Inishowen Rivers Trust

ON THE GROUND
NATURAL FLOOD MANAGEMENT
INISHOWEN

FLOODING 101

A Guide to Flooding in Inishowen

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Flooding 101 aims to improve our understanding of why and how floods occur, what are the solutions to flooding and what can be done to protect homes and property from flood damage.

The term '101' refers to a basic course. It is a term used at third level educational colleges to mean a course that everyone can do no matter what your previous experience. In essence, this is a guide for everyone.

Flooding 101 has been developed by the Inishowen Rivers Trust with the help of experts from Ireland, the UK and local expertise and experience. Our understanding of how to tackle floods is changing, particularly in the context of climate change.

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PART 1: What is flooding?

Flooding can happen for a variety of reasons. There are different types of floods and Inishowen is most at risk from coastal flooding, river flooding, flash flooding, storm surges and areal flooding (ground becomes super saturated with water which accumulates and cannot escape from an area quickly enough).

Low lying areas bordering the river are known as 'floodplains'. Floods are a natural phenomenon and traditionally floodplains held the water until the flood subsided. However, modifications to our river channels and floodplains means water now have less options and flooding is more common. Climate models for Ireland in the future predict heavier rainfalls in autumn and winter and more intense storms (EPA Research Report No. 159).

PART 2: Some flooding terms

Hydrology is the study of water, in particular it's movement in relation to land, and includes the study of flooding. Hydrology is an important subject for students of geography, agriculture and engineering. The more information we collect about rainfall and water flows the more accurate our predictions of flooding. At Tullyarvan Mill in Inishowen, a gauge has collected data on the water levels at this point since 1975. A large flood was recorded in 1987 but the August 2017 flood was half a metre higher.

The severity of a flood is measured using the term Annual Exceedance Probability (AEP). This is a measure of the chances of a flood occurring in a given year. For example, the August 2017 flood in Inishowen was termed a 1% AEP. This means that there is a 1% chance of a flood of this size occuring each year. This flooding event has been described as a 100 year flood but this is not an accurate description as it implies that the flood will only occur once every 100 years. It is possible to have a 1% AEP event several years in a row.

PART 3: **How does flooding occur?**

1. **When there is lots of prolonged rainfall - this saturates the soil and the water will run off when it can.**

2. **When there is intense rainfall over a short period of time – the carrying capacity of the channel is exceeded**

3. **When the shape or nature of the landscape encourages flooding e.g., Steep slopes on valley sides and non-porous clays**

4. **Land and riverine management practices - when human activity exacerbates flood risk.**

Humans can cause or exacerbate flooding by:

1. **Urbanisation** - increased hard surfaces – water will run off more quickly

2. **Poor planning** - building on floodplains

3. **Deforestation** - cutting down trees and removing vegetation that would ordinarily intercept rainfall and store water

4. **Modifications** - modifying rivers or carrying out works that may increase the likelihood of flooding. e.g. channel straightening, hard engineering on banks

5. **Engineering failures** – hard engineering that encourages water to move faster causing it to build up at pinch points and flood

6. **Poor land management practices such as cattle poaching in** - stream (leads to bank erosion and sedimentation), soil compaction (reduces soil drainage capacity) and crop growing on steep slopes (increase in overland flow).
   Failure to maintain culverts and bridges to avoid obstruction e.g. a blocked culvert can back up and lead to flooding in nearby properties

PART 4: How do rivers react to flooding?

How a river reacts to flooding depends on many factors. We already know that a heavy rain event can lead to flooding in rivers. If there is excessive rainfall the ground can become saturated with water which it can no longer hold, and this water is released into the river channel too.

Some rivers are known as "flashy" systems as it takes a short amount of time for precipitation to reach these rivers and for the river to reach "peak flow/discharge". Flashy rivers are sometimes the most dangerous as there is a shorter window of time to respond, and they have the potential to be the most destructive.

During a flood the speed of water increases. This can cause the river to deepen and scour the river bed, lifting large objects such as boulders and carrying them downstream. Increased speed also leads to bank erosion. Bank erosion in turn can lead to increased sediment such as soil being washed into the river.

PART 5: A Brief History of flooding in Inishowen

Ireland has excellent weather records dating back to the early 1800s with some additional historical diaries and records which add to this information. There have been a number of significant flood events in Inishowen through the years, particularly around the late 1800s, the 1950s and in 2011. The main towns effected are Buncrana, Burnfoot, Carndonagh, Clonmany, Moville and Newtoncunningham with flooding caused by a combination of river flooding and coastal flooding. This can be particularly exacerbated when heavy rainfall coincides with high tides as was the case during the flood event of August 2017. Understanding the history of our flooding events can help us to predict what might happen during more severe events. Recording the collective memory of Inishowen floods could provide new insights to increase our understanding.

MEN'S HANDKERCHIEFS
3 for 2/6
Austin & Co. Ltd.

The Derry Jo
Established 1772

THOUSANDS OF TONS OF ROCK CRASH DOWN MOUNTAINSIDE

HOUR OF TERROR FOR INISHOWEN FARMERS

LANDSLIDE, FLOODS CAUSE HEAVY DAMAGE

FARMERS in the Clonmany district of Inishowen are still trying to assess the damage caused by the week-end cloudburst at Buluba Mountain, when a freak storm about three o'clock in the afternoon led to the worst flooding the district has known in years.

A FALL-OUT on Buluba and the adjoining Rochten mountain literally tore tracts out of the mountain sides and transformed small streams into raging torrents. Thousands of tons of rock were carried down the mountains and a number of small farmsteads had narrow escapes.

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On the 24th July 1959, the regional newspaper, The Derry Journal, reported a significant landslide at Buluba (Bulbin) in Clonmany after a freak storm event. If you have any information or photographs of past flooding events that could contribute to our knowledge, please contact the Trust. You can also visit the Trust website to read our section on Historical Flooding in Inishowen.

1. What is flood risk management?

Flood risk management aims to reduce the likelihood of flooding occurring and/or the impact of flooding. This usually requires a combination of strategies from all sectors of the community including public and private sector organisations and residents. Flood risk management in Ireland is co-ordinated by the Office of Public Works (OPW) who produce flood maps and risk assessments (www.floodinfo.ie). Once a high risk area has been identified they may develop a flood relief scheme and will co-ordinate with the flood unit within the local authorities in implementing the approved flood relief schemes locally.
Information on the Flood Relief Schemes for Donegal is available at https://countydonegalfrs.ie

Prevention | Protection | Preparedness

Prevention first and foremost aims at preventing impact and damage to homes, businesses, community spaces and the natural environment. This can include education and perception changes as to the causes of flooding, promoting appropriate land management practices, improving or restoring natural processes i.e. natural flood management, clear guidelines for riparian owners e.g. culvert maintenance, and adapting developments to better cope with flooding.

Protection includes implementing measures, both structural and non-structural to reduce the likelihood or the impact of flooding to properties and land.

Preparedness includes improving information sources and flood alert systems for the public, empowering and mobilising the community to create emergency flood response plans for their communities in partnership with local authorities, and adapting developments to better cope with flooding.

2. How do you stop flooding?

While there is no one-size-fits-all approach to stopping flooding, there are a number of things that can be done to reduce its likelihood. Working together, with local authorities, private and public sector organisations and the local community, is key to ensuring a multi-tiered approach is taken. Importantly we need to look at flooding at a "catchment scale" and prioritise working in the upper reaches of the catchment (the source) which can help prevent or reduce the likelihood of flooding occurring downstream. A catchment based

approach looks at the whole landscape taking into account factors such as geology, land management practices, location of settlements etc. Solutions to flooding are generally divided into 'soft' engineering approaches and 'hard' engineering approaches. The impact of these will vary depending on the location of the scheme and there is an evolving body of knowledge on the advantages and disadvantages of each approach. The science behind these is changing rapidly particularly as we become more aware of climate change and adapt to changing weather patterns.

3. What is hard engineering?

Hard engineering is based on using hard, structural measures to protect areas where flooding generally occurs. These measures include walls and rock armour, concrete culverts, dams, dredging and widening, flow diversions and embankments. Hard engineering provides immediate solutions but are expensive and often un-sympathetic to natural environment and landscape character. Their construction can impact heavily on the environment and are costly to maintain. In addition recent research on climate change has raised concerns about how flexible hard engineering solutions can be in light our changing climate.

4. What is soft engineering?

Soft engineering involves the use of natural techniques that slow the flow or store water temporarily. These measures include tree planting and buffer strips along river channels, restoring meanders, reconnecting to a floodplain, leaky dams, bunds or gully stuffing. These measures have the advantage of being inexpensive to implement, have minimal environmental impact, mimic and improve natural processes and are sympathetic to the natural environment and landscape character. In addition they have minimal maintenance and integrate easily with standard land/woodland management practices. Soft engineering in relation to flooding can also be referred to as natural flood management (NFM), natural water retention measures (NWRM) or green infrastructure (GI).

5. What is Natural Flood Management?

Natural Flood Management aims to improve, restore or mimic natural processes in order to reduce the risk of flooding by slowing the flow of flood waters, holding or storing water or improving opportunities for water to soak away.

Natural Flood Management looks at opportunities to mimic nature and build on the capacity of the catchment itself to absorb heavy rainfall events. Techniques can include introducing small woody “dams” into streams to help slow the flow; re-

meandering rivers, creating soakaways and improving land drainage, reducing overland flow by introducing earth bunds etc.

6. What has happened to our floodplains?

In the past when a river burst it's banks, it spread across the flat fields at the edges of the rivers. These are the floodplains of a river and are usually found in lower lying areas. However these are the areas where many urban centres have been built. This means we have built on the floodplains and now the rivers are restricted in their movements and we are constantly battling against floods. Many people advocate for giving the river room to spread but this is not always possible. There are some measures we can take to give the river the chance to get back to its natural state. This is known as river restoration and helps the river to behave more naturally.

7. What is a leaky dam?

A leaky dam is a structure introduced to a small stream, comprising of newly felled trees or planks of wood that are placed across the channel at a height and an angle that does no impede normal base flow. These "leaky dams" come into effect when rivers are in high flow, causing flood waters to back up behind each structure. Their aim is to gradually "slow the flow" in a stretch of river, and to store water temporarily in order to delay the arrival of flood waters downstream. Leaky dams also provide secondary habitat benefit, as well as capturing silt.

8. Is planting a hedgerow good for flooding?

Hedgerows provide excellent natural weather barriers and ideal habitat for farmland birds and wildlife species, but also perform a natural flood management function by trapping and slowing water flow.

Hedgerows reduce the volume of runoff by promoting rainfall infiltration into the soil and reducing the rate of runoff.

They remove water faster from the soil than crops during periods of excessive rainfall through increased evapotranspiration.

They trap sediment and reduce sediment flow into watercourses

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9. How are trees used to reduce flooding?

Trees have been shown to significantly slow overland flow of water and reduce riverbank erosion within that area.

Planting of trees increases the roughness of the vegetation, slowing the flow of water during a flood event.

Trees reduce the volume of runoff by promoting rainfall infiltration into the soil and reducing the rate of runoff.

Trees intercept rainfall and can reduce the amount of rainfall reaching the ground by as much as 45%.

Woodland soils typically have a relatively open, organic, rich upper layer, which facilitates the rapid entry and storage of rainwater – the sponge effect.

Woodlands must be managed appropriately. Dense woodland can have a negative impact when the forest floor becomes very sparse and devoid of lower plants that provide roughness. This can exacerbate flooding at this point.

The roots of bankside trees and associated vegetation help to bind and strengthen stream banks, reducing the risk of bank collapse, erosion and siltation.

(by Dan Turner, Yorkshire Dales Rivers Trust)

10. What are the best types of trees to plant for flooding?

Alder, downy birch, and willow are excellent native trees to plant in riparian areas. These trees/shrubs are tolerant of wet conditions and grow rapidly. Buffer strips along the riparian edge of a channel will benefit from vegetation that will increase the capacity of the soil to retain moisture and will provide refuge for wildlife.

Riparian planting has been shown to be one of the most effective measures used in NFM (Working with Natural Processes Evidence Directory)

11. What is a sediment trap?

Sediment traps can take many forms, but normally comprise an excavation located on a surface runoff pathway. Runoff enters the excavation and is detained there, allowing sediment to settle out before the runoff is discharged, usually via a gravel outlet. Sediment traps help to control the release of sediment to the river network.

Sediment traps can hold some excess floodwater but many traps would be needed in a catchment to make a big impact on flooding.

They reduce siltation of watercourses thereby maintaining capacity.

They can be used as a pre-treatment for other natural flood management measures such as retention ponds.

(by Dan Turner, Yorkshire Dales Rivers Trust)

12. What is a detention basin?

A detention basin is also known as a retarding basin, and is an excavated area installed on, or adjacent to, tributaries of rivers to protect against flooding and, in some cases, downstream erosion by storing water for a limited period of time. In NFM this storage time is generally between 12 and 24 hours and does not interfere with normal farming practices.

13. What permissions do I need to work in or near the river?

Landowners with rivers on their property have many rights in relation to the river. However, permission is needed to carry out some works and there are recommendations for maintaining a good healthy river. Any instream works require permission from Inland Fisheries Ireland or the Loughs Agency and in some cases National Parks and Wildlife Service and no works are allowed between the end of September to the end of March. This is to allow fish to spawn and hatch at this time. Leaving a buffer zone and preventing livestock from entering the channel will help prevent bank erosion and pollution. The OPW have produced a short guide for riparian landowners called 'Living Near Watercourses' that is available on www.flooding.ie.

14. What is SuDS?

SuDS is an acronym for Sustainable Urban Drainage Systems and refers to the practice of using specific construction techniques to sustainably manage water in an area. SuDS measures mimic nature by slowing runoff, provide areas to store water and allow water to soak into the ground. SuDS can slow the flow, minimise pollution and can also promote biodiversity and provide amenity value. Examples of a SuDS approach are: water butt for harvesting, green roof, permeable paving on a driveway, planted ditches, retention ponds, inlet and outlet control devices etc

Sometimes we hear about rSuDS which is Rural SuDS and refers to measures that are used in rural areas to provide drainage control. This includes many of the urban control measures but can also include sediment traps and wetlands.

1. Evaluating if you are at risk

Check out if your home is at risk from flooding using the Irish national service from the Office of Public Works (OPW). OPWs national flood information portal, provides location specific access to flood risk and flood management information for your area http://www.floodinfo.ie/

2. If you are at risk you really need to act. Here is some good advice from the OPW on actions you can take. 'Plan, Prepare, Protect' is a document produced by the OPW which provides good advice on how to prepare for flooding.
https://www.opw.ie/en/media/Plan%20Prepare%20Protect%202014.pdf

3. Property level protection measures

Are you living in a flood zone? Have you thought about property level protection? If you haven't then you really should. Some useful products and suppliers can be found here on http://bluepages.org.uk

Door barriers

You can purchase barriers for your doors to stop flood waters entering your home. You can also get flood proof doors fitted. Here is a link to PCD Contracts Ltd based in Ballymena who has supplied and fitted door barrier for homeowners in Inishowen. https://pcdcontracts.com

Devices for Wastewater

Is your property at risk of flooding? Did you know there are small things you can do yourself in your property to reduce the risk of your property flooding? If you are worried about water entering your home through wastewater pipes, you could stop this by installing a cheap non-return valve in your wastewater outlets. These McAlpine Non Return valves can be fitted to downstairs sinks and washing machine and dishwasher outlets to stop floodwater back flowing into your home during floods.

Suitable non-return values can be purchased online.

Devices to stop sewage backflow during floods

WAR Valve

A big problem during floods is that sewage can backflow into your home through the downstairs toilet if the flood waters are high enough. If you can access your inspection chamber from a manhole on your property you can easily install a WAR Valve yourself without having to dig up your property
https://thefloodcompany.co.uk

There are a number of videos online which show you how valves and barriers work.

Inline Non-return valve

If you don't have an inspection chamber to fit a WAR Valve in your sewage system don't worry there are other products available called inline non-return valves. You can also search for details of these online.

4. Early Flood Warning App for your phone

Buncrana Flood Group have worked with the developers of Pegel Alarm which is an early warning flooding app that uses OPW water level gauges on rivers to issue an early flood warning. The app is available on any app store just search for Pegel Alarm. They also have a text message service website here: https://pegelalarm.at/paw/ which will send a text message if river levels are high which costs €20 per year. You can register for this service online for a small annual cost. Currently, Inishowen has one OPW gauge which is on the Crana River and the OPW have given access to this gauge data to Pegel Alarm. Talk to you local Councillor if you feel your area would benefit from a river gauge or contact the Inishowen Rivers Trust.

5. National support networks for communities at risk of flooding

The Irish National Flood Forum are a national body set up by communities who have suffered from severe flooding. If you are worried about flooding and need support check out their Facebook page.

Local support groups for flooding

The Buncrana Flood Group is a voluntary community group affiliated to the Irish National Flood Forum set up after the floods in Inishowen in August 2017. If you live in the Buncrana area and have concerns about flooding you can join in the regular meetings in Cockhill Celtic Youth Club, Buncrana. The group share advice and support to people to help build flood resilience in their community. Check out the Facebook site which has regular updates on what is happening locally and nationally with flooding and what communities can do to build resilience. https://www.facebook.com/buncranafg/

The Future & Climate Change

Donegal County Council has released a Climate Change Adaptation Strategy 2019-2024 which acknowledges that flooding is a significant concern in the county and future impacts as a result of climate change may exacerbate the issue.

The Climate Change Adaptation Strategy sets out how the Council will lead the journey to a Climate Ready Donegal and work to reduce our exposure to climate risks and capture new opportunities. The Strategy includes a range of actions across four operational themes: Critical Infrastructure & Buildings, Natural & Cultural Capital, Water Resources & Flood Management and Community Services.

You can read access the plan here
http://www.donegalcoco. ie/services/environment/ climateaction/

Additional information on the Flood Relief plans for County Donegal can be found here
https://countydonegalfrs.ie

The Department of the Environment, Climate and Communications have also developed a Climate Action Plan for Ireland. You can download that here:
https://www.gov.ie/en/publication/ccb2e0-the-climate-action-plan-2019/

Inishowen Rivers Trust

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