DRAINAGE & RIVER MANAGEMENT

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Inishowen Rivers Trust

Thursday 19th November 2020

19.30pm- 20.30pm

Drainage and Flood Relief in Ireland

- Famine - Flood Relief Schemes – 1840's
- Major manual schemes - 1880's
- Land drainage – Major issue 1920's and 30's
- 1945 Drainage Act – incredibly powerful piece of legislation
- Agriculture – Dominant industry
- Arterial Drainage – Field Drainage – Flood Relief

Drainage and Flood Relief in Ireland

- The Commissioners of Public Works can promote a scheme under the **Arterial Drainage** Acts, 1945 and 1995 to prevent or substantially reduce flooding or to improve **drainage** of land.

- Statutory authority from the Arterial Drainage Acts, 1945 and 1995 and the European Communities (Assessments and Management of Flood Risk) Regulations 2010

- Statutory requirement to maintain the drainage works ….. Ongoing maintenance activities are of a cyclic nature …..maintain the channel at a certain outfall datum and conveyance capacity by means of repetitive works. …….In any one year, approximately one-fifth of watercourses are maintained.
- Following major schemes rivers are fundamentally changed – examples gravel removal…Rivers Feale and Inny

Drainage and Flood Relief in Ireland

Major Schemes:

Brosna	1948 - 1955
Inny	1960 - 1968
Moy	1960 - 1971
Boyne	1969 - 1986
Maigue	1973 - 1986
Robe	1979 - 1986

Drainage and Flood Relief in Ireland

Fisheries and River Corridors

- Fih Hatcheries constructed – no benefits! + even some negative impacts!
- Wildlife ?, Birds ?, Aquatic Flora?, Aquatic Fauna ?
- 1982 - *LAND DRAINAGE POLICY IN IRELAND*, **Bruton and Convery – ESRI**
  - **Minimise interference, removing only high points in the river bed (sills).**
  - **Retain old channel, and leave in meanders.**
  - **Retain trees, removing lower branches.**
  - **Leave vegetation untouched on one bank.**
  - **Remove vegetation from alternate banks in sections of 500-1,000 metres.**
  - **Replant banks where possible with deciduous trees.**
  - **Replace large boulders, stone and gravel.**
  - **Excavate and support pools at intervals.**
  - **Drain in a stepwise manner so as to provide short riffle areas wherever possible - break the surface film and increase aeration.**

Arterial Drainage and Flood Relief in Ireland

OPW Current Approach

- Much improved – EU WFD and Habitats Directive – '95 Act and 2010 EU Regulation
- Extensive liaison – all stakeholders, statutory consultees, walk overs, plans and maps
- Birds √ Mammals √ Flora √ Fauna √ Fisheries √
- Flaws – where is the baseline for recovery ? – Rivers Unshin and Fergus ?

I. Fly in the ointment: *"….statutorily obliged to maintain all rivers in "proper repair and effective condition".*

- The more OPW carry out drainage works – the more they have to keep "channels" drained and to maintain the damaged catchments – no opportunity to fully re-establish the lost , unique structures – fundamentally less productive and less biologically diverse river and stream systems

Drainage and Flood Relief in Ireland

Hurricane Charley – August 25th , 1986

11 in (280 mm) in Kippure

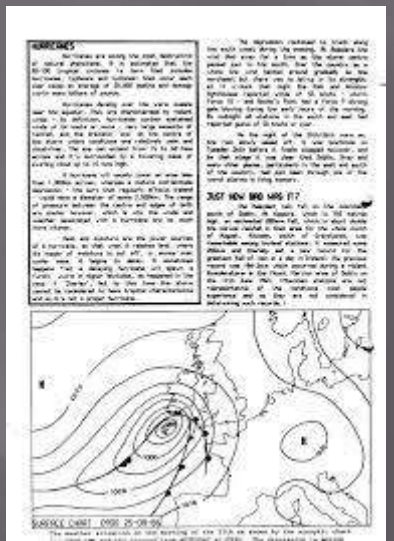
7.8 in (200 mm) in 24 hours

Flooding in Dublin - 451 buildings were inundated, up to 8 ft (2.4 m).

The Dodder (*An Dothra*!) and the Dargle overflowed their banks

Bray flooding - some areas up to a depth of 5 ft (1.5 m) and forcing about 1,000 people to evacuate

The River Dodder, nearly exceeded the reservoir dam in South Dublin, Bohernabreena - tap water colloidal suspension



Drainage and Flood Relief in Ireland –

Flooding - November 2015 to February 2016

Arterial Drainage and Flood Relief in Ireland

- River Bandon – 2016 / 2020

Photos courtesy : RIVUS / RMS - AO'S

Photos courtesy : RIVUS / RMS - AO'S

Drainage and Flood Relief in Ireland

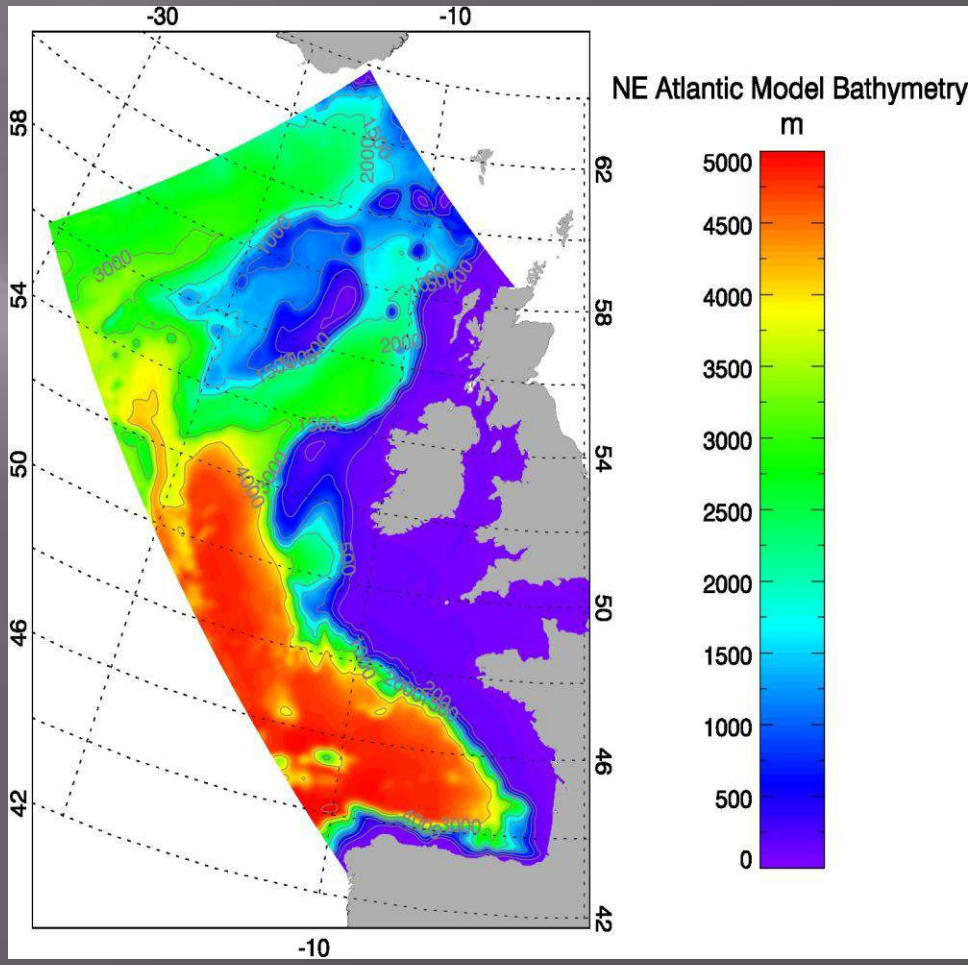
The Future

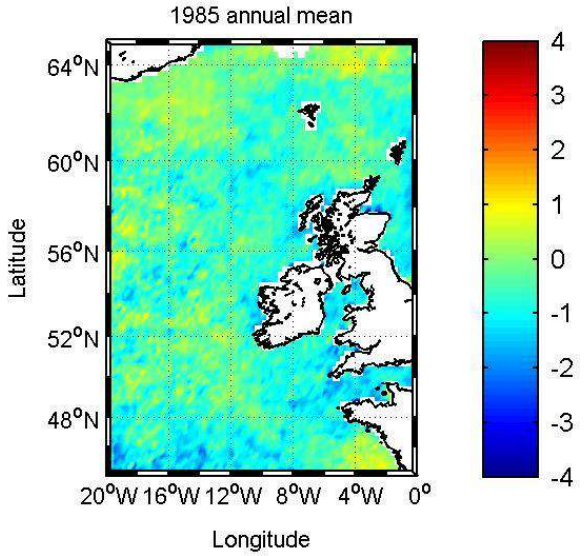
- Burrishoole Research Station – 50mm in two hours
- Three bridges and three landslides

Changing Oceans

Aquatic systems are changing and changing fast.

Water is getting warmer, storms are getting stronger and the availability of food resources in and from the ocean is under threat.




1985 annual mean
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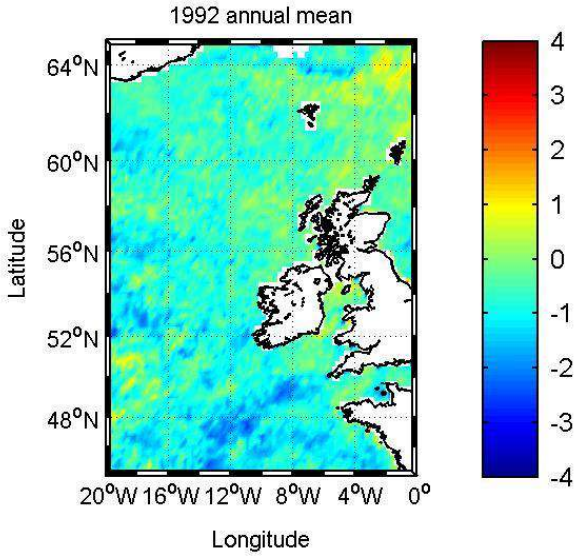
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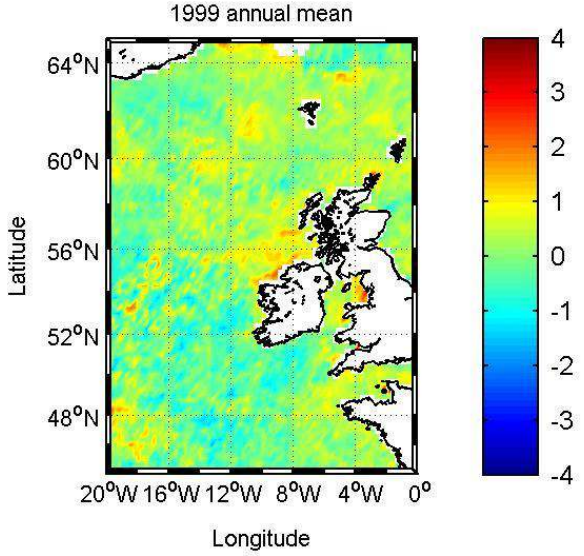
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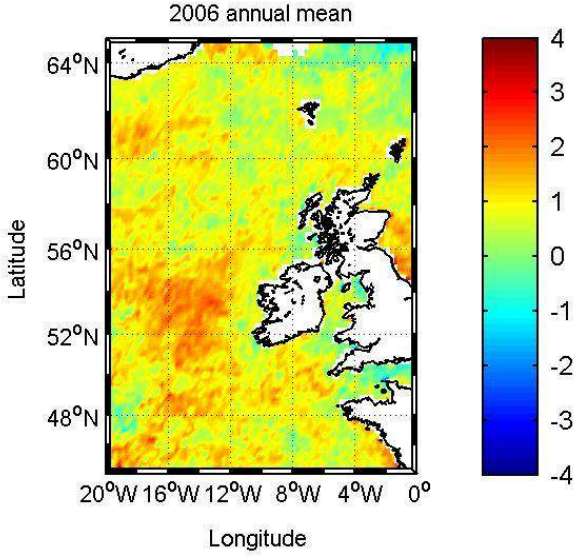
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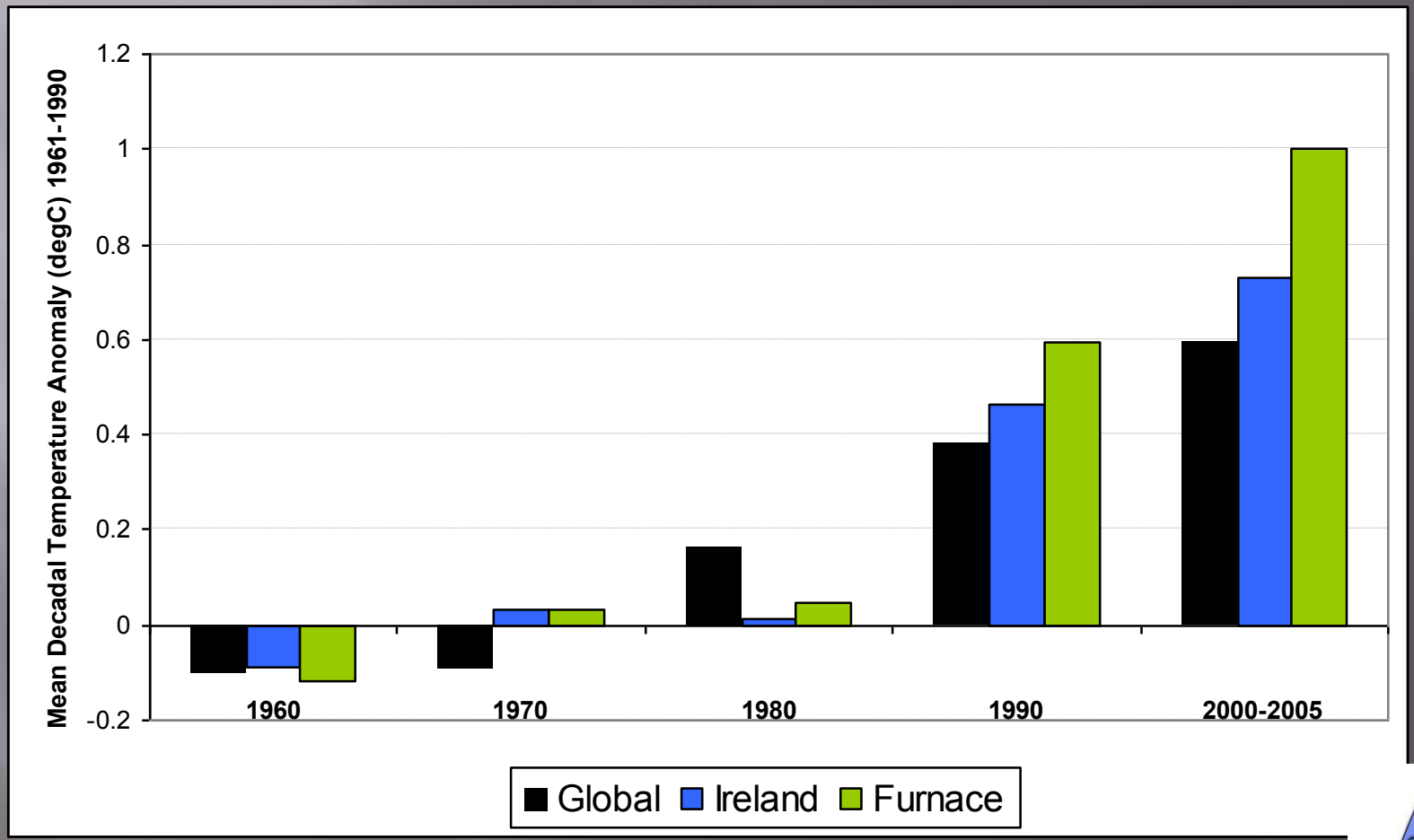
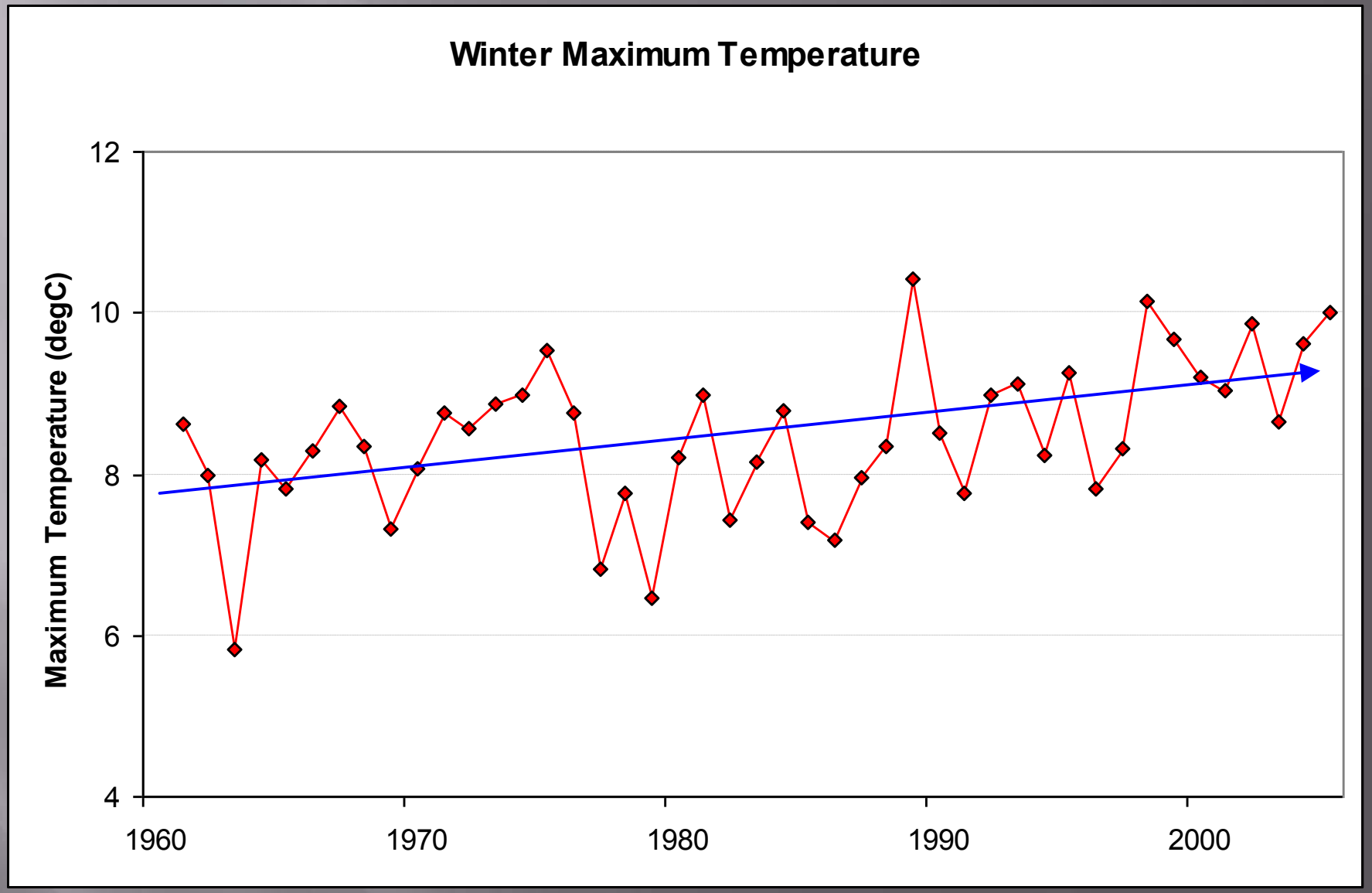
Mean Decadal Air temperature Anomaly Global, Ireland, Furnace





- Annual Winter max air temp has increased by 1.8 degress over the period 1960-2008

Predicted changes

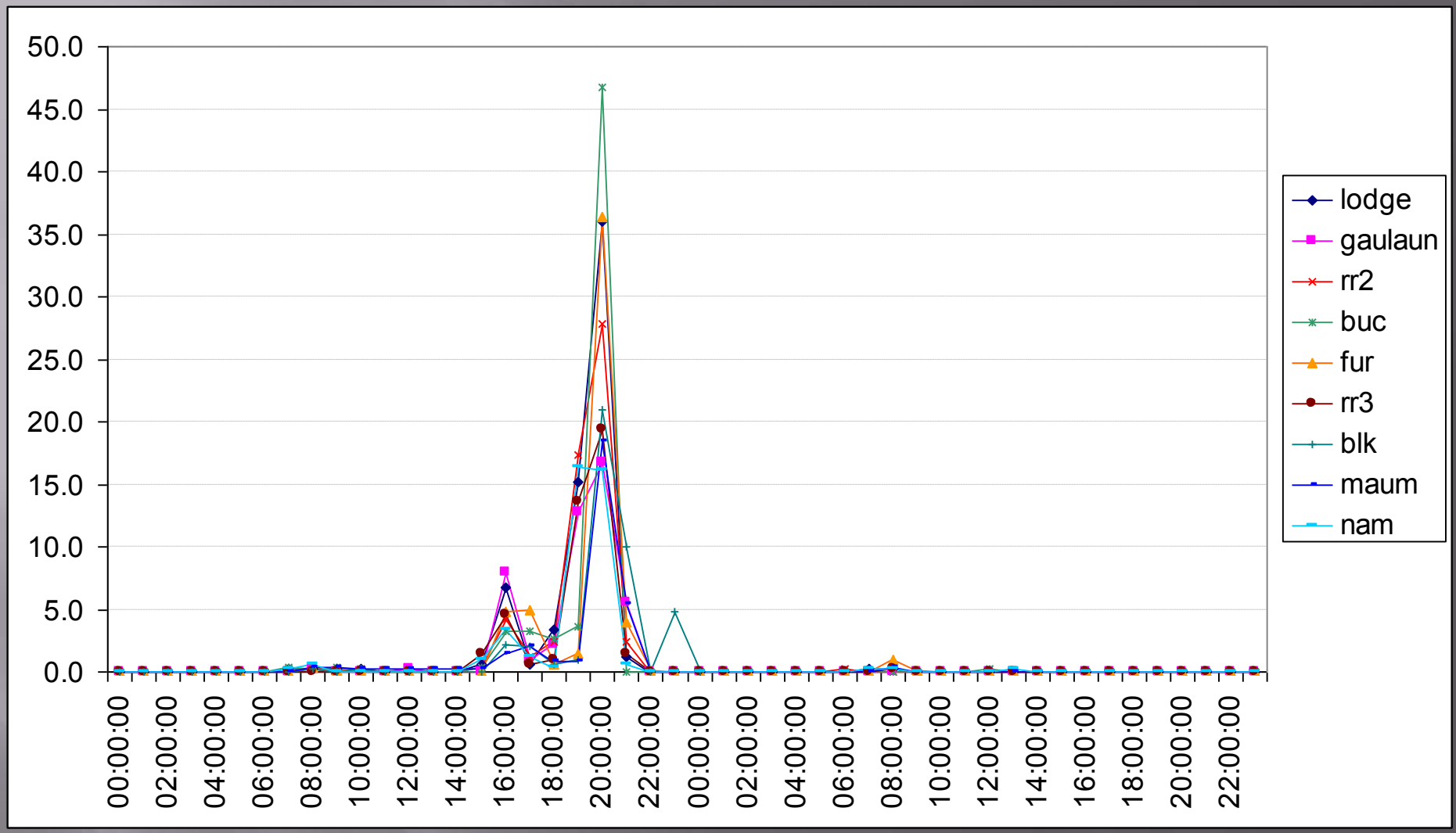
"As global temperatures increase the hydrological cycle will become more intense and will result in more extreme precipitation events. Changes in intensity or duration are likely to result in an increase in flood frequency and magnitude……."

"…….. the frequency of flood events of given magnitudes is likely to increase as a consequence of climate change ……."

Heritage Council 2009

Flood 2-7-2009

Rainfall in the Burrishoole catchment 2,3 July 2009



	Lodge	Gaulaun	Buckagh	Rough2	Millrace	Rough3	Black	Maumeratta	Namaroon
19:00:00	15.2	12.8	3.6	17.4	1.4	13.6	1	0.8	16.4
20:00:00	36	16.8	46.8	27.8	36.4	19.4	21	18.4	16.2
21:00:00	1.2	5.6	0	2.4	4	1.4	10	5.4	0.6
Daily	64.8	46.8	60.8	56.4	52.9	42	42	30.8	40

Return in Years

	2	5	10	20	30	50	75	100	150	200	250	500
2 hours	14.3	19.1	22.5	26.3	28.7	32.0	34.8	37.0	40.2	42.7	44.7	N/A

Lodge	Gaulaun	Buckagh	Rough2	Millrace	Rough3	Black	Maumeratta	Namaroon
52.4	35.2	50.4	47.6	41.8	34.4	32	24.6	33.2

Drainage and Flood Relief in Ireland

- RESCALE – NUI Maynooth and MI
- 55 year data set (1955 to 2010) – simulations out to 2099
- Minimum temperatures >>>: September (+2.2C), October (+1.4C), November (+2C) and February (+C)
- Precip. : February (+16.8%) , January (+13%)
- Largest decreases August (-11.7%), June (-8.1%) and July (-8.6%)
- June, reductions in stream flow of up to 40% are likely for three of the sub-catchments examined.
- More frequent flood events, with 50-year flood events occurring every seven to nine years by the 2080s.

Drainage and Flood Relief in Ireland

- New paradigm – flood prevention and not short term flood relief! State bodies must take the lead: OPW, EPA, IFI, NPWS, LA's – new, innovative modern legislation
- Rebuild catchments over a decadal scale: water retention: bogs, wetlands, farm management, environmental stewardship, adopt a stream-LAWPRO
- Manage for extreme low water as well as high water
- Best practice - Nature Based Solutions

Rural Sustainable Drainage Using Nature Based Solutions: The Stroud Project as a case study

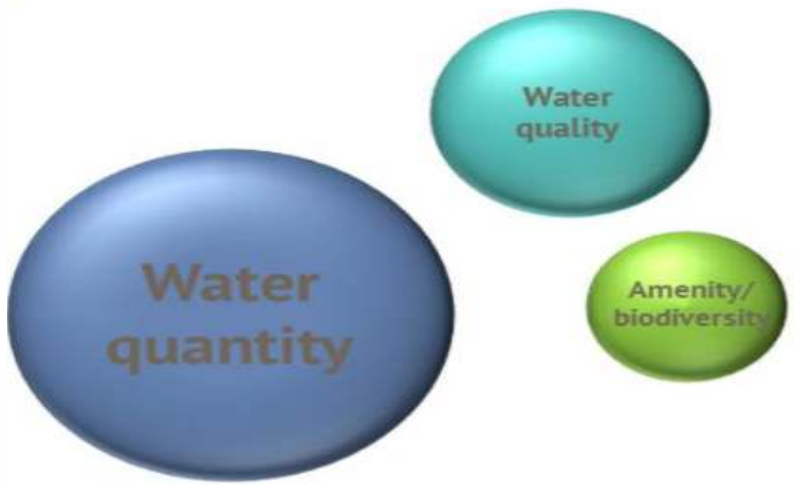
Rosemary McCloskey, Trustee of Inishowen Rivers Trust and
Project Manager Stroud Rural Sustainable Drainage Project

Environment Agency

STROUD DISTRICT COUNCIL
www.stroud.gov.uk

Sustainable Drainage

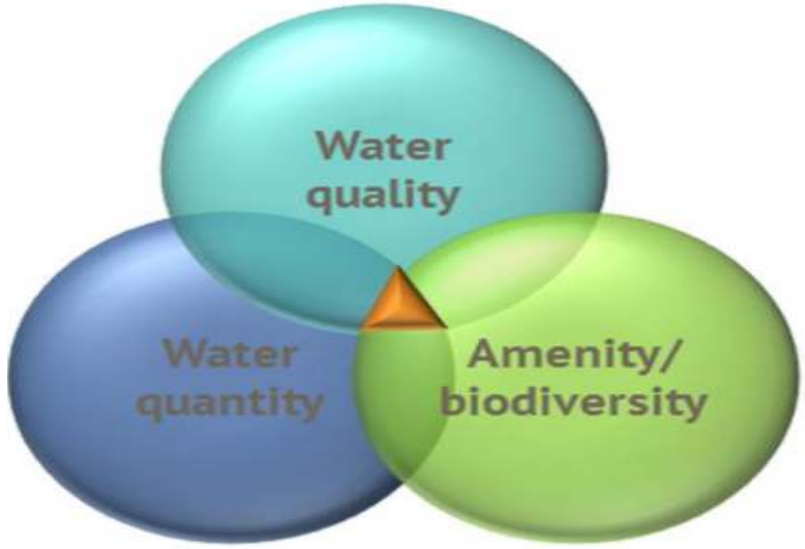
"SuDS are a collection of water management practices that aim to align modern drainage systems with natural water processes"



The "traditional approach"

Surface water is conveyed away from our cities and towns as quickly as possible to primarily manage risks from flooding and poor sanitation.

Water quality, amenity/biodiversity are given very little consideration.



The SuDS triangle

The SuDS philosophy is to replicate, as closely as possible the natural drainage from a site before development.

SuDS is designed within the opportunities and constraints of a site to deliver the most benefits for water quantity, quality and amenity/biodiversity. Where these objectives overlap this is called the SuDS triangle.

Credit: Susdrain.org

A brief history of flooding in Stroud…

- A history of frequent flooding both from surface water and fluvial

- In 2007 over 200 properties were impacted.

- Within the 250km2 catchment of the River Frome we have 2 rapid response catchments

Project Methods

- **Slow the Flow -** by increasing resistance to flow. For example, by planting floodplain or riverside woods or constructing large woody debris dams in channels & gulleys or flood plains or constructing earth bunds to slow overland flow.
- **Attenuating water** by using, and maintaining the capacity of, ponds, ditches, channels or land
- **Increasing infiltration.** Allowing water to soakaway can reduce surface runoff. Free-draining soil will make saturation less likely. Directing water onto floodplain and woodland floor provides more opportunity for infiltration.


Silt trapped behind leaky dam
Leaky dam trapping woody debris reducing the amount of material transported downstream that could block culverts


unflooded floodplain
Leaky dam forcing high flow to interact with floodplain
high flow deris and trapped silt

Nature Based Solutions