

DRAINAGE & RIVER MANAGEMENT

with Prof. Ken Whelan & Rosemary McCloskey

Q&A

Please see below answers to questions posed by participants during the webinar.

Thank you for your input

Q1	Do you think that water infiltration rates may have considerably lessened due to intensive farming systems, leading to faster run-off?
A1	<p>(R. McC) Soil compaction has a variety of causes and impacts on water infiltration rates. The usual causes of compaction are tillage methods and other activities which disrupt soils and the accumulation of organic matter, equipment and livestock that cause compaction and reduced porosity, or a lack of cover crop which causes compaction and erosion. The level of compaction may vary due to the degree of intensity of activity and conservation practices but there are many variables to consider. Tips to managing soils to improve infiltration include:</p> <ul style="list-style-type: none"> • Minimise tillage to reduce the loss of soil structure and organic matter. • Limit farm traffic to operate only when dry and avoid travelling when wet. • Manage drainage. • Use cover crops, green manures and mulches. • Use grass leys to improve organic matter. • Use plants with large roots. • Try agroforestry to help with drainage, using fast-growing trees.

Q2	How amenable is the OPW to natural flood relief measures rather than building walls?
A2	<p>(IRT) The OPW is currently partnering with the EPA on the SloWaters projects which is researching the opportunities for natural water retention measures in Ireland (https://nwrmieland.wordpress.com/slowaters/). The scoping study commissioned by the IRT in 2019 and conducted by Prof. Mary Bourke from Trinity College, Dublin, was funded by a grant from the OPW. The IRT are now seeking funding to implement nature based solutions in the area around Clonmany in Inishowen and are in discussion with the OPW in relation to this pilot scheme.</p>

Q3	In rivers already effected by low waters levels, is there a danger that flood management practices, could impact on the habitat requirements for sustaining fish migration?
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A3	(R. McC) Natural Flood Management techniques will not impact normal/low flows. For example, leaky dams in streams have an envelope underneath for fish passage, and only come into effect (slowing the flow and temporarily creating pools) on heavy rain events. Other techniques such as bunds, offline attenuation ponds, and gully blocking are all to meet the purpose of intercepting and storing surface water flow pathways or ephemeral flow paths that result from heavy rain events.
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Q4	Are there any successful examples of pilot schemes or projects in Ireland that have attempted to harness the potential of nature-based solutions, particularly in the upper catchment, in an attempt to mitigate against urban flood events in the lower catchment, or do we have to look across to the UK or further afield for those? If none in Ireland, are there any in the pipeline?
A4	(IRT) There are some examples of nature based solutions (bunds, leaky dams, riparian planting, gully blocking) installed in various locations across Ireland. On a walkover in upper peatlands you will find examples of where landowners have culverted cutaways in order to slow the flow of water into downstream courses. The techniques are simple, but we are unaware of any examples where a catchment approach has been taken. The IRT have carried out a scoping study with Trinity College, Dublin to investigate the potential for a pilot scheme in Inishowen and we are currently awaiting the outcome of a funding application for implementing measures in the Clonmany area. (KW) The rock ramps, piloted by Alan Sullivan of RVIUS on the Nore, and now used by IFI, are also an example of a successful nature based solution for fish passage (KW).

Q5	Across Europe, are there examples of NBS in areas with a lot of arterial drainage, like the Maigue catchment? I think there needs to be examples to convince landowners to show what can be done.
A5	(KW) I'm not aware of any examples of NBS in the Maigue Catchment but I agree that we need a series of demonstration projects, designed to deal with a selection of the more common water retention and water flow issues

Q6	How could you see a flood relief scheme be implemented in a river system that is a SAC for freshwater pearl mussel? (context: Owenea River catchment, Donegal. Currently under public consultation. Increasing frequency of flooding along banks. Football clubhouse, new housing estates built on floodplain)
A6	(IRT) It is important to comply with the regulation set out by the NPWS in relation a particular SAC. A scoping study of the upper catchment may yield areas with potential for natural water retention. Nature based flood measures may be viewed as complementary to the conservation objectives of the SAC but would need to be carefully considered by all the relevant authorities. Riparian restoration may help to improve habitats and promote natural flood control in the areas that are experiencing flooding. Wide buffer zones have an important role to play. In hard engineered areas, such as the housing estate, improvements to the overall capacity of the SuDS features should be assessed.



Q7	Do we need to 're-introduce' dung beetles, to improve soil structure and also carbon sequestration?
A7	<p>(IRT) Dung beetles play an important role in processing dung on pasture by aerating, churning and digging. Their potential impact on GHG emissions is being investigated but what contribution they can make is still in question and there are many environmental factors to consider such as weather conditions.</p> <p>https://academic.oup.com/ee/article/49/5/1105/5902392 ; https://access.onlinelibrary.wiley.com/doi/pdfdirect/10.2134/jeq2018.03.0111)</p> <p>There is no doubt that maintaining and restoring our soils to good health is critically important going forward and there is considerable research in areas around soil compaction, root structures, mycorrhizal fungi, nutrient and mineral cycling etc. The interactions between soil biodiversity above and below ground and atmospheric conditions is complex and more research is needed (See Teagasc website for more information on soils https://www.teagasc.ie/environment/soil/).</p>

Q8	Are there any studies ongoing to monitor the recovery of the Bandon River post-FRS?
A8	(KW) The original EIA recommended post-works monitoring and a set of recommendations have recently been provided to OPW.

Q9	Ken, do you get the sense there is an appetite to overhaul the 1945 act?
A9	(KW) I think a review of the 1945 and related Acts would be very beneficial, to align both drainage and flood relief legislation with the various EU Environmental Directives and with other relevant national legislation. It is also timely, in the context of increasing interest in nature based solutions and modern approaches that could be developed to deal with the impacts of climate change.

Q10	Would it be fair to say that the problem with fast flowing rivers is not only flooding, but also low river levels at other times of the year causing problems for fish migration etc? Both are the result of not having enough areas to hold water back and slowly releasing it over a longer time.
A10	(IRT) Hydromorphology (the interaction between water flow, energy and physical features) has emerged as a significant pressure on our rivers. Modifications to a river channel can lead to low river levels (channel widened) or faster flows (straightened). Slowing the flow brings many benefits including to fish migration but modified habitats such as barrier and loss of natural pools will also impact migration.

Q11	Is the silt that is eroded/washed out during peak flood events less potentially damaging as it is carried out to sea?
A11	(R. McC) We want to do everything we can to keep silt out of rivers. Silt in streams can cloud the water reducing the amount of sunlight that can get to aquatic plants, as well as



	<p>smothering fish and larvae. In addition, other pollutants like fertilizers, pesticides, and heavy metals are often attached to the soil particles and wash into the water bodies, causing algal blooms and depleted oxygen, which is deadly to most aquatic life. Whilst a heavy rain event may clear gravels by washing sediment through, it transfers the problem further downstream; often exasperating flood risk in the lower catchment where the river begins to lose energy and drops the silt out.</p> <p>Sediment transport and distribution into coastal zones has huge impacts on the morphology of estuaries and coastal zones, on water quality (and related issues such as aquaculture), on navigation and harbour capability, on recreation areas, and can affect chemical and biological processes which impact coastal biodiversity.</p> <p>(KW) Siltation is a fast growing issue in Irish rivers. We have a great deal to learn from countries such as New Zealand where intensive agriculture has resulted in major issues relating to soil loss and siltation. This has resulted in major impacts on some of NZ's premier trout fisheries.</p>
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Q12	If fields have to be taken out of production, who pays?
A12	<p>(R. McC) This rarely is the case with Natural Flood Management. In the Stroud NFM scheme, fields are not taken out of production and therefore there is no need to incentivise. At most an already wet field corner might be enhanced with the permission and agreement of a landowner, creating better habitat and attenuation. Most of the techniques can be integrated with existing land and woodland management.</p> <p>Within the review of CAP there will be a growing trend towards a new system of paying farmers “public money for public goods” - principally their work to enhance the environment and invest in sustainable food production.</p> <p>The CAP reform will include separate payments for eco-schemes which will support farmers who adopt additional environmental measures including nutrient management plans, allocating some agricultural area to non-productive features and for the appropriate maintenance of wetland and peatland.</p> <p>I am unsure of the mechanisms at the moment for how “working with Natural Solutions” might be incentivised through CAP during the new reform period. Alternative funding sources should be identified and sourced by stakeholders in order to support the farming community to implement these schemes.</p>

Q13	What sort of level of intervention i.e. instances of Natural Flood Prevention per km are likely to be required to affect a discernible affect?
A13	<p>(R. McC) An example from the Stroud Project in the UK. In one 14km² sub catchment of the main river Frome in Stroud approx. 100 natural flood management interventions (including 85 leaky dams) have been implemented. Comparing data from two similar rain events pre and post intervention, with similar antecedent conditions, there was a 0.4m reduction in peak flow. I will caveat that by saying we need more data and evidence to be conclusive, but it is a good indication. We have also seen a reduction in reports of property flooding during rain events where we would usually anticipate property level flooding.</p>



Q14	Can post-season Christmas trees be used for projects to dam/slow the flow of water?
A14	(IRT) In a recent project on the Glennagannon River in Inishowen, the IRT used Christmas trees to provide a revetment or natural wall. Christmas trees can be used for larger areas, in combination with other types of brash. The revetment helps to rebuild the riverbank by trapping sediment in the interwoven branches as the water flows over the revetment. In time this compacts and recolonises with natural vegetation and a new bank is formed. Comparing the types of brash, the IRT found other types (spruce, willow) more effective than Christmas trees as the branches interweave more tightly together.

Q15	Conifer needles are nutrients released into waterways with regard to Christmas trees
A15	(IRT) Conifer needles do release nutrients into the waterways as demonstrated by large spruce forestry schemes and hence the requirement now for buffer zones. If using conifer trees in nature based solutions, it is important to dry the trees in advance (store inside for several months) but using in the river. (KW) In Ireland, large coniferous forests, based on acidic soils, have resulted in major impacts in some areas related to a drop in the pH and acidification of water courses. Buffering with deciduous trees is essential.

Q16	On the Owenwee River, Clew Bay, a bend on the river leading to a drainage channel was blocked. This has led to bank overflowing and is continually overflowing a weir installed over 40 years ago to alleviate the problem. Below this weir the river is now cutting through bank leading to constant problem of river flooding inside this on floodplain below river and thus an enormous average is flooded regularly that has become a major problem now because of high rainfall. The original weir worked well but the main river is cutting through more and more each year. What could be done to alleviate this in peak flow events?
A16	(KW) This sounds as if it is a serious problem! I would suggest approaching IFI / the local Council, with a view to commissioning a survey of the area impacted by blockage, to advise on a long-term solution to the issue. If left unattended, this issue will increasingly damage the flow pattern of the river and possibly impede access to key spawning areas for salmon and trout.

Q17	In the Kyle of Sutherland area in Scotland we are reprofiling huge areas of peat hags and drain blocking now to try and slow the speed of the spates heading down stream. Ken will know about this I think.
A17	(KW) Yes – this is exactly the type of approach that we require in Ireland, both on our blanket bogs and on our raised bogs.



Q18	The 3rd Cycle River Basin Management Plan goes to public consultation in the New Year. Is the next RBMP together with the new CAP the two major policy drivers that can embrace this novel approach to catchment management?
A18	(KW) Yes – in addition to these initiatives discussions have been ongoing in Ireland for some time on a new land policy, which would of course include managing the interface between land and water.

Q19	I agree fully with Ken – It's time to review the 1945 arterial Drainage Act; it is no longer acceptable or appropriate, in light of what we have learned especially in the past 4 decades.
A19	(KW) I think a review of the 1945 and related Acts would be very beneficial, to align both drainage and flood relief legislation with the various EU Environmental Directives and with other relevant national legislation. It is also timely, in the context of increasing interest in nature based solutions and modern approaches that could be developed to deal with the impacts of climate change.

Q20	Elvers and very small eels use fine substrate silt for burrowing. Is there a danger with flood management practices changing silt deposition patterns that it will have a negative effect on the habitat for eel migration?
A20	(R.McC) If anything, natural flood management practices should create further habitat for eels. (KW) Correctly, managed natural silt banks will also provide an ideal home the juveniles of our three lamprey species.

Q21	Rosemary, what was the net effect of your work? Have you measured the overall effect of your nature based solutions?
A21	(R.McC) In Stroud a 0.4m reduction in peak level was observed when comparing similar rain events. Further monitoring and data analysis is needed to make conclusions on the reduction in flood risk. Feedback from residents who regularly flood say that there has been a noticeable impact. Additional benefits have included increased biodiversity of invertebrate species in a recently conducted study. We have had very positive feedback and uptake from local landowners as well.

Q22	Is there a legal requirement for a farmer to seek permission for drainage works? Is there a requirement for them to put measures in place to prevent sediment from reaching the river, i.e. silt control?
A22	(IRT) Best practice in drainage management is important both for the productivity of a field and for the general environment and local hydrology. Land drainage works on land used for agriculture is covered by EIA Regulations and controlled by the Dept. of Agriculture Food and Marine (DAFM). Screening is required for works which exceed 15ha.



	<p>Silt control and the use of sediment traps when carrying out drainage works are recommended and may help to increase the efficiency of the drainage once completed. Sediment collected can be returned to the land. Teagasc provide a practical guide to draining grassland in Ireland. https://www.teagasc.ie/media/website/publications/2013/Land-Drainage-Manual.pdf</p>
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