towns and cities located alongside rivers. As well as flooding often causing widespread destruction, flood waters are usually full of lots of unpleasant things that do not leave areas that have been submerged in good condition. It can contain chemicals from agriculture and industry, sewerage, oil, and dangerous sharp objects, to mention but a few.

However, floods can distribute and deposit river sediments over large areas of land. These river sediments replenish nutrients in topsoil and make agricultural lands more fertile. The populations of many ancient civilisations concentrated along the floodplains of rivers such as the Nile, the Tigris and the Yellow because periodic flooding resulted in fertile, productive farmlands.



Flooding renews wetlands where it can balance their healthy ecology. Healthy wetlands promote healthy water supplies and improve the surrounding air quality. Flooding contributes fresh water and waste to the wetlands that carry and deposit nutrient-rich sediments which support both the plant and animal life of the wetlands.

Who can help?

- Natural Resources Wales provide a floodline warning service which people who live in a flood risk area can sign up to.
- The local authority organise rest centres for people to be evacuated to, and help with identifying vulnerable people.
- 999 – The fire service and police are involved with rescue and evacuation.
- The Red Cross supports the emergency services.

2. THREE COMMON TYPES OF FLOODING



Flash flooding

Flash flooding happens when rain falls so fast that the underlying ground cannot absorb the water or drain it away, fast enough. Roads can become like rivers and if there is a lot of water, it can flood buildings and carry cars away. So, if the rain is falling too fast for the ground or drains to cope, there is a risk of flash flooding. Most rivers flow fairly gently as they slope slowly towards the sea. Therefore, when a river floods it does so quite slowly as it takes time for the rain to percolate through the ground and into the rivers and out to sea allowing time for some warning. With flash flooding there is often very little time between the rain falling and flash flooding occurring.

Flash flooding happens more commonly where rivers are narrow and steep, so they flow more quickly. It can also occur away from small rivers in built-up urban areas where hard surfaces such as roads and concrete don't let the water drain away into the ground. This leads to surface overflow and can often overwhelm local drainage systems leading to flash flooding. The flooding of Boscastle in Cornwall in 2004 is one of the most well-known examples of flash flooding.



Fluvial (river) flooding

Fluvial flooding occurs when rivers burst their banks as a result of sustained or intense rainfall.

The likelihood of a river bursting its banks and flooding is determined by factors in the surrounding landscape, such as steepness of the river valley, the amount of vegetation and the prevailing rock-type. The faster the rainwater reaches the river channel, the more likely it is to flood.

The following factors may encourage flooding:

- *A steep-sided channel* - a river channel surrounded by steep slopes causes fast surface run-off.
- *A lack of vegetation or woodland* - trees and plants intercept precipitation i.e. they catch or drink water. If there is little vegetation in the drainage basin then surface run-off will be high.



Coastal flooding

Coastal regions are particularly vulnerable to flooding. Tidal levels are a crucial factor especially when combined with other weather conditions, including low pressure and high winds. These conditions can lead to coastal defenses being breached or overtopped, resulting in flooding.

The extreme tidal conditions that can lead to coastal flooding occur because of three main mechanisms, either individually or in combination.

- *High tide levels* - variations in tidal levels due to gravitational effects of the sun and moon can result in higher sea levels. There is an approximate twice daily variation between high and low tide, onto which is superimposed a spring-neap tide cycle when extra high and low tides occur.
- *Surge* - an increase in sea level above tidal level caused by low atmospheric pressure which may be exacerbated by the wind acting on the sea.
- *Wave action* - dependent on wind speed and direction, local topography and exposure.

- *A drainage basin consisting mainly of impermeable rock* - this will mean that water cannot percolate through the rock layer, and so will run faster over the surface.
- *A drainage basin in an urban area* - surfaces in urban areas tend to consist largely of impermeable concrete, which encourages overland flow. Drains and sewers take water quickly and directly to the river channel. Houses with sloping roofs further increase the amount of run-off.

All these factors increase the likelihood of fluvial flooding. You could also investigate pluvial flooding.

Useful websites:

MET office

www.metoffice.gov.uk/learning/rain/flash-floods
www.metoffice.gov.uk/learning/learn-about-the-weather/weather-phenomena/case-studies

BBC GCSE Bitesize

www.bbc.co.uk/schools/gcsebitesize/geography/water_rivers/river_flooding_management_rev1.shtml

Welsh Government site

<http://gov.wales/topics/environmentcountryside/epq/flooding/nationalstrategy/strategy/?lang=en>

Local Government Association

<https://www.local.gov.uk/topics/civil-emergencies/flooding>

Natural Resources Wales

<http://naturalresources.wales/flooding/what-to-do-before-a-flood/?lang=en>

Natural Resources Wales

<http://naturalresources.wales/flooding/5-day-flood-forecast/?lang=en>



3. HISTORY OF FLOODING IN WALES

Wales has extensive coastline and river networks and a high rainfall. The steep valleys of the South East result in fast reacting rivers where flash flooding is more common in urban areas, whereas the topography of the North lends to larger floods across flood plains.

Flooding isn't new. The tsunami of 1607 devastated settlements in Porthcawl and the Gwent levels resulting in many deaths, and a tidal surge in the late 1800s affected much of Llanelli.

The Crown has always had a duty to defend against incursion by the sea and the power to order the construction of defenses.

From Victorian times, legislation provided powers, through various bodies, to provide for the drainage of land, mainly for agricultural purposes. The key principle was that flooding could be prevented if water could be drained effectively from the land. The legislation enshrined this principle in the various Land Drainage Acts from 1930 through to 1976.

4. FLOOD RISK MANAGEMENT

Widespread flooding in 1998 and 2000 in England and Wales led the Environment Agency and Government to fundamentally review how it dealt with floods, and led to a change in emphasis.

It became obvious that we cannot prevent flooding, neither can we “protect” ourselves from it. In turn this led to a study of flood risk, and the simple realisation that what we actually do is find the best ways to manage the flood risk to our communities. The concept of “Flood Risk Management” more clearly represents both what we can do and what we actually do.

The Welsh Government’s ‘The National Strategy for Flood and Coastal Erosion Risk Management’ in Wales, published Nov 2011, sets out four over-arching objectives:



The 1989 Water Act shifted the emphasis from Land Drainage (and Local Land Drainage Committees) to Flood Defense with the formation of the Regional Flood Defense Committees and Local Flood Defense Committees. This recognised a shift from draining the land for agricultural use to defending our communities.

Many of our flood defenses were built in the period following the devastating flood in Wales in 1979 when the capital city was under water, and there was huge public pressure to “defend” our communities against flooding.

To an extent this approach misled the public into a false sense of security. The “defenses” do not remove the hazard of flooding; they only reduce the frequency and impact of flooding. Indeed they are not the most effective way of protecting people from the risks that come from floods.

- 1 Reducing the consequences for individuals, communities, businesses and the environment from flooding and coastal erosion;
- 2 Raising awareness of and engaging people in the response to flood and coastal erosion risk;
- 3 Providing an effective and sustained response to flood and coastal erosion events; and
- 4 Prioritising investment in the most at risk communities.

References:

- SE Wales: From land drainage to flood risk management - Environment Agency Wales
- Flood and coastal erosion risk management in Wales <http://naturalresources.wales/media/680131/flood-coastal-erosion-risk-management-in-wales-2014-2016.pdf>

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