

Catchments Newsletter

Integrated Catchment Management: sharing science and stories



Inside this issue

TidyTowns Waters and Communities Award

Community meetings in Priority Areas for Action

Pint of Science – taking science from labs to pubs and cafes

Public engagement and environmental policy

Woodlands and forests: a renewed focus

Longford Demesne Wood: protecting knowledge of our past for the future

The impact of the 2018 drought on river flows and lake levels

What happens when we urbanise a catchment?

Small streams and their importance in Ireland

CONTENTS

Inside this issue

Editorial	3
One thing you can do... is help our bees and other pollinators.	3
Waters and Communities News	4
TidyTowns: Waters and Communities Special Award 2018	4
Community Information Meetings in Priority Areas for Action	6
Dublin: The River Camac tells a story	8
Galway: Lough Rea birdwatching and beach clean-up	10
Leitrim: anglers learn how to protect small hill and coastal streams	11
Longford: kids in primary school learn about water and wildlife	12
Roscommon: The Community Water Fund helps Portrun tell the story of the Portrunny water catchment	12
Wexford: school children working to understand their local streams and getting their community involved in Duncannon	14
Pint of Science Ireland – taking science from labs to local pubs and cafes	15
Articles	16
Public consultation: timetable and work programme for the third-cycle River Basin Management Plan 2022-2027	16
Public engagement & environmental policy	17
Ireland's woodlands and forests: a renewed focus under the 2nd cycle of the River Basin Management Plan	21
Longford Demesne Wood, Sligo: an award-winning forest, protecting knowledge of our past for the future	24
Measuring the impact of the 2018 summer drought on river flows and lake levels	25
Donation of EPA hydrometric equipment to Engineers Without Borders	27
What happens when we urbanise a catchment?	28
Dingle Hub: real-time remote sensing to allow continuous water quality monitoring	32
Acclimatize – addressing pollution in urban and rural bathing waters	34
EU SWIM Project prepares for the 2019 bathing water Season	35
Small streams and their importance in Ireland	36
The WISDOM Project: learning from Group Water Schemes and connecting water, infrastructure, and people	39
Book	41
Wilding: the return of nature to a British farm	41
Karst of Ireland: Landscape Hydrogeology Methods	42

EDITORIAL

Editorial

Moving across boundaries

The EPA State of the Environment Report 2016 highlighted the need to restore and protect our water quality. It also identified the need to protect our nature and wild places while achieving sustainable economic activities. Importantly it identified that we need to inform, engage and support communities in the protection and improvement of the environment in delivering on these needs. Clearly, these challenges are not isolated from one another and the approach being taken to implement the Water Framework Directive which is focused on working with others, and across the silos that divide different disciplines has the potential to deliver multiple benefits. While focused on water quality, we will all have to try and think about the impacts human activities are having from other perspectives such as climate change, biodiversity, public health and flooding. Ideally, actions that are selected for solving water quality problems should also have multiple benefits from these other perspectives - this is the essence of an integrated catchment management approach.

Ireland recently held 'New Horizons for Nature', its first national Biodiversity Conference, with some great talks, including an address by President Micheal D Higgins. Talks from the conference will soon be available online at www.biodiversityconference.ie. The President talked about the connections between ecology,

ethics, and the economy, and how he was inspired by Irish communities restoring wetlands and bogs, and monitoring wildlife. He said 'it's about sharing information, listening, and being able to differ with courtesy... we have to recognise the deep changes that need to be made if we are to be authentic...we cannot continue with decisions being taken in a silo... we need to move across boundaries'.

With the creation of the Local Authority Waters Programme and the Agricultural Sustainability and Support Service there is now an opportunity for local action and measures to address local issues with water quality. It will be important that the focus is on actions that will have multiple benefits, and that when decisions are taken on what actions to carry out, they are not taken in a water quality silo, but also consider other benefits, such as climate and biodiversity. This will ensure that we get the best outcomes possible for the investment in the actions that are taken. This will require all parties to not only share our information, but also to listen, and if we differ in views, we do so with courtesy. The new services are only now getting into the field so the next few years will be exciting ones and hopefully successful ones too.

Jenny Deakin, EPA Catchment Science and Management Unit

One thing you can do: is help our bees and other pollinators.

One third of our bee species are threatened with extinction from Ireland. This is because we have drastically reduced the amount of food (flowers) and safe nesting sites in our landscapes.

The National Biodiversity Data Centre work with citizen scientists on monitoring bumblebee populations. 2018 figures show a continued decline in overall numbers of 25% compared to 2017 figures, and a decline of 17% since 2012.

The All-Ireland Pollinator Plan is about all of us, from farmers to local authorities, to schools, gardeners and businesses, coming together to try to create an Ireland where pollinators can survive and thrive.

This can be as simple as mowing your lawn less. For gardens to be good for pollinators, they need to provide food in the form of flowers, shelter for nesting, and safety from chemicals.

To see what you can do, visit www.pollinators.ie



WATERS AND COMMUNITIES NEWS



TidyTown Awards Ceremony, September 2018 L to R: Catherine Seale, Local Authority Waters Programme; Paul O'Reilly, IFI; Therese Murphy and Gerry Larkin, Abbey TidyTown; Sheevaun Thompson, Local Authority Waters Programme.



A kingfisher on Abbey's mural watches over their sensory garden.

TidyTown Waters and Communities Special Award 2018

Sheevaun Thompson tells us all about the TidyTown Waters and Communities Awards, the 2018 winners Abbey from County Galway, and how your community can enter this year's competition...

The SuperValu TidyTown Waters and Communities Award was introduced in 2017 and encourages communities to get involved with their local water bodies, and to preserve, promote and nurture their local natural heritage. Any community group who wants to enter can do so – they just need to show the work they have done over the previous 12 months. Examples of work they could do include clean-ups, providing or upgrading amenities, supporting biodiversity, promoting angling, and awareness raising. This award is sponsored by Inland Fisheries Ireland, Waterways Ireland and the Local Authority Waters Programme, and is open to all community groups to apply.

WATERS AND COMMUNITIES NEWS

2018 Award Winners

Abbey TidyTowns, County Galway.

Abbey TidyTowns won the overall 2018 Waters & Communities Special Award. They have been very concerned about their river and the continuous growth of algae and lack of fish in the river. During 2017 and the first half of 2018 they raised awareness, linking with relevant bodies like Galway County Council, the LA Waters Programme, and Inland Fisheries Ireland.

Abbey TidyTowns helped get the local Community Employment Scheme involved in cleaning up the river, organised a public meeting, and talked to local school children and scout groups about the biodiversity of the river, and their own impacts on water quality. They invited Inland Fisheries Ireland to do electrofishing on the section of river that flows through their village.

Abbey TidyTowns received funding from Galway County Council's Local Agenda 21 for a biodiversity mural on a wall in their sensory garden, beside the river. The mural explores and illustrates the importance of water quality. It shows species that can be sighted regularly on local rivers, and the life cycle of native trout.

Sheevaun Thompson, LA Waters Programme

Learn more:

www.tidytowns.ie

www.watersandcommunities.ie



Inland Fisheries Ireland electrofishing in Abbey, County Galway.

2018 TidyTowns Waters and Communities Awards

Region	Winner (€1,000)	Runner-up (€500)
Midlands & East	Ballymore Eustace Trout & Salmon Anglers' Association & Ballymore Eustace TidyTowns, Co. Kildare	Grange TidyTowns, Co. Louth
North West & West	Abbey TidyTowns, Abbey, Co. Galway	Portrunny Development Association CLG, Ballymurray, Co. Roscommon
South East	Kilkenny TidyTowns - Keep Kilkenny Beautiful, Co. Kilkenny	Silvermines Enhancement Group, Cranahart, Cappamore, Nenagh, Co. Tipperary
South & Midwest	Glounthaune TidyTowns, Co. Cork	UL Kayak Club; Riverpath Volunteers and Limerick City TidyTowns, Limerick
Overall winner	Abbey TidyTowns, Abbey, Co. Galway – Additional €1,000	

Community Information Meetings in Priority Areas for Action

Bernadette White tells us how talking with the local community is the first step taken in any catchment, with the LA Waters Programme introducing themselves, their findings, and the proposed Local Catchment Assessments. This allows people living and working in the catchment to discuss any issues, and get involved in potential solutions.

In the Winter 2018 Catchments Newsletter we learned about the new Local Authority Waters Programme Catchment Assessment Team, and the approach being taken to Local Catchment Assessments. Local Catchment Assessments are being carried out in the 190 Areas for Action targeted in Ireland’s River Basin Management Plan 2018-2021.

The first step in our Priority Areas for Action is a desktop study. We then hold Community Information Meetings to introduce people to the LA Waters Programme, to tell people about our initial findings, and the assessments we are proposing. These meetings allow those who live and work in the catchment to discuss and get involved in any potential proposed solutions. Meetings started in 2018, and will continue throughout 2019, 2020 and 2021.

All Community Information Meetings were advertised on www.watersandcommunities.ie; in selected local newspapers; through the Public Participation Network and via radio interviews where possible. Posters were placed in local community venues, and Elected Members of the Local Authorities were also notified of meetings. Where possible, local community venues were chosen to hold the meetings such as town halls and community centres. It was important to the team that the meetings were held within the Priority Area for Action, where feasible.

Community meetings

Each community meeting was opened by the local Community Water Officer, who gave feedback on the local consultation on the Draft River Basin Management Plan in 2017, including a report on how the submissions were dealt with, and informed the final Plan published in April 2018. Details on the Community Water Development Fund for 2019 were also provided.

This was followed by a presentation by the Regional Catchment Manager or a Catchment Scientist. This part of the meeting focused on who we are; which agencies we are working with; where we plan to work; why we were specifically in their community; and what we plan to do and where. We also told people about our initial findings from our desktop assessments.



The LA Waters Programme Local Catchment Assessment Process.



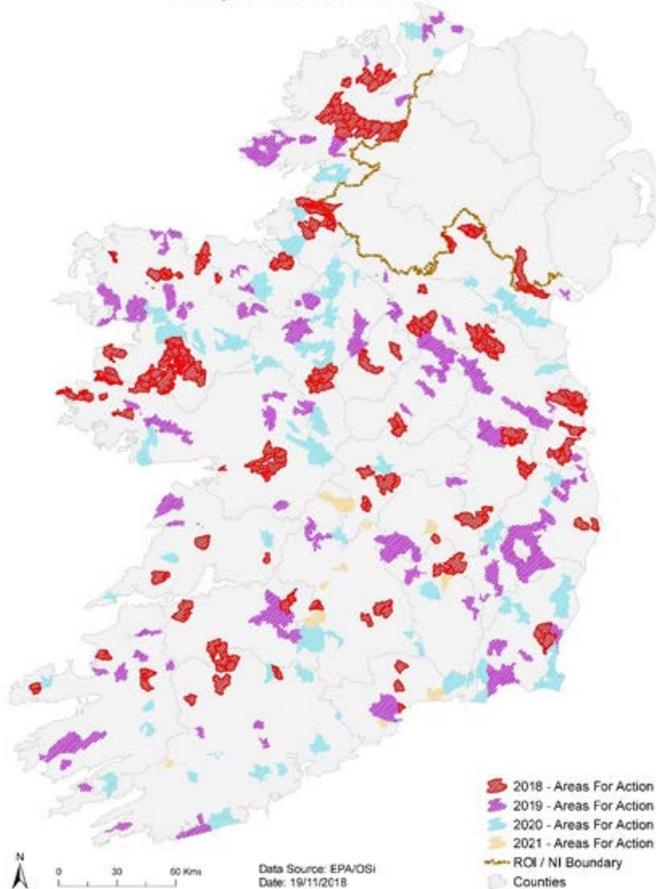
Community Meeting in the Louisburgh Bunowen Priority Area for Action.



Community Meeting in the Milltown Priority Area for Action.

WATERS AND COMMUNITIES NEWS

Priority Areas for Action 2018-2021



The LA Waters Programme will be working in these Priority Areas for Action between 2018 and 2021.

Our desktop assessments build on the knowledge gained during initial characterisation undertaken by the EPA, and the outcome of each assessment will tell the story of the Priority Area for Action, with interim conclusions made on the significant issues (e.g. phosphate, sediment etc.), significant pressures (e.g. industrial discharges, urban waste water, agriculture etc.). By late 2018, the Catchment Assessment Team had started approximately 50 desktop assessments.

The meetings so far were well received, and there were some lively debate and questioning of our teams, followed by refreshments and opportunity for further conversations. Attendees raised many local water issues that are of concern to them including; impacts on fish, flooding, sediment and maintenance of rivers, nutrient pollution, pesticide impacts on water, and discharges from waste water treatment plants.

More general questions were asked about the programme, for example further details on why the priority areas were chosen; how long the teams would be active in the area; land access permissions; engagement with the farming community specifically; how we would engage with the community post meetings and assessment work, and how we would update them on our progress.

Comments provided at the meetings included:

"We are very grateful and supportive of the respectful approach you have taken to public engagement on your work. How can we help you and your team?" - Councillor Orla Leyden & Councillor Kathleen Shanagher at the Clooneigh Community Information Meeting, Kiltreevan Community Centre, Kiltreevan, Co. Roscommon

"We are disappointed with the obvious decline in the water quality of our local river. We feel many pressures are acting on the river, and this has impacted the fish and other fauna living in the river."

"How will the Catchment Assessment Team monitor improvements in the river? We have a lot of concerns about pesticides, nutrients and sediments getting into our local river."

Twenty Community Information Meetings were held across the five Regions in 2018 and three farmer stream-side meetings were also held. These meetings were facilitated by both the LA Waters Community Water Officers and Catchment Assessment Teams, and the Agricultural Sustainability Support and Advisory Programme for the farmer meetings. The Community Water Officers have been working with communities over the last 3 years on engagement, events and projects, and this important work will continue in parallel with the work of the Catchment Assessment Team.

Of the 20 meetings held between October and December 2018, attendance numbers varied from 20 to 60. Attendees included representatives from Tidy Towns groups, Group Water Schemes, Heritage Groups, Angling Clubs, farm organisations, local authority councillors, and private individuals.

Each community meeting held in 2018 is being followed up by farmer meetings, led by the Agricultural Sustainability Support and Advisory Programme, and delivered with the support of the Catchment Assessment Team. Three stream-side farmer engagement events were held in December 2018, and further events are scheduled for throughout 2019. At these events, the Catchment Assessment Team demonstrates some of the local catchment assessment methods they will be using to tell the story of the Priority Area for Action, such as the use of bugs as biological indicators from the river, for example macroinvertebrates and macroalgae, and the use of hand-held devices such as dissolved oxygen meters and conductivity meters.

Bernadette White, LA Waters Programme

Learn more:

Community Information Meetings will be taking place throughout 2019. www.watersandcommunities.ie has the schedule of upcoming meetings and we look forward to seeing you at a local meeting soon.

Local Catchment Assessments: the next step in characterising our catchments - www.catchments.ie/local-catchment-assessments-the-next-step-in-characterising-our-catchments

Dublin The River Camac tells a story

Mary-Liz Walshe from Dublin City Council tells us the story of the River Camac, how it has changed as the city has grown around it, and how local people have gotten involved in sharing stories about the river and its locality, while learning about its cultural, natural and built heritage.

The Camac River has a rich industrial heritage, one that influenced and facilitated the growth of the city to the west. Over 100 years ago sawmills, papermills, woollen mills, grain mills, gun powder mills and several other industries lined the riverbanks.

Many depended on the Camac as a power source, resulting in numerous modifications to it to harness the energy of the fast-flowing water. A wealth of built heritage is also a feature of the river: it passes Heuston Station, the Royal Hospital Kilmainham, Kilmainham Gaol and Courthouse, the lesser known Drimnagh Castle with its flooded moat, and the Round Tower in Clondalkin.



Drimnagh Castle – the last remaining castle in Ireland with a flooded moat. Photo: Mary-Liz Walshe.

The river's past importance seems in stark contrast with its current condition, with much of its course now dominated by concrete channels and lengthy culverts where the river is covered over. Environmentally, the Camac is complex and for it to achieve Good Status under the Water Framework Directive, an informed and nuanced approach will be required. To untangle the many influences acting on the river, an appreciation of the river's story seemed an important step.



The River Camac at Kilmainham, taken from the bridge at Kern's Place. Photo: Mary-Liz Walshe.

Dublin City Council (DCC) in conjunction with the Local Authorities Water Programme launched an exciting Camac River Culture and Heritage Programme in 2018, with the intention of sharing insights about the river, both cultural and environmental, and raising awareness of and appreciation for the river's rich history and future potential.

To start, a series of reminiscence evenings took place last May and June. Local people, historians, nature lovers, business and property owners, and community groups were invited to share their memories of the river and any old photos they might have. These gatherings took place in informal library settings in Inchicore and Drimnagh.

A parallel school outreach programme was developed by DCC incorporating four local primary schools within the Camac Catchment; Our Lady of Lourdes, Goldenbridge, Inchicore National School, Assumption Senior Girls Primary School Walkinstown and Drimnagh Castle Primary School. The programme included a series of river walks, poetry workshops and classroom-based talks. The

WATERS AND COMMUNITIES NEWS

pupils first studied historical maps of their area and learned about the role of rivers in society, past and present from Engineer/Planner for DCC, Mary-Liz Walshe.

Along the banks of their local river, they learned about its natural and built heritage from local historian Pat Liddy, nature enthusiast Eanna Ni Lamhna, leading bird expert Eric Dempsey, and Community Water Officer Sinead Hurson. The pupils then participated in a Camac River Poetry Competition. A second poetry competition was subsequently held for river enthusiasts of all ages to carry on the tradition of poetry in the Camac catchment, in the manner of former Inchicore resident poets, Michael Hartnett and Thomas Kinsella. Hartnett famously featured the Camac River in one of his Inchicore Haiku.

DCC Historian-in-Residence, Cathy Scuffil, has also been interviewing local people to collect their Camac stories. Some local historians are working to chronicle their own memories and interpretations of the role of the river in old Dublin. A book will be published later this year with a selection of these accounts, the verses from the school children and adults, and the new and old gathered images.

As part of Heritage Week, a Camac River event was hosted in August 2018 by DCC and the LA Waters Programme. It celebrated the River Camac through song, poetry and stories, featuring the river's past, present and future. Local and well-known experts were joined by over 100 attendees in the historic Richmond Barracks. Music was played by members of Kila. A guided walk and talk along the Camac was held in September for Culture Night as a concluding part in the Camac Culture and Heritage Programme 2018.

The success of the Camac Cultural and Heritage Programme in 2018 provided further evidence that an opportunity for river-centred tourism exists here and this can only grow in the future as the river benefits from improved water quality, and can offer even more in relation to amenity and recreation.

The Camac is currently classified as being of Moderate Status in the upper reaches and Poor Status in the lower reaches. Significant interventions will be required to achieve Good Status and address the many pressures on this waterbody that exist because of human activities.

The informal telling of stories has evolved into a more formal sharing of information between the local residents and the Council. The next date in the diary for the Camac River Project is an event to facilitate more discussions, between interested locals, environmentalists, technical experts and the Camac Water Framework Directive Team, to set an agenda together for this mighty little river.

Mary-Liz Walshe, Dublin City Council Water Framework Directive Office

Learn more:

To get involved you can mail CamacHeritage@dublincity.ie

You can read a paper by Mary-Liz Walshe and Gerry O'Connell Rehabilitation of the Camac River under the water framework directive: New opportunities to engage local communities and to manage flood risk which was published in Proceedings of National Hydrology Conference November in 2018: www.bit.ly/camacrehabilitation



Local people learning about the Camac River and sharing their stories.

WATERS AND COMMUNITIES NEWS

Galway Loughrea birdwatching and beach clean-up

Caitríona Cunningham from Clean Coasts tells us about a recent event where the community got involved in birdwatching and a clean-up of the Blue Flag beach in Loughrea.



Clean Coasts groups from Loughrea Tidy Towns and the local St. Brendan's Boys National school went birdwatching in January 2019, at an event organised by Clean Coasts, the LA Waters Programme, and the National Parks and Wildlife Service.

Loughrea Lake has been awarded the prestigious International Blue Flag award for the past number of years for its excellent water quality, provision of environmental information and education and safety and services such as lifeguards and toilet facilities.

Loughrea Lake is home for about 3,000 birds during winter, with about 15 species living there, and on the day they saw Black-headed gulls, a lesser Black-headed gull, drafts of Coots, Pochards, Mute Swans and Mallard Ducks.

Recent Birdwatch Ireland surveys also recorded Little Grebes, Great Crested Grebes, Cormorants, Shovelers, Tufted Ducks, Goldeneyes, Lapwings and Great Black-backed gulls. Most of the water birds are migratory and come to Ireland to overwinter from northern countries, and need a safe, undisturbed area with clean water and good feeding to get through winter. Loughrea Lake is a Special Protection Area (SPA) under the EU Birds Directive as it has nationally important populations of Shoveler and Coot.



Looking at birds on Loughrea - small and up close, or big and far away?

Bird Watch Ireland have recorded a dramatic decline by nearly 50% of the number of water birds at Loughrea over the last 30 years. The decline in birds can be due to what is happening during their breeding season elsewhere, the severity of the winter, and local factors.

After the bird-watching event Loughrea Lake Tidy Towns volunteers, and 4th & 5th class pupils from St. Brendan's Boys National School along with their teachers Mr. Pearce Mulhall and Patricia Callaghan conducted a beach clean-up of Loughrea Lake. Speaking at the Loughrea Lake's beach clean, Clean Coasts Officer Caitríona Cunningham said, "every single piece of litter removed during the beach clean is one less piece of litter that will pollute the beautiful Loughrea Lake or harm its wildlife."

Caitríona Cunningham, Clean Coasts

Learn more:

www.cleancoasts.org

www.birdwatchireland.ie

Up-to-date water quality information for Loughrea Lake is available on www.beaches.ie throughout the bathing season, which runs from 1 June to 15 September - www.bit.ly/loughrealake



Some of the local volunteers doing their bit for Loughrea.

WATERS AND COMMUNITIES NEWS

Leitrim

Anglers learn how to protect small hill and coastal streams

Karen Kennedy tells us how the LA Waters Programme organised training for anglers who wanted to learn more about protecting and managing small streams, and citizen science techniques.

Anglers from Leitrim, Sligo, Donegal, Fermanagh and Cavan came together on the 20 October 2018 at The Organic Centre, Rossinver, Co. Leitrim to learn about protecting and managing small hill and coastal streams. The course was organised by the Local Authority Waters Programme and provided participants with an understanding of the role small streams play in the functioning of a catchment. It was also an opportunity to learn about basic citizen science techniques. Dr Ken Whelan, fisheries and environmental consultant, delivered the day-long training. This involved interactive discussions in the morning, followed by scientific sampling and survey work on the Ballagh River in the afternoon. A staff member of Inland Fisheries Ireland was also present to provide advice on access, and timing of in-stream activities. The anglers will hopefully be able to carry out basic assessment of the health of small streams in their areas which provide important habitats for juvenile fish.

The training was an important opportunity to build regional and cross border networks and exchange information on work being carried out by volunteers on catchment protection in their areas. Several anglers commented on the relaxed setting for the course, and are eager to expand on their citizen science skills into the future.

Karen Kennedy, LA Waters Programme



Getting ready for the anglers to arrive. The Organic Centre, County Leitrim. Photo: Karen Kennedy.



Participants carry out sampling and survey work on the Ballagh River at The Organic Centre, County Leitrim.



Course participants, Waters & Communities staff and IFI staff at the Organic Centre in Rossinver.

Longford Kids in primary school learn about water and wildlife

Local kids in Longford Town learn about water quality, water bugs, and what they can do to help protect their river.

The Local Authority Waters Programme and Longford County Council supported a pilot two-day StreamScapes education project for the Camlin River, Longford Town on 26 and 27 September 2018. The StreamScapes methodology, developed by Coomhola Salmon Trust, involves short, intensive outreach activities for a river catchment involving schools and the local community. In total 48 students from St. Michael's Boys National School and the Angling Club at St. Mel's College participated in the project. The workshops involved interactive discussion on water quality and biodiversity in class, followed by a short walk to the Camlin River at The Mall to investigate the bugs living in the river. The students took part in discussions with great enthusiasm and could identify many of the water bugs and make a general assessment of water quality. Afterwards students came up with some interesting ways to raise awareness on the impacts of plastics and rubbish entering rivers. The workshops were supported by Community Water Officer Karen Kennedy and Longford County Council Environment staff, and were funded under Local Agenda 21.

Karen Kennedy, LA Waters Programme



St. Michael's Boys National School, at The Mall Longford Town. Photo: Karen Kennedy.



St. Mel's College Angling Club at The Mall, Longford Town. Photo: Karen Kennedy.

Roscommon The Community Water Fund helps Portrun tell the story of the Portrunny water catchment

The Community Water Development Fund supports communities developing water related projects and initiatives. Eoghan Brennan from Portrun Development Association tells us what his community has done with their funding.



The new sign with the Hind River behind it.

WATERS AND COMMUNITIES NEWS

During 2018, Portrun Development Association received funding under the Community Water Development Fund for the installation of an interpretive sign for the Hind River and the production of a short film on Portrunny Water Catchment.

The Hind River has been identified as a Priority Area for Action to improve water quality on Lough Ree. The interpretive sign was installed at the Hind River road bridge in Clooncagh which is close to Portrunny. Visitors to the area on the Portrunny Heritage Trail now have the benefit of this sign, along with cyclists on the Green Heartlands Cycle and future visitors as part of Irelands Hidden Heartlands.

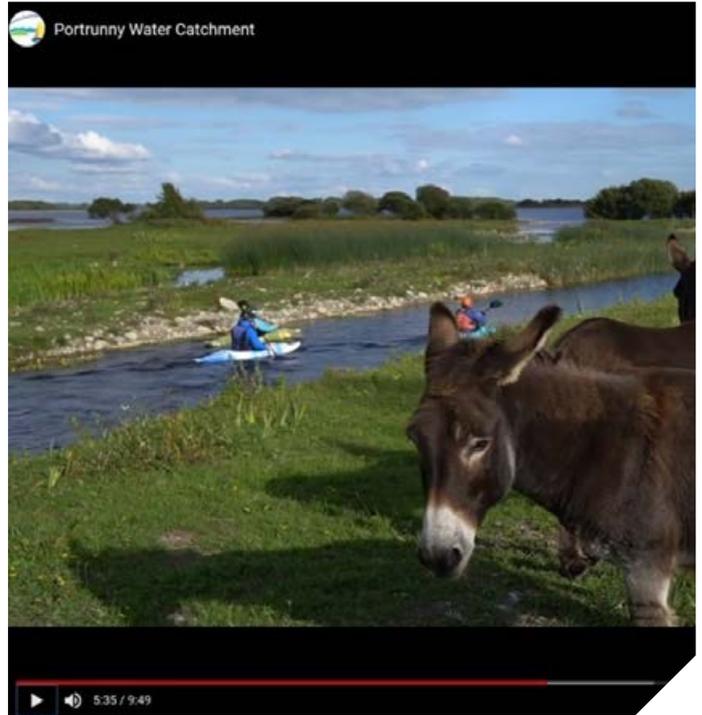
The sign has information about the Hind River, its drainage and navigation, and the butterflies and biodiversity it helps provide a habitat for.

Portrun Development Association would like to acknowledge the help and support of Community Water Officer Catherine Seale, NPWS Ranger Laura Gallagher and John Mockler from Roscommon County Council for making these projects possible.

Eoghan Brennan, Portrun Development Association

Learn More:

www.portrun.ie



The film on the Portrunny Water Catchment can be viewed on YouTube or on www.portrun.ie

THE HIND RIVER

The Hind River - An Eidhneach



The Hind River flows into the west side of Lough Ree, the second-largest lake on the River Shannon, at Kinawley near Portrunny Bay. The Hind River rises near Clontarf and is over 34km in length. The river was once a top class trout river which provided some of the finest trout found within the Shannon water catchment.

The Hind River is a slow flowing river system that provides a natural habitat for wildlife. A rich biodiversity can be found along the river bank with several varieties of wild flowers and native plants. The boundary lands are generally used for agriculture purposes. An 1811 map located in Clooncallan on the bank of the Hind River which was operated by Hugh Fennell in 1768. It was not in existence in 1837 as the Ordnance Survey map records the mill and mill-race.

A tributary of the Hind River, the River Juggy originates to the south of Roscommon town and flows through Roscommon before meeting the Hind River upstream of Ballymartin Lodge.



Drainage and Navigation



The Hind River is a small river but it might have been much larger if nineteenth-century proposals to make it navigable had been implemented. This would have provided a link from Roscommon town to the Shannon, a much needed link to the Shannon at the time. In the early 1840s plans were submitted to implement a drainage scheme and also works to make the Hind River navigable.

The River Hind Navigation is not well known, which may be attributable to its abandonment. There were several proposals to make the Hind navigable, but none of them were implemented.

The project to make the Hind River navigable involved the widening and deepening of the river initially between Lough Ree and Ballymurray and then to Roscommon town.



Butterflies

The wealth of wild flowers in spring and summer as the Hind River bank and Lough Ree across a variety of butterfly species. The orange tip butterfly is one of the first to appear in April each year. It lays its eggs on the leaves of the lady's smock. Later in summer other species emerge including speckled wood, meadow brown and green-veined white.

In Ireland the brimstone butterfly is mainly found in limestone areas, where the native buckthorn tree occurs. The brimstone emerges in springtime from winter hibernation and lays eggs on the leaves of the buckthorn tree. A new generation of the brimstone butterfly emerges in the late summer and hibernates during the winter and lays eggs the following spring.

Biodiversity

BIO-DIVERSITY is short for 'Biological Diversity'. It refers to the variety of life on earth and includes all plant life and animals, and the habitats of which they are

part. It varies from the smallest micro-organism on earth to the largest animal. Biodiversity is important because without it the world would not exist.



Small tortoiseshell (Agonis urticae)



Speckled Wood (Pararge aegeria)



Peacock (Inachis io)



Meadow Brown (Maniola jurtina)



Green-veined White (Pieris rapae)



Common Blue Polyommatus (Polyommatus icarus)



Brimstone (Gonepteryx rhamni)

Príomhshruith Éireann

The poem 'Príomhshruith Éireann' (The Principal River of Ireland) was compiled by Michael Ó Brádaigh, Tigheanán in 1794. In this lengthy poem, which was written in Irish, he traces the course of the River Shannon and its many tributaries. He mentions many townlands and place-names. An excerpt from the poem is reproduced here which covers many areas in this locality.

Very little is known about its author today - even the date of his birth and death remains unknown.

In 1914 a book 'Príomhshruith Éireann', was published as a tribute to Michael Ó Brádaigh and also to share the importance of place-names in Irish society. The book also includes an English version of the poem by Art Ó Máedóráin.

The Hind River
Eidhneach cheilgheach na m-uasmair,
na mbarr, is na tír, is é léi a abhainneach
a tóbach éirí as póil each fainéin
is na bbeiríní a tóir an t-áin.
D'áin a tóir ó Dhroicheadh
deáilín an t-áin de ghairn na h-áin,
is baic na h-áin na h-áin.
An t-áin a tóir ó Dhroicheadh
deáilín an t-áin de ghairn na h-áin,
is baic na h-áin na h-áin.
An t-áin a tóir ó Dhroicheadh
deáilín an t-áin de ghairn na h-áin,
is baic na h-áin na h-áin.

The Hind River - The Banew River

The 'Banew' river or the 'Banewach' river was a name attributed to the Hind River. It is translated as the 'River of the Blessing'. Tradition claims that every evening the monks from Roscommon and those from the Bannow (Banew) Island (or Clooncallan) met on the banks of this river. The prayer

resolution by which they greeted each other when they met and parted is supposed to have given a blessing to the river (S.M.S. 240.23).

Another version of the tradition documents that the Banew is a small bridge in Clooncallan. At this bridge the monks of the

Quaker Island and the monks of Clooncallan Abbey used to part. When they were saying goodbye they used to say 'banewach' and that is why it is called the Banewach (M.M.S. 120, 174-175).

Reference: M.H.S. Irish Manuscript Collection (1957-8) Vol. 1506

Wexford

School children working to understand their local streams and getting their community involved in Duncannon

Fran Igoe tells us how the local community in Duncannon, County Wexford have been working together to understand their local streams and beach, and what they can do to improve their water quality.

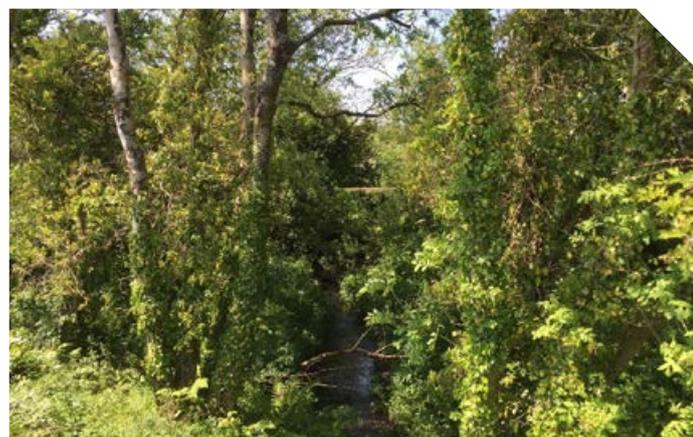
Bringing about water quality improvements in Priority Areas for Action (PAAs) requires a good knowledge of the pressures impacting on water quality, and the identification of practical solutions to address them. This should be accompanied with local community engagement and wider stakeholder participation, ideally from the onset.

In Duncannon, considerable work has been undertaken by Wexford County Council to address water quality issues affecting the beach at Duncannon, and its Blue Flag. Duncannon is within the Waterford Harbour Priority Areas for Action, one of 190 Priority Areas for Action nationally. The work by Wexford County Council has culminated in the successful award of a European Innovation Project, which will focus on locally-led solutions for water quality in the area.

To help set the scene, government organisations collaborated with local school children and their families to promote awareness of the uniqueness of the area, and showcase the wonderful life that exists in the small coastal streams.

Wexford County Council had already organised a citizen science water bug awareness workshop for local farmers with the support of Department of Agriculture funding. The LA Waters Programme then built on this, working with Wexford County Council and Inland Fisheries Ireland to deliver a classroom talk in Duncannon National School.

The discussions focused on the importance of these local streams for a range of aquatic life, especially as breeding grounds for sea trout, together with the need to ensure that they are kept clean as they also flow onto the beach, which recently lost its Blue Flag.



One of the beautiful streams in the Duncannon area.

In the afternoon, the kids were taken on a field trip out to one of the local streams and shown the water bug kick sampling monitoring technique. They discovered the range of water bugs that can be found, even in small streams less than two metres wide. These water bugs included mayfly, which are very sensitive to pollution, and more tolerant species such as water shrimp. All are important fish food of course!

This was followed by a discussion on hydromorphology, which means the physical shape of the river and its banks, and the importance of the riverside plant life to the health of streams. The highlight of the day was the capture of a young salmon (returned of course) when Fisheries Officer Declan Cullagh carried out a demonstration of the electrofishing technique used by Inland Fisheries Ireland to monitor fish in our rivers. Three-spined sticklebacks were also caught to everyone's delight.

Commenting on the initiative, St Oliver's National School Principal Martin Lyons stated "this was a very enjoyable day and the students



Getting stuck in and exploring a local stream.

WATERS AND COMMUNITIES NEWS

learnt a lot about their own environment which is so important as it is their heritage. Perhaps you might come back and bring out the other classes and organise a source to sea event and maybe bring in Bannow Bay too." We just might do that...

Special thanks to Wexford Co Council, Inland Fisheries Ireland, Martin Lyons and the teachers of St Oliver's National School, Duncannon, the children's parents for assisting in organising the event and of course the kids themselves for being such great sports.

Events like these working with local communities are very important,

and we would like to encourage community and agency collaborations across the country, especially in other Priority Areas for Action.

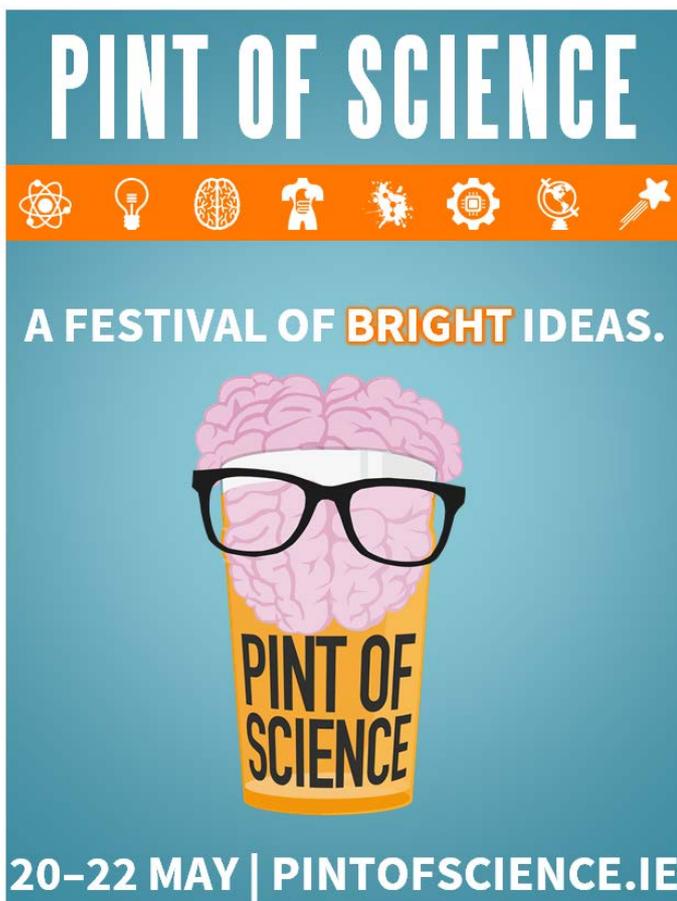
Fran Igoe, Local Authority Waters Programme Southern Coordinator

Learn more:

Information about the Duncannon Blue Flag Farming and Communities European innovation Project is available from the National Rural Network www.nationalruralnetwork.ie/eip-agri

Pint of Science Ireland – taking science from labs to local pubs and cafes

Beatriz Gil Pulido tells us about this year's Pint of Science festival, which is taking place in Dublin, Cork, Galway, Limerick, Birr, Athlone, Dundalk, and Waterford from the 20 - 22 May.



Pint of Science is an annual international science festival that takes science out of the lab and into local pubs and cafes. Pint of Science has grown considerably since it began in the UK in 2013. Last year, Pint of Science took place in 275 cities across the globe – including Dublin, Cork, Galway, and Limerick.

This year's festival will be held on 20-22 May and, for the first time, the festival will also take place in Birr, Athlone, Dundalk, and Waterford. This will build on the success of the May 2018 festival, where 70 scientists spoke to over 900 attendees across 12 different pubs in Ireland. The topics covered were very broad, and talks were focused on these themes: Our Body; Our Society; Atoms to Galaxies; Beautiful Mind; Planet Earth; and Teach me out.

"Science communication plays a crucial role to make science real for people and Pint of Science Ireland provides a great opportunity to chat with researchers in a relaxed atmosphere. We really hope that people across the country will enjoy the 2019 festival." - Beatriz Gil Pulido, Pint of Science Ireland Co-Director

The Pint of Science Ireland team comprises over 60 passionate volunteers at national and local levels to bring science to all of you. This has been made possible by our many great sponsors who are passionate about sharing science with us.

"The public has such an appetite for science but often it can be hard for adults to find the time to learn about the great research is being done around Ireland. Between 20 and 22 May, people attending Pint of Science will hear from a wide range of scientists who are speaking about their cutting-edge research - issues which are relevant to society and very much at the forefront of our understanding." - Sean Mooney, Pint of Science Ireland Marketing and Communications Manager

Pint of Science Ireland wouldn't be possible without volunteers, and we are always seeking people enthusiastic about science to help organise the events in May. There are still some locations which need volunteers, where you will have the opportunity to be involved in the festival and to meet other people who are passionate about science. Please get in touch if you are interested in taking part in Pint of Science Ireland as a speaker or volunteer.

Beatriz Gil Pulido, Pint of Science Ireland

Learn More:

www.pintofscience.ie

ARTICLES

Public consultation: timetable and work programme for the third-cycle River Basin Management Plan 2022-2027

Mr. Eoghan Murphy T.D. Minister for Housing, Planning, Community and Local Government has published the draft timetable and work programme for the third-cycle River Basin Management Plan (RBMP) 2022 – 2027, and launched an accompanying public consultation.

Water is a fundamental aspect of all our lives and maintaining good water quality is important in promoting improvements across all elements of our society, economy and environment. By protecting our water quality, we will also help to protect public health. Our groundwater, rivers and lakes are the sources of our drinking water and the health of our water bodies is intrinsically linked to maintaining safe, clean water supplies. In addition, they are not only essential parts of our natural environment but also a national asset that our communities and tourists enjoy. By continuing to improve the quality of our water bodies, we will also help to sustain jobs in water-intensive sectors, such as agri-food and tourism, sectors that collectively sustain over 400,000 jobs.

Water quality must be protected to ensure we have sufficient quantity and satisfactory quality to ensure we comply with the Water Framework Directive (WFD), the principal water policy driver in the EU. The WFD is implemented through the river basin management planning process and river basin management plans (RBMPs) are reviewed and updated every six years in accordance with the Directive. Ireland's first River Basin Management Plans were published in 2009 covering 7 separate River Basin Districts. The second RBMP, encompassing one single national River Basin District, was published in 2018. The third RBMP is due to be published by the end of 2021 and will run for six years to 2027.

The purpose of this consultation is to set out the main steps and milestones towards preparing the third River Basin Management Plan (RBMP) for Ireland by December 2021 and to seek your views with respect to them. Early engagement with stakeholders allows the DHPLG to undertake a more informed, collaborative, and ultimately, robust review of the current RBMP structures and measures and apply these learnings in the development of the third-cycle Plan. This engagement sets the direction for how the DHPLG will work with others in the coming years to improve on their existing Plan, and help accelerate improvements in water quality during the third river basin planning cycle.

This first consultation stage, which will run for six months from January to June 2019, will allow The Department of Housing, Planning and Local Government to:

1. Finalise the timetable and work programme for developing the third cycle RBMP;
2. Explain the structures which are in place to enable stakeholder participation in the development of the Plan and to highlight the opportunities for that engagement;
3. Set out the approach to developing the third cycle RBMP;
4. Provide the opportunity for improvements to be suggested in respect of how stakeholders are engaged with; and
5. Promote the continued implementation of RBMP measures.

How to respond to the consultation:

Full details of this public consultation are available on the DHPLG website: www.housing.gov.ie/water/water-quality/river-basin-management-plans/public-consultation-timetable-and-work-programme

A short, targeted questionnaire has been developed to facilitate responses to some of the key questions the DHPLG have in relation to the development of the RBMP. The responses received to this questionnaire will allow the DHPLG to determine the public opinion on the current RBMP and the level of engagement between the implementation bodies and the stakeholders. You can find this survey at: <https://www.surveymonkey.com/r/3Q9VMS7>

If you have any comments or suggestions outside of those topics covered in the questionnaire, you can also send them directly to rbmp@housing.gov.ie

You can also engage through the Local Authority Waters Programme (LAWPRO) either at one of its public meetings, through its website: www.lawaters.ie or by email: info@lawaters.ie

Written submissions can be sent to: RBMP Public Consultation, Water Division, Department of Housing, Planning and Local Government, Custom House, Dublin 1, D01 W6X0.

You are invited to make written submissions or comments no later than **Friday, 28 June 2019**.

ARTICLES

Public engagement & environmental policy

Simon O’Rafferty is an EPA-funded researcher who focuses on the design of environmental policy interventions for sustainable behaviour change. In this article, he talks about the different ways public engagement can work, using water catchments as an example, and tells us about some innovative case studies from Ireland and across Europe.

What if the fundamental role of public policy was to promote community and ecological wellbeing? What issues might be prioritised by government and what issues might be prioritised by communities? Would they be the same priorities? How would existing policymaking processes have to change? Who would be involved and when? What goals or targets would be set, and how would we know if these policies were having an impact?

This is more than just an interesting thought experiment because there is recognition that current approaches to designing and implementing environmental policies are not facilitating the required social, technical and economic transitions quickly or deeply enough.

The reasons for this are varied, but include factors such as fragmented engagement between citizens and public bodies, inertia around pro-environmental behaviour changes, a lack of systems thinking and human-centred approaches in policy design, or structural barriers to the scaling of successful sustainable community initiatives.

Several broad strategic frameworks such as the UN Sustainable Development Goals have signalled that policy design and implementation should, among many other things, place a greater emphasis on public engagement and a wider demographic ethos.

Public engagement recasts the policy design focus away from the government and functions of public bodies to the local level. This in turn demands systems-oriented and place-based approaches that are adaptive to local contexts and local stakeholders.

Since at least the 1950s there have been many academic and practitioner arguments for and against different approaches to public engagement. Previous experience has shown that if done well public engagement has the potential to strengthen the legitimacy and accountability of democratic institutions, and build trust in public bodies.

Involving citizens in policy design can also provide real-time and relevant information about local needs and conditions, and if captured this can result in public services, regulations and other policy interventions that are more effective (and efficient).

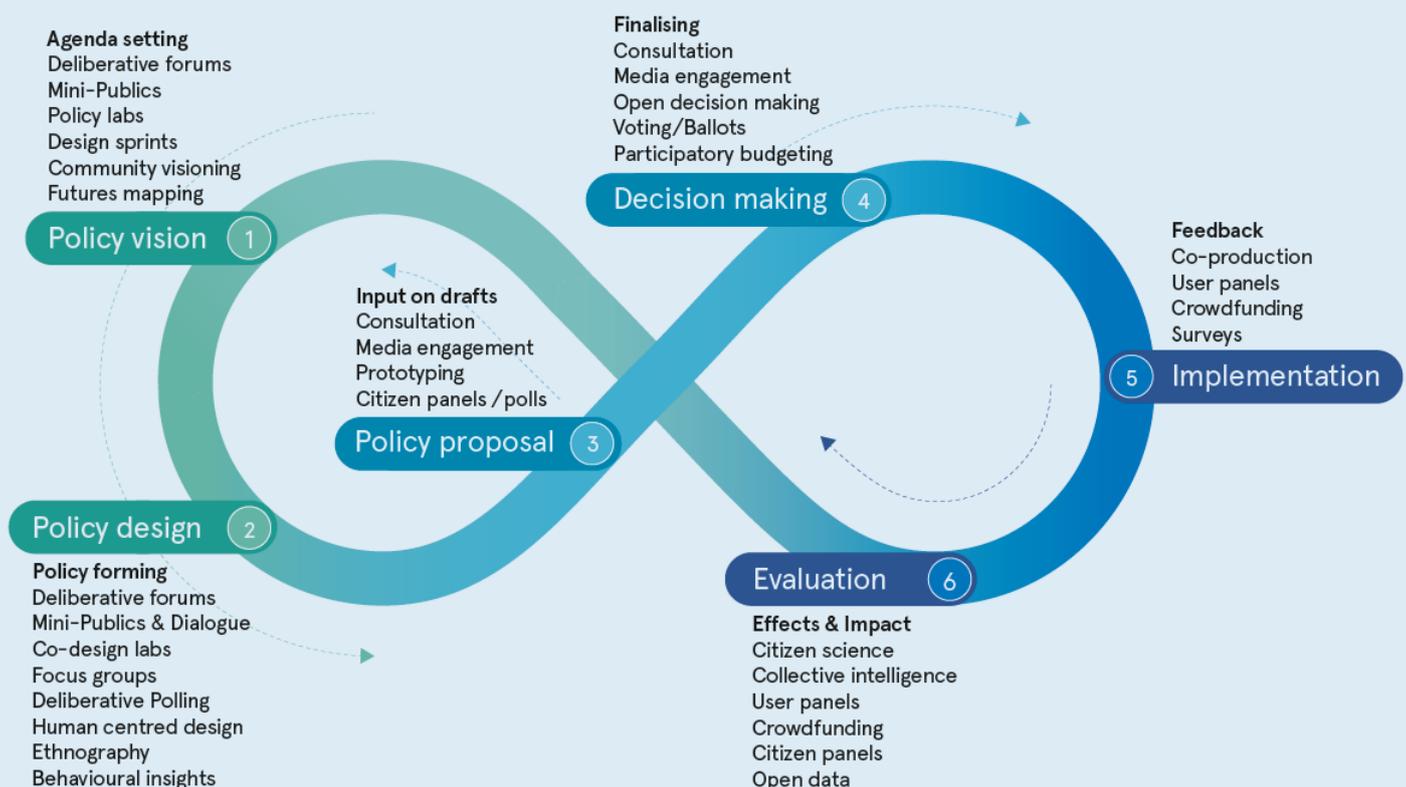


Figure 1: Key public engagement approaches and where they work on the policy cycle.

ARTICLES

Public engagement also has the potential to build capacity and empower communities by improving awareness, confidence, knowledge, and skills for engaging with local and national policy making.

This requires a shift away from the paternalistic approach of public engagement as being something done “to” people towards being something done “with” or “by” people. It may also require a change of traditional ‘command and control’ organisational models and ways of working.

On the other hand, if public engagement activities are poorly designed it can lead to frustration, disengagement and disillusionment amongst communities and public bodies alike. They can also reinforce social inequalities by locking out those communities potentially most impacted by policy decisions. For example, people living in deprived or marginalised communities often face multiple structural barriers to participation and have low levels of engagement. This can be a lack of financial resources, transport and childcare costs, language barriers, income barriers, scepticism, and motivational barriers, but primarily the public engagement may not have been designed with them in mind.

What is public engagement?

One of the challenges with public engagement is that there is no single definition as it addresses a spectrum of interactions between citizens, communities, stakeholder groups, and public bodies. Public engagement can range from general communication, public consultation, deliberative public fora, citizen panels and citizen juries, through to co-design and co-production of public services and policies.

Figure 1 highlights some key public engagement approaches and

where they work on the policy cycle.

Some people use the term public engagement to describe, in general terms, how people choose to engage and interact with, learn from, and respond to the world around them.

Using water catchments as an example, public engagement may be used to describe what people think, feel and do about water quality and the wider issues connected with water catchments. In this sense, public engagement is used to describe the attitudes people have towards a topic and ultimately how they may moderate or change their behaviour in relation this.

How people engage with the issue can also be very different, and range from active engagement to passive compliance with whatever rules, regulations or social norms determine what is ‘appropriate’ to do.

When public engagement is something that an organisation does to or with the public it can be seen in a number of different perspectives. For example, it may be:

- **An additive process** for communicating with the public. For example, some organisations, such as research institutes, often see it as the mechanism to communicate research, policy ideas or other topics with various publics (the public)
- **An extractive process** for consulting the public on issues, such as policy concepts or proposed policy interventions. It is extractive in the sense that the public are being asked about their preferences for a range of pre-determined policy options
- **A deliberative process** for public bodies to engage the public in a process of consultation and debate around a topic. Processes such as mini-publics (e.g. citizen assemblies) are examples of this

Figure 1 highlights some key public engagement approaches and



Figure 2: Stakeholder engagement for developing regulations. Source: OECD Better Life Index, 2017.

ARTICLES

- A **productive process** for the public to participate in generating evidence to support policy making or service design. This can be through activities such as citizen science, citizen social researchers, open source smart cities, narrative neighbourhoods or as active participants in participatory action research projects
- A **co-creative process** for the public to be directly involved in the design of policies, services and programmes. Co-creation requires different approaches to the governance of public engagement as well as mindset shift towards designing “with” as opposed to “designing for”

Public engagement in Ireland

Apart from the ongoing public engagement activities by local and national government and state agencies, Ireland has been developing a number of new approaches to public engagement in recent years. This includes the Public Participation Networks and Citizen Assemblies, as well as financing mechanisms that support social innovation within and between communities.

While these are welcome, Ireland still has a long way to go towards developing advanced and meaningful approaches to public engagement. In their 2017 “Better Life Index” the OECD ranked Ireland the 4th lowest country in terms of “Civic Engagement” in general and the lowest for “Stakeholder engagement for developing regulations” (Figure 2). They defined Civic Engagement as a range of factors such as voter turnout, and involvement of citizens and stakeholders in regulation and policy.

Relationships to water catchments

Because water catchments are complex places with multi-level interactions between land, communities, businesses, farmers, and a myriad of other stakeholders they are often contested places.

They are contested in the sense that they reflect and embody divergent beliefs, values, meaning, cultures and interests. Any social, technological or economic engagements with catchment areas implies a role for deliberation as well as the traditional analytic input to policy.

Some of the arguments for increasing public engagement within water catchments are:

- effective and democratic governance of water catchments may demand public actions in the form of individual or community behaviour change
- introduction of new infrastructure, governance models or land use patterns will require public support, perceived legitimacy, trust, and some form of community buy-in and return
- policy makers and communities may also want to simply deliberate and debate around what type of society they want to live in, and how this relates to sustainable water catchments

To support this, public engagement processes could be designed in a way that move beyond tokenistic engagement towards building social networks, increased community trust, lifelong learning, and increase a sense of purpose and community wellbeing.



Local people getting involved in designing a park for their community in Ballyfermot.

To be worthwhile and impactful, public engagement should:

- Start with a clear set of objectives, an evaluation protocol, and a strategy for inclusion of marginalised groups
- Clarify who you are looking to engage with (e.g. a population segment)
- Be supported, aligned or integrated with the decision-making processes of local and national government, funding agencies, and other relevant public bodies
- Be based on principles of experimentation and innovation, so that it rigorously shapes priorities and supports decision making

Simon O’Rafferty, EPA Research Fellow

Case examples

There are hundreds, if not thousands, of examples of public engagement that provide valuable lessons on the points above. The following are two examples of public engagement; an expanded version of this article with more examples will be on www.catchments.ie.

ARTICLES



HOME ABOUT PROJECTS SPRING NEWSPAPER 2019 WE MAKE OUR CITY FESTIVAL MORE

SEARCH

WE MAKE OUR CITY

SPRING PROGRAMME 26 FEB - 18 APRIL
FESTIVAL 15 - 16 MARCH

BARKING AND DAGENHAM
LONDON



Every one, every day encourages local residents to come up with ideas for their community.

Co-creative engagement - Ballyfermot Play Park

The Play Park project is an ongoing collaborative and participatory design project aimed at developing a new play area and skate park in 'The Lawns' at Le Fanu Park, Ballyfermot in Dublin 10. The site in Le Fanu Park was chosen by Dublin City Council in response to the growing need and desire for a free play and skate park in the Ballyfermot area.

The primary objectives of the project were the development of a play area and green space for local residents that encourages active citizenship, fosters community engagement, addresses inequality and disadvantage, exploits opportunities for inter-disciplinary learning, and employs a genuine participatory design process.

The initiative is being delivered in three phases through a process of high quality public engagement, an architectural competition, and construction. In the first phase of the project there were 10 public engagement events that combined aspects of consultation, public engagement, co-design, and participatory planning. Almost 370 residents of all ages participated in these activities.

Learn More:

<https://architecturefoundation.ie/project/the-play-park/>

Multi-Stakeholder Public Engagement - Every One Every Day

Every One Every Day is a partnership between Participatory City, and Barking and Dagenham Council, and is the largest participatory and public engagement project in the UK.

Every One Every Day is based on the principle of "Neighbourhoods made by everyone, for everyone". It is a multi-million-pound five-year long project that will be engaging with 25,000 residents across the Barking and Dagenham borough to create over 250 neighbourhood-led projects, and form more than 100 new businesses.

As part of the initiative, residents are invited to share ideas for projects and community businesses they would like to create in their neighbourhoods. These projects include sharing knowledge, spaces and resources, for families to work and play together, for bulk cooking, food growing, tree planting, for trading, making and repairing, and for growing community businesses.

Learn More:

<https://www.weareeveryone.org/> & <http://www.participatorycity.org>

ARTICLES

Ireland's woodlands and forests A renewed focus under the second cycle of the River Basin Management Plan

Kevin Collins and Ken Bucke, Forestry Inspectors with the Department of Agriculture, Food & the Marine, provide us with an overview of the range of initiatives now in place under the 2nd cycle of the Water Framework Directive, to minimise any negative impacts arising from forestry, and to realise the ecosystem services woodlands and forests can deliver to protect and enhance our waters.



Undisturbed water setbacks are a key component of all afforestation, instantly eliminating a range of pressures on water.

Forests and water: some international perspectives

According to the UN Food & Agriculture Organisation (FAO), approximately 75% of the world's accessible freshwater for agricultural, domestic, urban, industrial and environmental uses comes from forests.

The US Forest Service says that, in the face of challenges created by rapid and compounded climatic and socio-economic changes, forests from rural to urban landscapes will be increasingly relied upon to provide clean, reliable water supplies for human uses, as well as for aquatic ecosystems, due to their ability to moderate hydrologic extremes and improve water quality by filtering nutrients and sediment.

The European Environment Agency (EEA) states that an increase in the scarcity of water has led to a focus in Europe on providing clean

drinking water from forests. Forests serve to replenish and provide clean drinking water, and it is estimated that forests provide more than 4 km³ of water annually to European citizens. The EEA also highlights the large potential forests have in water retention. In water basins where the forest cover is 30%, water retention is 25% higher than in basins where the forest cover is only 10%.

Water quality decline in Ireland

The second cycle of Ireland's River Basin Management Plan (RBMP) 2018-2021 is strongly focused on identifying and implementing the solutions to problems within those water bodies At Risk of not meeting their Water Framework Directive (WFD) objectives. Forestry as a land use can be a cause of water quality decline, as poorly sited, designed and managed forests can result in sediment and nutrient release, and impact on hydromorphology. This is reflected in forestry being the fourth most significant pressure on

ARTICLES

At Risk waters, and significantly, the leading pressure on existing high status objective waters deemed to be At Risk, perhaps reflecting previous State planting in upland areas and headwaters.

The response of the Department of Agriculture, Food & the Marine (DAFM) and the wider forestry sector to the second WFD cycle is 3-fold:

- to safeguard water during all forestry operations;
- to restructure existing forests to reflect water sensitivities, where required; and
- to situate and design new woodlands and forests in a way that protects water quality, by delivering water-related ecosystem services.

Regarding the first two objectives above, many wetland habitats and water-sensitive landscapes are no longer eligible for afforestation due to rules introduced in March 2016 regarding minimum timber productivity potential. Afforestation proposals which meet this bar must then undergo a rigorous evaluation process incorporating site inspections by DAFM Forestry inspectors, the application of Appropriate Assessment and EIA screening, referrals to statutory referral bodies, and public consultation.

Water setback

If subsequently licensed, all afforestation must adhere to environmental requirements that include (in relation to water) mandatory water setbacks and other protective measures regarding cultivation, fertiliser application, and herbicide use.

Forest restructuring is also crucial to reshape the existing forest estate to take account of water and other environmental sensitivities. This is being undertaken primarily at reforestation post-clearfell, when the replanting of the site can incorporate water setbacks, native woodland zones and hydrological restoration. This ensures that the new rotation of the forest has a far more sensitive 'footprint' regarding water. The DAFM publication, *Felling & Reforestation Policy*, sets out in greater detail the options now available regarding reforestation.

These measures focus on eliminating negative impacts. But what of the positive role woodlands and forests can play in relation to water? There is a growing realisation that forestry in Ireland has a significant contribution to make in this regard. At a general level, forests only require fertiliser and herbicide application within the first 2-3 years of growth, and such inputs are added only as required. After that, the forest rotation is characterised by long periods where no activities or inputs take place. When water setbacks and the water-focused use of the mandatory 15% broadleaf component within each plantation are both factored in, forests can be regarded as being far more benign regarding water quality compared to other land uses.

Creating native woodlands for water

Furthermore, financial supports available from DAFM can be used strategically to protect and enhance water quality. Foremost among these is the Native Woodland Scheme, developed with Woodlands of Ireland and other stakeholders, to fund the creation of new native woodland and the restoration of existing native woodland (including the conversion of conifer stands to native woodland).

Creating permanent native woodlands along watercourses, to be managed under 'continuous cover forestry', is a highly significant and far-reaching measure to improve water quality, so much so that this approach forms a key component of the KerryLIFE Project in the Caragh and Kerry Blackwater catchments, which is exploring and demonstrating sustainable agriculture and forestry practices compatible with the highly endangered Freshwater Pearl Mussel.

Native woodlands have been shown to buffer watercourses against overland sediment and nutrient flow, stabilise river banks, restore riparian zones, provide food, shading and cooling for fish and aquatic life, and help to reduce flood risk. This is in addition to other co-benefits regarding biodiversity, landscape, carbon capture, woodland and non-wood production, outdoor recreation and environmental learning, etc. The DAFM document *Woodland for Water (2018)*, developed with input from Woodlands of Ireland, explores this use of native woodland in greater detail.

In September 2018, Minister Andrew Doyle TD, Minister of State with responsibility for forestry, announced the setting up of a new Woodland Environmental fund (WEF) to further boost the creation of new native woodlands in Ireland. This new initiative provides an opportunity for businesses, public agencies and other bodies to work in partnership with landowners and the Government as part of the national effort to plant an additional 3 million native trees between now and 2020. The WEF is an initiative of the Department of Agriculture, Food & the Marine under the national Forestry Programme 2014–2020. Although in its infancy, the Woodland Environmental Fund could be used to realise the Woodland for Water model at key locations within sensitive water catchments, to target water-related ecosystem services where most needed.

There are other DAFM measures, existing or soon to be available, that have a strong application regarding water. These include the Agroforestry Scheme, the Continuous Cover Forestry Scheme (launched by Minister Doyle in January 2019), and the forthcoming Forest Environmental Enhancement Scheme. The DAFM is also committed to continuing research in the area forests and water, and is involved with a number of projects driving innovation in catchment management



An example of the Woodland for Water model, comprising new native woodland and an undisturbed water setback.

ARTICLES

A new role for Ireland's woodlands and forests

The DAFM and the wider forestry sector are dedicated to eliminating negative impacts on water arising from forests and forestry operations. These are real but manageable, through the careful siting, design and management of our forests. Irish forestry is also offering a range of innovative measures focused on protecting water against all pressures, not just forestry-related. The DAFM is working closely with other bodies involved in implementing the RBMP and with landowners and other partners to continue to roll-out real initiatives on-the-ground. Forestry can often be seen as a negative player regarding water quality, but sometimes solutions appear in what's perceived to be a problem. Throughout the world, forests are recognised as underpinning clean water supply and aquatic ecosystems. Hopefully, through the targeted measures under the RBMP 2018-2021, we can establish a similar role for Ireland's woodlands and forests.

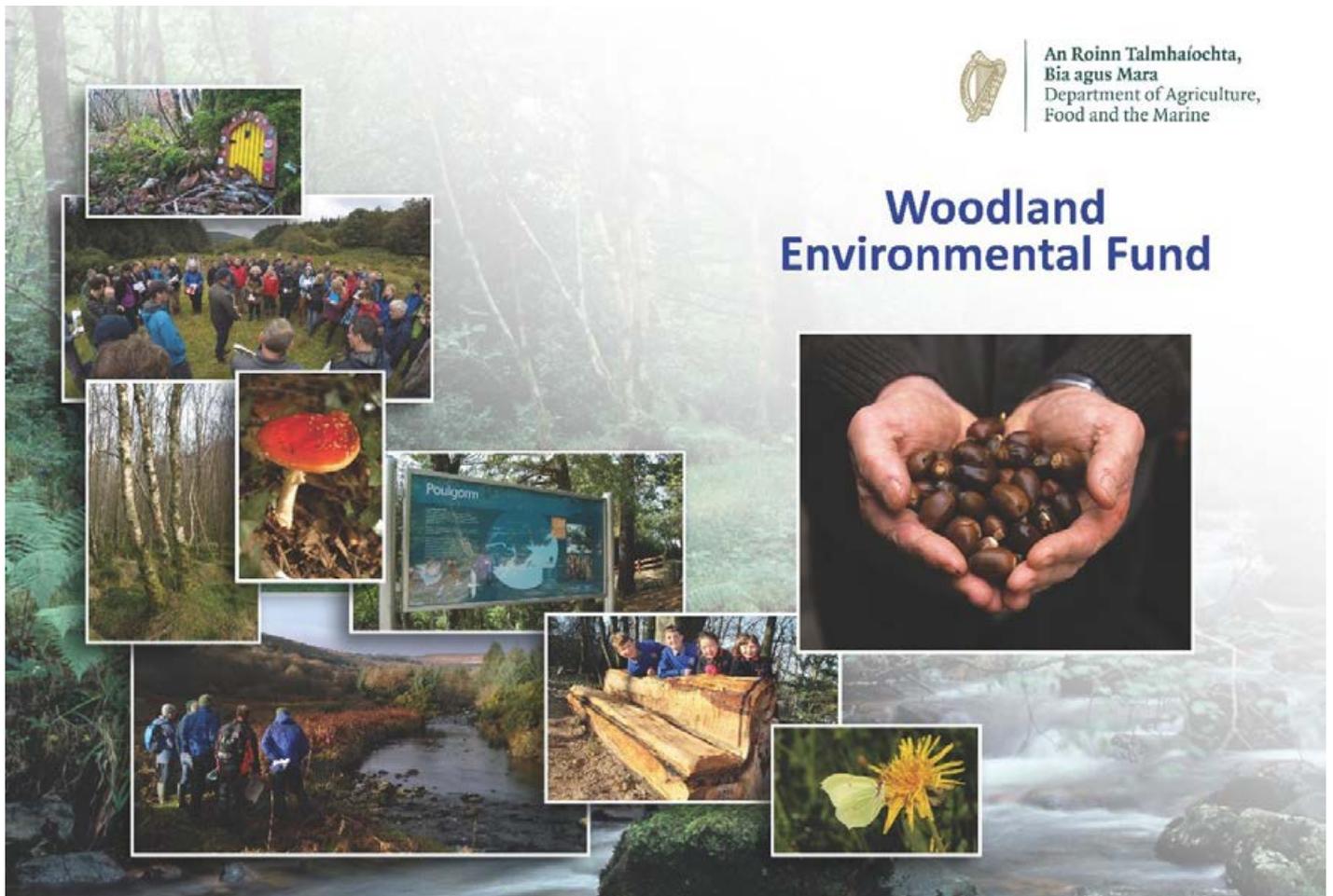
Ken Bucke and Kevin Collins, Forestry Inspectors, Department of Agriculture, Food & the Marine

Learn more:

Details of the Woodland Environmental Fund, and the publications *Forests & Water: Achieving Objectives under Ireland's River Basin Management Plan 2018-2021* and *Woodland for Water: Creating new native woodlands to protect and enhance Ireland's waters* are available at www.agriculture.gov.ie/forestservice/grantsandpremiumschemes2014-2020/



Learning about creating new native woodlands: a KerryLIFE field day for farmers from the Caragh and Kerry Blackwater FPM Catchments



 **An Roinn Talmhaíochta,
Bia agus Mara
Department of Agriculture,
Food and the Marine**

Woodland Environmental Fund



The Woodland Environmental Fund: allowing businesses and landowners to work together to plant more native woodlands for Ireland.

ARTICLES



Longford Demesne Wood, Sligo An award-winning forest, protecting knowledge of our past for the future

Declan and Yvonne Foley tell us how their wood, which won the 2010 RDS Forest Service Bio-Diverse Forestry/Woodland Award, has been conserved and protected, and allows people from the local community, and further afield, to study and learn about the natural wonders that live in and around their forest.

Our farm is situated about 8 kilometres from Ballisodare Village and about 3 kilometres into the hills from the N59 Sligo-Ballina Road. The old estate rests beneath the shelter of Knockacree, enjoying the fresh water flow from the mountain streams feeding into the Ardnaglass river, through the woodland which has some natural springs, continuing to Dunmorán Strand and the Atlantic Ocean.

The conservation and protection of the woodland started in 2004 with the old estate woods of Poulaphuca and Big Meadow, maintaining and enhancing the species and structural diversity while protecting the historical and cultural integrity of the woodland under the Native Woodland Conservation Scheme, and also installing a new plantation in the adjacent former grazing land under the Native Establishment Scheme.

The woodland is composed of a series of loops. Visitor can choose to walk the entire length, or just complete one of the shorter loops and with the level landscape and many footbridges, these walks are easily accessed. Natural springs and wells flow through the woodland, joining up with the mountain streams.

Deadwood and hollow trunks are abundant throughout the woodland, allowing for extensive habitats for insects, and hosting a large selection of fungi.



One of the butterflies that lives in the woods.



Some of the fungi who live in Longford Demesne Woods.

ARTICLES

Since 2006 we have held workshops for writers groups, nature studies and now host Polish Students of Forestry for workshops in all aspects of woodland conservation, including improving accessibility by the addition of more footbridges and seating areas in a sensitive manner to allow for future research purposes.

We also have a rath/ringfort, an imposing site reminding us that farming communities over millennia depended on this land. This area is protected under the Forest Service Guidelines and is cut to establish a species rich grassland/wild flower meadow.

Native species rich hedgerow measuring 400 metres has been planted over six years on a raised bed along the river bank to prevent soil erosion, enhancing the riparian environment, while providing shelter and shade. Through GLAS 3, we have established an area for wild bird cover.

Declan and Yvonne Foley, Longford Demesne Wood, Beltra, County Sligo

Learn more:

www.longforddemesnewood.com



People come to the forest to learn, including groups of writers, nature studies groups, and from further afield, Polish forestry students.

Measuring the impact of the 2018 summer drought on river flows and lake levels

The drought of summer 2018 was a unique opportunity to measure how much water was flowing when levels were approaching the lowest recorded flow seen in decades. Conor Quinlan tells us how the EPA captured as many low flow measurements as possible, which will be vital for updating our long-term flow statistics.

Ireland experienced its first widespread drought in many years during the summer of 2018. Following a wet winter and spring, from May onward rainfall levels were much lower than long-term averages. By mid-July river flows across most of the country were approaching annual low levels usually observed around August-September. With Met Éireann forecasting no significant break in the dry weather, it became apparent that river flows could potentially fall to levels not seen since the mid-1970s.

Irish Water had highlighted the risk posed to water supplies by the drought, and the National Emergency Coordination Group met weekly to manage the situation. This triggered an intensified low flow measurement programme by the EPA Hydrometric and Groundwater Section, together with the Hydrometric Section of the OPW, and consultants on behalf of Irish Water, to ensure that the impact of the dry weather on river flows across the country was accurately and comprehensively measured throughout the drought.

This work measured flows at priority monitoring sites identified in the National Hydrometric Monitoring Programme 2018-2021, and at sites identified through recent WFD characterisation work as rivers that were potentially At Risk due to abstraction pressures.



The Shannon, downstream of Lough Allen – it's not often you can walk across the Shannon here.

ARTICLES

The National Hydrometric Working Group coordinates the activities of organisations involved in this area. Working relationships developed through this forum made it possible to coordinate both a programme of flow measurement throughout the summer drought, and to produce weekly maps and summaries of the actual state of river flows and lake levels to inform the work of the National Emergency Coordination Group.

Low flow measurement, particularly in large rivers, is physically demanding work. When flows fall to low levels in rivers such as the Nore, Barrow, Munster Blackwater, or the Owenduff in Mayo for example, the river may either flow very shallowly in the river bed, or may split into two or more sub-streams with wide stretches of gravel or cobbles in between.

Accurate measurement of the flows in such channels requires reshaping the river bed using hand tools to guide the flow into a channel with low enough turbulence and sufficient depth of water to measure using a current meter. In cases where a river flow is too wide and shallow, the river may have to be “banked in” from its original width to a measurable channel of less than half that width by creating a stone and silt or mud embankment either side of the channel. Weed growth must also be removed from upstream and downstream of the flow measurement site to provide stable and low turbulence measurement conditions. This work usually takes 1 to 2 hours at each site and in some instances the temporary



The Upper Barrow, July 2018 – only 2.5 metres wide.

banks must then be dismantled following the measurement so no obstructions to flow are left in the river which could result in increased silt build up.

River flows were so low this summer that the Rivers Nore and Barrow could be measured in small channels only four meters wide, while the Liffey and even the River Shannon could safely be waded across.

The nine field-based staff of the EPA hydrometric team, assisted by three usually office-based colleagues, took 439 flow measurements between June and September 2018, with the highest weekly total of 90 during the height of drought conditions in July.

The information obtained will be vital to updating our long-term flow statistics which facilitates accurate licencing of discharges, and in the future, abstractions, WFD characterisation, and the real-time management of water supplies.

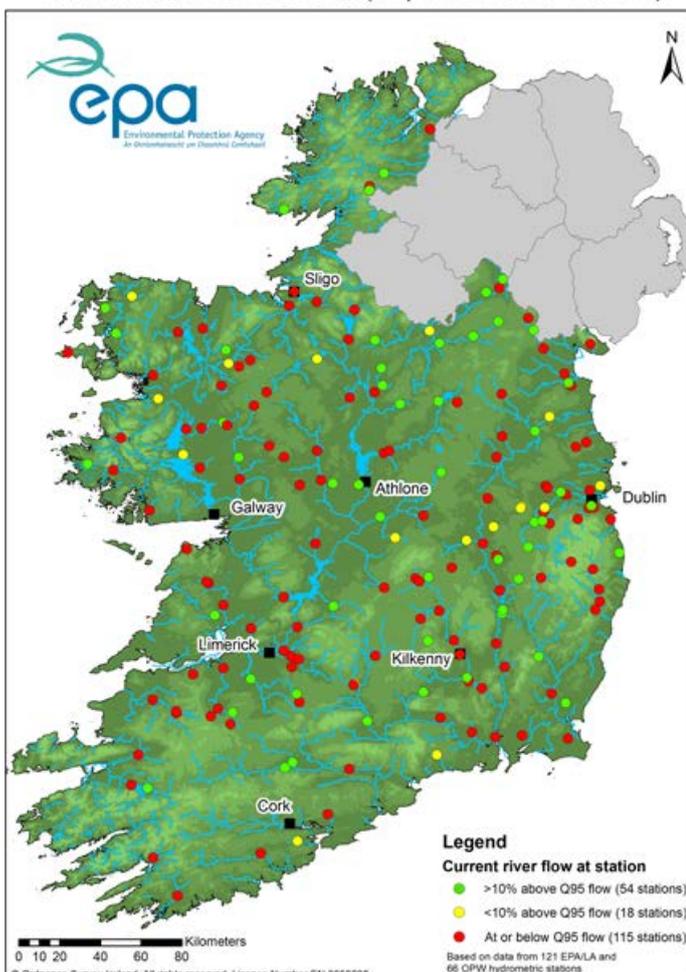
While average river flows can be accurately modelled, it is much more difficult to model low flows successfully as small localised variations in groundwater storage and discharge can greatly affect the low flow behaviour of a river. Indeed, from early July onward, all water remaining in Irish rivers had either emanated from lake storage or from groundwater aquifers, as all surface runoff had long since made its way into the ground, lakes, or to the sea.

Due to such uncertainties in low flow estimation, regular physical measurements of low flows are required to maintain the accurate calibration of national river flow models. Changing precipitation patterns due to climate change are also predicted to result in differing regional responses in terms of summer low flows. Regionally representative low flow measurements are needed to accurately measure whether and to what extent such changes are occurring, and to identify emerging trends in a timely fashion. This information will be crucially important in enabling us to sustainably plan for and manage our water supply and waste water infrastructure, and to protect our aquatic environment into an uncertain future.

The coordinated national response in hydrometric data collection during the 2018 drought provides a good example of how services can be effectively delivered by a group of organisations working together within the framework of established working groups and national plans. Work is now ongoing within the EPA using the data collected during the drought to re-analyse our existing low flow statistics and hydrometric station calibrations.

Although flows did not generally fall to the low levels observed in the mid-1970s, for many stations, particularly those operational for

National River Flow Estimates (for period 17/7/18 - 23/7/18)



ARTICLES

less than 20 years, new record lows were recorded during 2018. The incorporation of this data into our existing record and models will enable us to identify catchments where WFD characterisation information may require upward or downward revision. Our analysis of results from rivers potentially at risk from abstraction or changing trends due to climate change will also inform the development of the national hydrometric network in the next planning cycle, from 2022 to 2027.

Conor Quinlan, EPA Hydrometrics and Groundwater Section

Learn more:

<http://www.epa.ie/hydronet/#Water%20Levels>



The Upper Liffey, upstream of Poulaphouca, July 2018 - only 5 metres wide.

Donation of EPA hydrometric equipment to Engineers Without Borders

The EPA upgraded their surface water hydrometric stations and groundwater level monitoring sites to telemetric data loggers during 2016 and 2017.

As a result, the EPA had a large number of obsolete water level monitoring devices for which we no longer had a use. In line with the Agency's sustainability goals, specifically to promote reuse and recycling, it was decided to investigate if an aid organisation could be found who could put the old equipment to good use. In March 2017, the EPA and local authorities donated a consignment of obsolete water level monitoring equipment to Engineers without Borders (EWB).

We have recently received an update regarding the reuse of this equipment. Some of the units donated are now being installed in Arua, Northern Uganda for water supply monitoring in refugee camps. EWB's regional partner organisation, Malteser International, have developed over 30 water supply boreholes at refugee settlements in the region. The local authorities and the UN have made it mandatory to monitor the water level in all water supply boreholes to ensure water is abstracted from the aquifers sustainably. The devices donated by the EPA have been repurposed to provide this monitoring capability in these boreholes. It is great to think that this equipment now has a fresh lease of life providing water managers in Uganda with a means of ensuring the sustainable development of their groundwater resource.

This reuse of obsolete equipment is a good example of the EPA showing leadership in reusing resources and contributing towards a wider, global circular economy. We will keep you posted with future updates.

Conor Quinlan, EPA Hydrometrics and Groundwater Section

Learn more:

Engineers without Borders Ireland www.ewb-ireland.org



EPA and local authority hydrometrics equipment has been repurposed and is helping manage water supplies in a refugee camp in Arua, Northern Uganda.

ARTICLES

What happens when we urbanise a catchment?

John Stack from Dublin City Council tells us about the changes that happen as a catchment urbanises, how an urban catchment can be managed, and looks at the Santry River as an urban case study.

A catchment may be defined as any area of land where precipitation collects and drains to a common outlet, such as river, lake or coastal waterbody. A catchment includes all the surface water from rainfall, snow melt, and nearby streams that run downslope towards the common outlet, as well as the groundwater underneath. Catchments are complex 3-D systems influenced not only by their topography, but also by the geology underneath.

One cannot discuss a catchment without considering the water (aka hydrological) cycle, and a discussion of the impact of urbanisation on catchments is effectively a discussion of the impact of urbanisation on the water cycle. The water cycle describes the natural processes by which water moves from one location to another and the pathways which facilitate this movement. The pathways of the water cycle are interrupted by urbanisation. Figure 1 illustrates (a) the natural water cycle, (b) the urban water cycle, and (c) a sustainable option for the urban water cycle.

In a natural catchment, channel form is governed largely by topography and geology. In an urban catchment, channels are engineered to facilitate development. Channels are typically straightened, diverted and culverted. Furthermore, the area draining to the channel becomes artificial, constrained by drainage infrastructure.

What is Urbanisation?

Urbanisation is the process by which a natural, pervious landscape is converted into one that is hard, sealed and impervious. It may also be described as the process by which towns and cities are formed and become larger as more and more people begin living

and working in central areas. There are good social and economic reasons for urbanisation. This article is not intended to demonise urbanisation; however, it is important to sustainably manage the consequences of urbanisation.

Prior to urbanisation, precipitation would have soaked into the ground, recharging groundwater, and feeding the river naturally (and slowly). As the water passed through the soil layer, it was purified, resulting in clean water supplying the baseflow of the river. In the urban context, precipitation is rapidly moved from the point at which it lands, to the drainage infrastructure, and into the nearest water course. This is known as stormwater runoff or urban runoff. The typical movement pattern of storm water in this instance is sheet flow, where rainwater flows rapidly across hard surfaces. In this scenario, water is seen as a waste product to be disposed of quickly, when it should be valued as an asset. When treated as a waste, it exacerbates flooding and becomes contaminated with pollutants.

Urban Runoff

Urban runoff is precipitation that has collected on roofs, roads, footpaths and other sealed surfaces. It flows directly to the surface water system and into the nearest waterbody. As the surface water system has no treatment processes, pollutants are washed into our surface waters. As the surface water system is designed to move water rapidly away, it can lead to flooding further downstream.

Impact of Urbanisation on a Catchment

Urbanisation dramatically changes the landscape of a catchment and disrupts the natural water cycle. Rainfall and other precipitation that would traditionally have been managed by the natural water cycle now becomes stormwater and urban runoff, resulting in flooding and pollution of watercourses. Figure 2 illustrates the differences between natural cover and impervious cover.

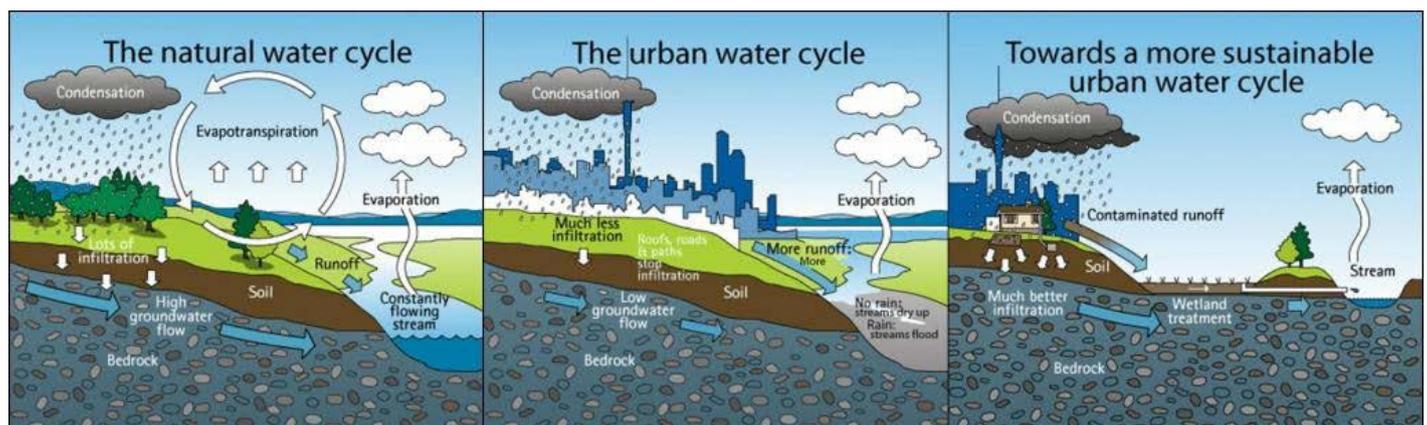


Figure 1: The natural water cycle and how it is impacted by urbanisation. Source: Auckland City Council.

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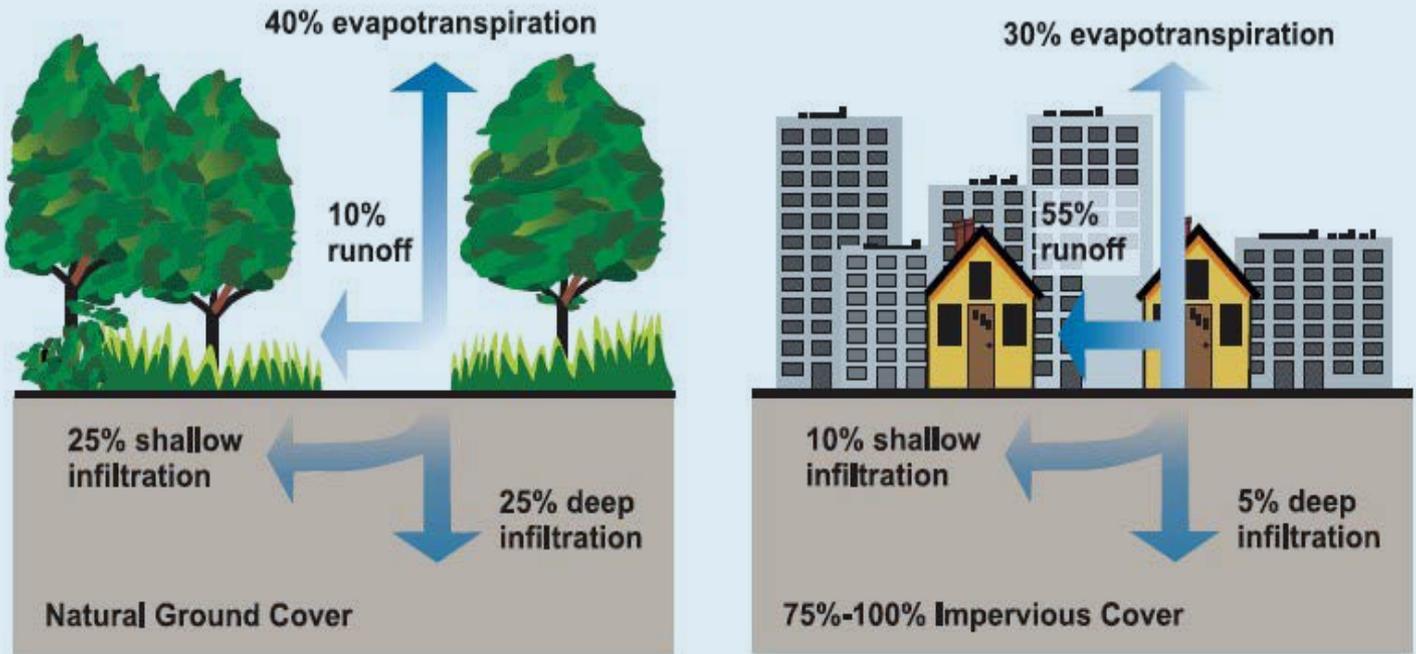


Figure 2: A comparison between runoff from rural and urban surfaces. Source: US EPA.

Table 1 describes how urbanisation changes a landscape and how these changes can lead to flooding and poor water quality.

Elements of Urbanisation:	Effects of Urbanisation:
Removal of trees and vegetation	More stormwater runoff and erosion because there is less vegetation to slow water. High stormwater volumes impact waterways by: <ul style="list-style-type: none"> • Damaging the habitat for aquatic animals, such as fish and invertebrates • Disturbing the breeding cycles of aquatic animals • Eroding stream banks • Increasing turbidity and pollution levels • Altering natural flood cycles
Bulldozing of land for infrastructure	Flooding can occur because natural drainage patterns are changed
Intensive construction of buildings, car parks, roadways and footpaths and supporting infrastructure	More sediment is washed into streams, which increases the risk of flooding and reduces water quality
Filling in of ponds and draining of lands	Natural land that previously soaked up runoff is replaced by impervious surfaces. More pavement means less soakage into the ground, meaning less recharge of groundwater. This will lower the water table and some existing, shallower wells may dry up
Stream diversions and modifications to facilitate development	Base flow in rivers may be reduced and, at certain times of the year, small streams may dry up
Sinking of wells, including industrial capacity wells	Water quality deteriorates as any sediments and other pollutants collected by stormwater runoff are washed into the river.
Construction of water supply and distribution systems, including reservoirs	Urbanisation prevents water from soaking into the ground. This can result in low soil moisture content, which can impede healthy growth of plants, thereby increasing the need for artificial irrigation.
Construction of wastewater infrastructure, i.e. drainage infrastructure and wastewater treatment plants	Overall, the large scale interruption of the water cycle through urbanisation reduces groundwater recharge, reduces base flow in rivers and streams, increases the rate of flow of rainwater into the surface water network, increases the 'flashiness' of rivers and can lead to flooding.

Table 1: Elements and Effects of Urbanisation on a Catchment.

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Case Study: The River Santry, Dublin

The River Santry rises to the west of Dublin Airport and flows roughly eastwards through Ballymun, Santry, Edenmore, and Raheny, before eventually discharging to Dublin Bay at the rear of the North Bull Island, which is a RAMSAR site, and is contained within the Dublin Bay Biosphere.

The river is approximately 13 km in length and has a reasonably sized catchment of approximately 14 km². The district of Santry itself has changed from one centred around a large estate and, in later years, a small village to a modern, dispersed, and mixed-use suburb. Where there were once fields full of crops, and a variety of natural woodlands, there are now housing estates, a sports stadium, a shopping centre, industrial estates and a dense road network. The change is reflected throughout the whole catchment, having changed from a principally agricultural catchment to an urban/suburban one. There have been tremendous consequences for the river as a result of this urbanisation. Figures 3 and 4 clearly illustrate how the landscape has changed since the period 1837 – 1842, and the present day.

The pressures on the River Santry are summarised in Table 2. The table illustrates the difference in the pressures faced in an urban catchment compared to a rural catchment, where agriculture and diffuse pollution predominate.



Figure 3: Santry Catchment, 1837 – 1842. Source: Geohive.



Figure 4: Santry Catchment, present day. Source: Geohive.

Pressure	Description
Agriculture	Farms at the headwaters
Foul Drainage Network	<ul style="list-style-type: none"> • Network capacity issues • Effects of sewer overflow spillages – spillages from foul sewer network to waters • Sewer chokes • Exfiltration due to infrastructural deficiencies
Misconnections	Discharges from household appliances and toilets to the surface water network
Urban Runoff	<ul style="list-style-type: none"> • Road runoff • Runoff from other hardstanding areas <ul style="list-style-type: none"> • Car Parks • Cobblelocked driveways • Roofs • Illegal disposal of polluting matter to gullies (e.g. old engine oil, etc.) • Cross connections from foul to surface water network (both public and private) • Animal/bird faeces • Private drain blockages • Car washing on kerbside/in driveways • Discharges not subject to licence (e.g. business/people washing shop/house fronts and floors and throwing the washwater into the gullies) • Unlicensed discharges
Historical changes to morphology	River channel altered, culverted, canalised, diverted
Historical landfills	A historical landfill may be impacting on the river
SW Network Management	Contaminated river silts, dredging and disposal
Disruption to the hydrological cycle	<ul style="list-style-type: none"> • Urbanisation prevents rainwater from infiltrating to ground and recharging groundwater and the river naturally. • Urbanisation creates sheet flow from hardstanding surfaces during rainfall, which leads to flooding • Flow from hardstanding surfaces increases sediment impact on the river

Table 2: Pressures within the Santry River Catchment.

ARTICLES

For Water Framework Directive classification purposes, the River Santry is divided into 2 sections. The upper section is classified as Poor, while the lower section is unassigned.

Figures 5 and 6 show water quality parameters downstream of Clonshaugh on the River Santry over time (2008 to 2018).

What can we do?

Traditional stormwater management has treated precipitation as something to be disposed of rather than something to value. The consequences are loss of groundwater recharge, reduced base flows in rivers, increased flooding and poorer water quality.

Stormwater should be managed more naturally and in a way that generates increased environmental and economic benefits by restoring the natural water cycle as much as possible. Many cities are achieving this through the use of Green Infrastructure (GI). Everybody can, and should, be involved in the management of stormwater, including the private householder, business owners, estate managers, developers, and the State Agencies.

There are two focus areas to be addressed when mitigating urbanisation:

- New developments – design for stormwater management in a way that mimics the natural water cycle as much as possible, recharge it into the ground, retain it on site, and slow down its rate of flow. Preserve natural features, such as floodplains with a natural vegetation buffer along streams that can slow, filter and store polluted runoff.
- Retrofitting of Green Infrastructure in existing developments/ properties and within the public realm
 - Property owners can use green roofs, water butts, rain gardens and planters to slow down and reuse water
 - Local Authorities and developers can use Green Infrastructure in an integrated and coordinated way to manage stormwater on a bigger scale



Figure 5: Water quality D/S Clonshaugh, River Santry, 2008–2018, ammonia & BOD.

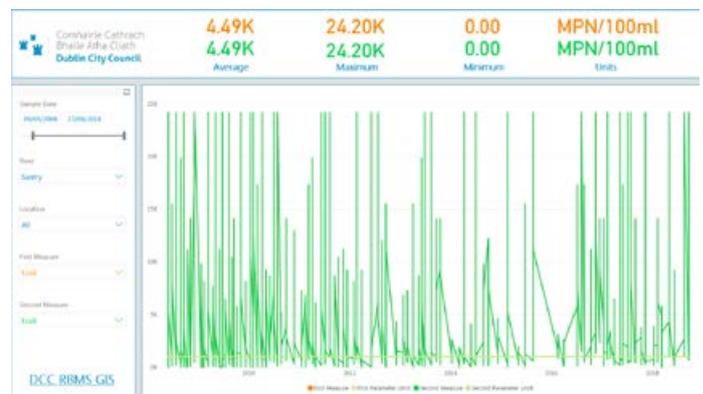


Figure 6: Water quality D/S Clonshaugh, River Santry, 2008–2018, E. coli.

Green infrastructure incorporates both the natural environment and engineered systems to provide clean water, conserve ecosystem values and functions, and provide a wide range of benefits to people and wildlife. Green Infrastructure boosts the economy, enhances community health and safety, and provides recreation, wildlife and other benefits. Table 3 outlines the outcomes of implementing Green Infrastructure throughout a catchment.

John Stack, Senior Executive Engineer, Water Framework Directive Office, Dublin City Council

Outcomes from the effective use of Green Infrastructure in a catchment

- Reduces runoff volume, peak flow and flow duration
- Slows down flow to increase the time of concentration and encourage infiltration and evapotranspiration
- Restore groundwater recharge
- Protect downstream water resources, including wetlands
- Reduce downstream flooding and property damage
- Reduce the frequency of operation of combined sewer overflows (CSOs)
- Improve water quality by preventing pollution from entering into the watercourse
- Reduce thermal pollution
- Improve habitats, biodiversity and ecology

Table 3: Outcomes from the effective use of Green Infrastructure in a catchment

ARTICLES

Dingle Hub, Kerry Real-time remote sensing to allow continuous water quality monitoring



Can networked real-time remote sensors and other new technologies enhance existing measures to protect our water catchments while helping to improve the efficiency of farming? Deirdre de Bhailís tell us how Dingle Hub are working with the local community to see what is possible...

With the global population set to exceed 9 billion by 2050, there is now an urgent need to significantly increase food production. However, against the backdrop of climate change this must be done in a sustainable and environmentally-friendly manner. The Dingle Creativity and Innovation Hub (Dingle Hub) aims, through a series of test and trial projects, to show that digitisation using real-time, remote monitoring techniques of current water sampling processes and of the farming industry will be an important part of the solution.

The Dingle Hub is a not-for-profit organisation that provides infrastructure and works to foster the ecosystem necessary to generate enterprise and support the increase in high-skilled employment on the Dingle Peninsula. Dingle Hub manages a number of community benefit projects in three key areas of local strength:

1. Marine and the Environment;
2. Internet of Things (IoT);
3. Music, Film and Animation.

When tourism constitutes a key player in a coastal economy, there are uncertain and often competing interactions between environmental and socioeconomic processes. Management plans to date have emphasized development rather than the interaction of tourism and environmental systems. While recent research has demonstrated that the tourism carrying capacity (TCC) concept is applicable to tourist destinations in coastal areas, most of these studies primarily focused on either economic or environmental factors in natural areas, not a combination of both.

Researchers at Sacred Heart University (SHU) are working to help advance the integration of ecological and social sciences within the study of coastal tourism by developing comprehensive models, and building an international network for interdisciplinary research. The methods and results will be applicable to coastal tourist towns around the globe. Water quality monitoring networks are essential to characterize and manage water quality accurately, and are important in water basin decision making.

The installation of on-line instrumentation to provide continuous

water quality measurement has many advantages. Where discrete sampling provides a snap shot of nutrient concentration and water quality at any given time, the provision of continuous water quality measurement provides a detailed picture of events, minute by minute. This data allows scientists and engineers to identify in real-time, a failing parameter affecting water quality. Continuous water quality monitoring systems allow nearly instantaneous notification of poor water quality events as they occur, allowing for immediate corrective action to be taken.

To support this work, Dingle Hub, in collaboration with Sacred Heart University, applied to Bord Iascaigh Mhara (BIM) Fisheries Local Action Group (FLAG) South West, and were awarded European Maritime and Fisheries Fund (EMFF) funding under the Fisheries Local Area Development Scheme through BIM to progress with an Internet of Things (IoT) Water monitoring project. Additional support for nitrate sensors in the Milltown and Owenmore Rivers was provided by the LA Waters Programme. The aim of this test and trial project is to showcase the potential of IoT technologies to help stimulate enterprise in this area. The output will be an automated monitoring system for conductivity, dissolved oxygen, pH, water temperature, nitrates, and water levels. This system will identify changes in, and provide a record of, the above environmental parameters.

The project is currently deploying and integrating water sensor nodes with IoT gateway technologies to provide real-time data in a cost-efficient manner. Using a bespoke dashboard, a cloud-based storage platform will capture the data, store the data, and make the data available in accordance with agreed protocols.

Figure 2a shows a graph of the temperature and dissolved oxygen



Installation of a probe in a local river, allowing real-time collection of data.

ARTICLES

in the Milltown River during a period in August 2018, while Figure 2b shows the conductivity for the same period. The areas for the additional nodes are Dingle Bay, Ventry Harbour, Tralee Bay, Milltown River, Owenmore River, Maine River and Castlemaine Harbour. This technology, when fully built, will pave the way for advance warning systems and can be reproduced inexpensively for deployment in other localities.

The follow-on project proposal to use IoT Technologies to develop a system to support farmers in complying with complex environmental regulations, and assist with increasing the overall efficiency of farming, was the key focus of a workshop hosted by Dingle Hub on 16 July 2016. Figure 3 shows a graphic of the main building blocks required for an IoT network to provide Smart Agriculture solutions. The water monitoring network contains all the same components, but simply with different sensor options.

Participants from the local farming community, the Environmental Protection Agency, Teagasc, Inland Fisheries, Kerry County Council, Net Feasa, Sacred Heart University, Institute of Technology, Tralee, Dublin City University, University College Cork, Transition Kerry, North East West Kerry Development and many more brought their significant expertise to help enhance the project proposal. It was very encouraging to have so much interest in this project, and an important opportunity to bring together so many key people and organisations to enable the co-creation of technology solutions.

Deirdre de Bhailís, Dingle Creativity and Innovation Hub

Learn more:

Dingle Creativity and Innovation Hub:
Live in a Creative Place, Work in a Creative Space

www.dinglehub.com

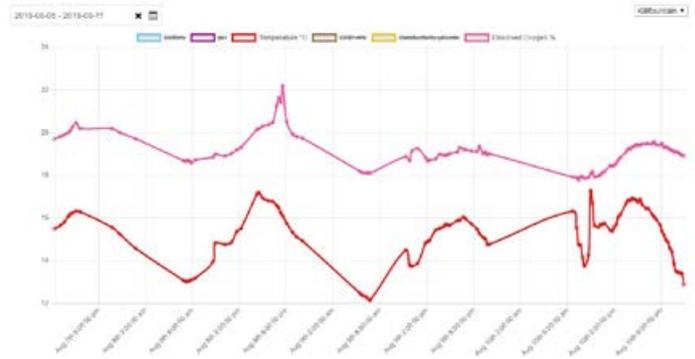


Fig 2a: Temperature and Dissolved Oxygen data.

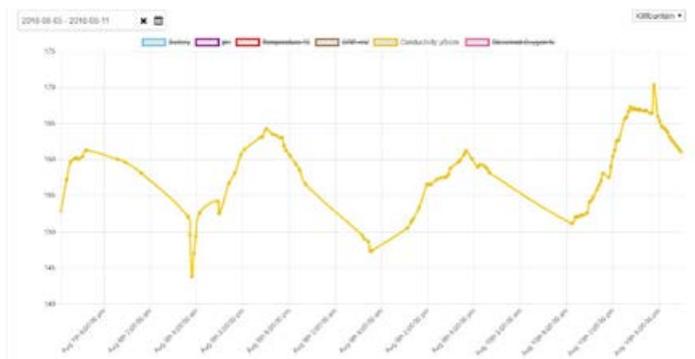


Fig 2b: Conductivity data.

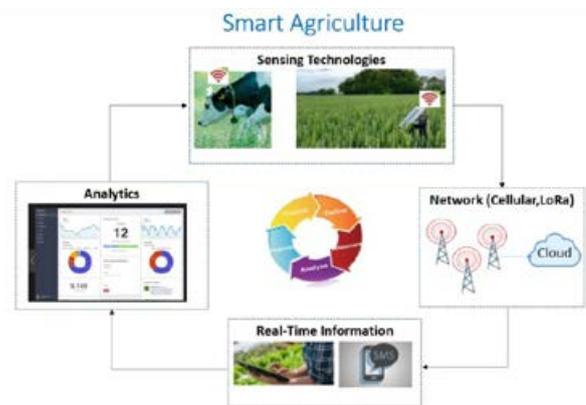


Fig. 3: Main components of an IoT Smart Agriculture System.



Dingle Hub workshop in July 2018: co-creation of technology solutions.

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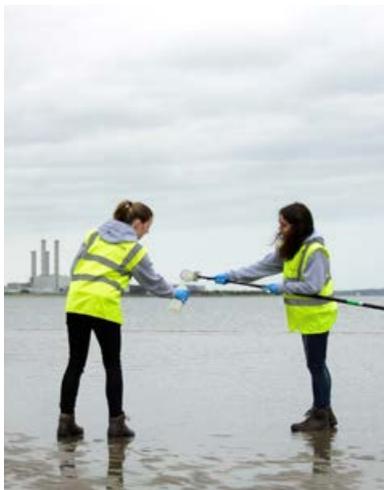
Acclimatize – addressing pollution in urban and rural bathing waters

Researchers in University College Dublin and Aberystwyth University in Wales have teamed up with stakeholders on Acclimatize, a large-scale multi-disciplinary research project focusing on bathing water quality and the potential impacts of climate change.



Acclimatize aims to identify and quantify the pollution streams affecting bathing waters and impacting on public health, and to determine how climate change will affect the quality of these bathing waters in the future.

The Acclimatize team is engaging closely with project partners and stakeholders, and using a combination of extensive fieldwork, laboratory analysis, and hydrology to gather information to build a picture of the current situation in Dublin Bay. The team is determining the faecal indicator bacteria (FIB) loading of bathing waters by animals and sediments, and the FIB flux from catchments to bathing waters.



Collecting water samples from Dublin Bay.

Microbial source tracking approaches are used to identify the biological source of pollution. These data will be integrated into a combined near shore and catchment model to describe bathing water quality. These integrated models will subsequently be used to assess the potential impacts of climate change on bathing water quality.

This information will help policy-makers and local authorities to protect the valuable amenities and resources provided by bathing waters.

Beaches

In Ireland, the team is focusing on Sandymount, Merrion and Dollymount strands in Dublin Bay.

In Wales, the team commenced with Cemaes Bay in Anglesey in 2017, and in 2018 focused on New Quay North and Traeth Gwyn New Quay. In 2019, the team will be based at Nolton Haven in Pembrokeshire. The bathing waters in these contrasting environments are affected by different factors, and will likely experience varying effects from climate change.

Partners and stakeholders

This €6.7 million project, which is part-funded by the European Regional Development Fund through the Ireland Wales programme, started in May 2017, and will run until October 2021.

The project is led by Professor Wim Meijer, Head of School of Biomolecular and Biomedical Science and Professor of Microbiology in UCD, and continues a successful collaborative partnership with Professor David Kay and his team in Aberystwyth University, Wales.

In UCD, a team including microbiologists, molecular biologists, engineers and computer scientists are working to identify and quantify pollution sources in Dublin Bay.

Complementing UCD's focus on an urban catchment, the team in Aberystwyth University is focusing on bathing waters in rural agricultural catchments throughout Wales.

In Ireland, the Acclimatize team is working together with the Environmental Protection Agency, Dublin City Council, Dún Laoghaire-Rathdown County Council, Fingal County Council, Irish Water, and the Dublin Bay Biosphere Partnership.

In Wales, the team is working with Dŵr Cymru Welsh Water, Natural Resources Wales, and representatives of Welsh Local Government, the Welsh Government, and relevant non-governmental organisations through the Wales, Water and Health Partnership: Bathing Waters subgroup.

Joanne Chadwick, Acclimatize Project Manager, UCD

Find out more:

www.swimproject.eu

Twitter: [@AcclimatizeEU](https://twitter.com/AcclimatizeEU)

Email: joanne.chadwick@ucd.ie



L - R John Collins (DCC), Paul Buggy (DLRCC), Dr John O'Sullivan (UCD), Emma Finlay (DCC), Professor Wim Meijer (UCD), Ronan Kane (IW), Kevin Callanan (DCC), Joanne Chadwick (UCD), Carla McKenna (FCC), Adjunct Professor Bat Masterson (UCD), Anthony Mannix (EPA) and Pat O'Halloran (DCC).

ARTICLES

EU SWIM Project prepares for the 2019 Bathing Water Season

Debra Castles tells us about the EU SWIM Project - an innovative cross-border project that wants to change how bathing water quality is monitored, by using predictive models to give near real-time results.

During the bathing water season from 1 June 2019 the EU SWIM project will provide invaluable, real-time information on water quality for the public on both sides of the border. There are currently nine SWIM beaches. Three are in the Republic: Enniscrone (Co Sligo), Lady's Bay (Co Donegal), and Clogherhead (Co Louth); six are in Northern Ireland; Castlerock (Co Antrim), Portrush - Curran (Co Antrim), Waterfoot (Co Antrim), Ballyholme (Co Down), Ballywalter (Co Down), Newcastle (Co Down). Some of these beaches have Blue Flag status, and this project will complement and reinforce the standards that users expect when they visit these beaches to enjoy all they have to offer.

The project is funded by the INTERREG VA Programme which focuses on overcoming the issues that arise from the existence of a border, including environmental issues. The EU SWIM Project will make a significant contribution towards meeting the EU's Bathing Water Directive, and therefore contribute towards our shared seas being safer places to swim and enjoy.

The EU SWIM Project combines the expertise of lead partner University College Dublin, and Northern Irish project partners Agri-Food Biosciences Institute and Keep Northern Ireland Beautiful. The project aims to develop a system that will allow bathers to check the water quality of their chosen bathing spots live before taking a dip. Developing a bathing water quality prediction model will directly tie into software to support the collection of data and delivery of information to the public.

Professor Gregory O'Hare of University College Dublin explains "The EU SWIM Project is not only developing a bathing water prediction model and enabling water sampling and microbial tracking, it will also result in the creation of an app and with real-life updates on the new website; which crucially promotes good management, environmental standards and sustainability for beaches on the island of Ireland."

Cross Border School Collaboration

As part of the project two weather stations have been deployed close to 2 of the EU SWIM beaches at Scoil Chríost Rí, Enniscrone, County Sligo and St Patrick's Primary School near Waterfoot beach in Glenariff, County Antrim. This approach has facilitated an exciting cross border aspect, as both schools can link up and share data coming from their SWIM weather stations and compare their results. During beach visits in October 2018 the EU SWIM team had the opportunity to spend time looking at the instalment at St Patrick's and talking to the children about how the data works.

The principal of St Patrick's Primary School, Roisin McCarry, kindly facilitated a demonstration of the weather station data to the pupils and she commented "at the minute, St. Patrick's Primary

School is the only school in this area to have a weather station. The information is very detailed for primary school use, but we hope that by working with UCD, AFBI and Keep Northern Ireland Beautiful, we will be able to come up with ways to use the data in our projects on weather, the environment as well as linking with other schools to work on joint projects".

Weather Stations and River Sensors

A major element of the programme roll out has been the deployment of the weather stations to assist with the predictive element in conjunction with the river sensors and gauges. There has also been a wide collaboration with other partners to gather as much predictive data as possible, for example. Northern Ireland Water, EPA, OPW, Met Eireann and Acclimatize, another INTERREG-funded project at UCD.

The water quality updates will be going live for the next bathing water season between June and September 2019.

Debra Castles, Keep Northern Ireland Beautiful

Learn more:

<https://swimproject.eu>

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Wayne Egan's work on Enniscrone Beach, which is informing the EU SWIM project, was previously covered in the Catchments Newsletter, see www.catchments.ie/assessing-the-impact-of-the-bellawaddy-river-on-the-microbiological-quality-of-the-bathing-waters-of-enniscrone-beach-co-sligo/

Project Funding: this research takes place across sites in Northern Ireland and the Republic of Ireland – a cross-border initiative supported by the EU's INTERREG VA funding scheme. The project is match-funded by the Department for Agriculture, Environment and Rural Affairs (DAERA) in Northern Ireland and the Department of Housing, Planning and Local Government in Ireland.



ARTICLES

Small streams and their importance in Ireland

Small streams represent approximately 77% of the 84,400 kilometres of river channels mapped in the EPA river network of Ireland. These streams provide many important benefits like water provision, supply and transport of water and nutrients, spawning grounds for fish, and other ecosystem and cultural services. This article by Mary Kelly-Quinn from UCD tells us about these streams, and an EPA-funded research project, SSNET, that is studying them.

Small streams have been defined in many ways but they are generally considered to lie within the headwaters of rivers extending only a few kilometres from their source. Streams like these have small catchment areas and narrow channel widths, generally less than 3 metres. Rivers and streams are often classified using a system called Strahler Stream Order, with the smallest streams known as Order 1, and then the number increasing as the size of stream and river channels increases. Most small streams are therefore first or second-order Strahler streams (see figure 1). In Ireland, 43,265 km of the river network (51%) are 1st order streams, and a further 20,466 km (24%) are 2nd order streams.

Types of small streams

Most small streams in Ireland are perennial, flowing in all seasons in response to rainfall that is also generally well distributed through the year. Although less common, some streams are temporary, flowing for only a part of the time. Temporary streams include both intermittent streams which only flow during certain parts of a year, and ephemeral streams which typically only flow during flood events.

Headwater flows arise from several different sources: seepage from soils (including peatlands), subsoils and aquifers, springs, and lake outlets. Differences in geomorphic, hydrological, precipitation and ecological conditions lead to their broad instream habitat diversity.

Small streams provide us with many important benefits

Described as the ‘capillaries of the landscape’s vascular system’, small streams collect and distribute water and various other materials to the lower reaches of the river network. They provide us with many goods and benefits, so-called ecosystem services. Some of the important, well known but often poorly described benefits are:



Figure 1: Strahler stream order



Figure 2: Typical upland headwater stream



Figure 3: Small lowland stream

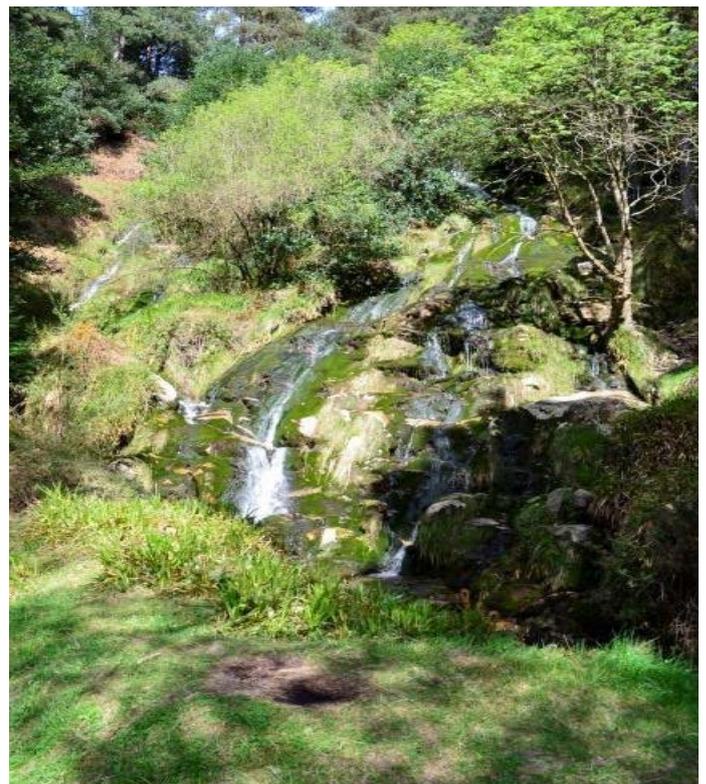


Figure 4: Temporary stream in summer

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Water provision

Small streams collect and deliver a considerable (greater than 70%) volume of water to downstream river reaches and lakes, where the water becomes available for abstraction.

Control the supply & transport of water & nutrients

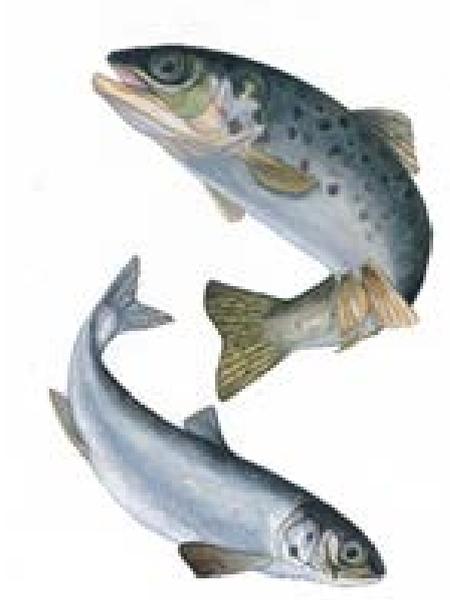
Small streams capture flood water and regulate flow downstream. They may contribute to groundwater recharge, providing hydrological connectivity between terrestrial and downstream aquatic ecosystems, controlling the transport of sediment and nutrients (nitrogen, N, and phosphorus, P) as well as water between river and land, and playing a vital role in the supply and transport of water and nutrients to the downstream river network and its floodplains.

The large surface area of these stream beds relative to the overlying water volume, the close contact and exchange of water along the stream bed where shallow groundwater and surface water mix, combined with their large spatial extent, mean that headwater streams can be important 'hotspots' for nutrient and organic matter processing within river catchments.

Retention and cycling of P and N in headwater streams provides an important 'ecosystem service', by transforming and regulating downstream delivery of nutrients, and modifying their form and timing of delivery in ways that can help reduce ecological impacts on downstream receiving waters.

Spawning & nursery habitat for salmonids

A number of fish species (e.g. eels) can be found in small streams, but they are best known for the important spawning habitat they provide for brown trout and salmon. The juveniles of trout can spend several years in these streams before migrating downstream.



Support high catchment & regional biodiversity

Small streams include species that are unique to the upper part of the river network, species that occur there but also in larger rivers, species that move into headwaters seasonally, and those that migrate there to complete particular life history stages (e.g. salmonids for spawning).

Small streams may individually support naturally low (less than 20) numbers of macrofaunal species, but collectively the network of headwater streams can make a large contribution to catchment and regional biodiversity. Studies in Ireland have shown that almost one third (29%) of a catchment's macroinvertebrate biodiversity can be unique to headwaters, while others are common to reaches further downstream, and are therefore important sources of species to repopulate downstream reaches that have been impacted by pollution or habitat degradation.



Cultural services

Small streams have an aesthetic value in the landscape and contribute to a sense of place. They are important for recreation where there are bank-side walking routes but also to angling in downstream reaches. They are enjoyed for the wildlife that lives in their waters and along their banks.

Threats to the Benefits Provided by Small Streams

Small streams are highly vulnerable to pollution and other human induced disturbances because of their high connectivity with adjacent land.

Low dilution capacity

This makes lowland headwater streams vulnerable to nutrient and sediment inputs from septic tanks and small rural waste treatment plants, as well as from agricultural point and diffuse sources.

ARTICLES



Vulnerability to channel modification

Low order streams are often channelised into straight ditches and are subject to direct field runoff from tile drains – this accelerates water transfers and causes loss of connectivity with potential sites for P sorption and denitrification. Channelisation to improve the efficiency of water transit modifies water flow velocities, reducing transient storage, and reduces connectivity between the channel and floodplain, thus diminishing the capacity for in-channel and overbank nutrient retention.

Furthermore, Ireland has a dense road network with numerous culverts on small streams which can lead to inputs of heavy metal and other contaminants as well as loss of biological connectivity where culverts and weirs act as barriers to the movement of sediment and migratory species as well as movement by fish and other species within river systems for feeding and to find suitable habitat.

Vulnerability to environmental change

Increasing prevalence of droughts and extreme summer low flows exacerbates the low baseflow dilution capacity of headwater streams. Greater magnitude and frequency of extreme high flows and floods promote stream scouring and reduce nutrient retention capacity in headwater streams. They also promote greater mobilisation of 'legacy' nutrient stores within the catchment, and increase the loadings of carbon and other nutrient inputs from terrestrial stores. High flows can result in increased stream-bank erosion and delivery of sediments from soil disturbance associated with agriculture and forestry.

SSNet: Managing the small stream network for improved water quality, biodiversity and ecosystem services protection

When it comes to the benefits we get from some small streams there is a lot we don't know. Water pollution problems in the small stream network affect water quality downstream, and are likely to limit our ability to achieve the objectives of the Water Framework Directive (WFD).

SSNet is an EPA-funded research project led by researchers in University College Dublin with partners in Trinity College Dublin, the Centre for Ecology and Hydrology, and Queen Mary University of London in the UK.

The research will build a science-informed knowledge base on the role of small streams in water quality, biodiversity and ecosystem services protection to inform policy, measures and management options to meet the WFD objectives and other regulatory targets.

The project will collect new data to:

- Determine the effects of nutrient processing, cycling and export of nutrients in headwaters on nutrient status further downstream
- Build an integrated understanding of the physical character and dynamics (hydromorphology) of headwater streams across Ireland
- Determine the contribution of small streams to catchment biodiversity and the role of hydromorphology and hydrochemistry in controlling their biodiversity potential. One of the tasks looks to the future and the potential for using emerging DNA tools in biodiversity and water quality monitoring. This is important given current developments in this area and the challenges of monitoring the extensive small stream network. In this regard, we will also explore options for increased engagement of citizen science in monitoring the physical and ecological health of small streams
- Model the level of intervention in the small stream network required to have a measurable effect throughout a catchment on both water quality (N, P & sediment) and flows, biodiversity protection and overall delivery/maintenance of ecosystem services
- Explore options for increased engagement of citizen science in monitoring the physical and ecological health of small streams
- Make recommendations for the management of the small stream network

Mary Kelly-Quinn, UCD

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RECENT PUBLICATIONS

The WISDOM Project Learning from Group Water Schemes and connecting water, infrastructure, and people

Group Water Schemes (GWSs) are community managed water suppliers, primarily in rural Ireland. WISDOM: Learning from Group Water Schemes, an EPA-funded research project, has launched a website www.waterschemes.ie highlighting their research on group water schemes and efforts to protect their sources for drinking water. Patrick Bresnihan tells us about it.

Our research provides analysis of the dynamics that characterise and shape drinking water source protection efforts, be they social, ecological, political, historical, geological, or economic. We are doing our research in Counties Mayo, Monaghan, and Roscommon, and will provide rich, multi-layered accounts that connect water, infrastructure, people, and landscape in ways that are less talked about or understood.

The website uses photographs, interactive timelines and maps together with written analysis and reflection.

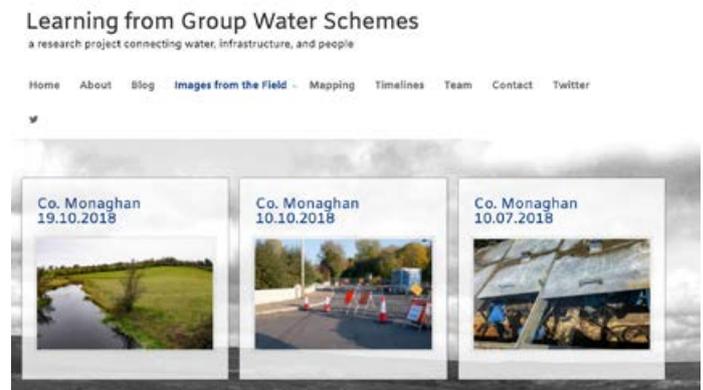
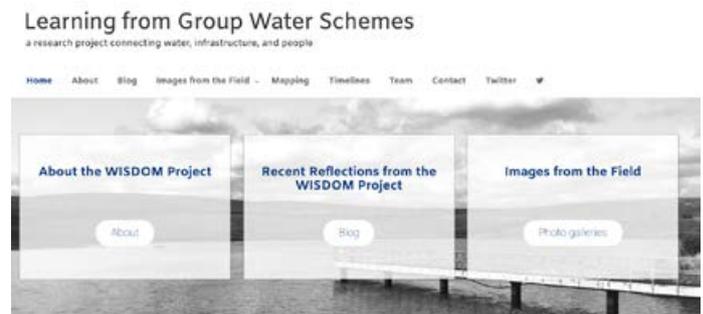
Images from the field

Images from the field offers a lens into the work and contexts of GWS, and includes photographs of water treatment plants, abstraction points, and the surrounding landscape.

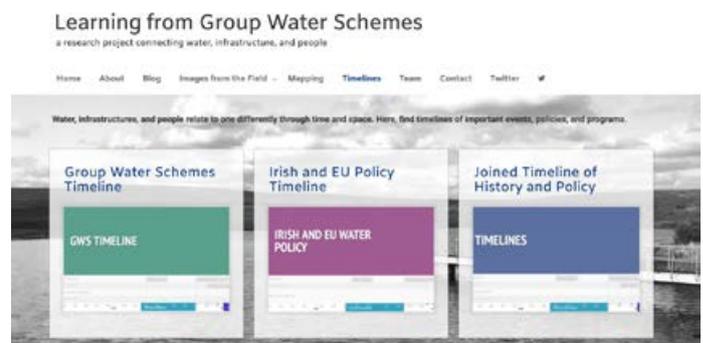
Timelines

Timelines present interactive historical accounts of key policy decisions and planning developments that have shaped group water schemes over the last half century. As much as environmental and water quality regulations have impacted water management and the delivery of clean drinking water, so too have policies that have shape land use decisions. Our timelines are grouped thematically, and include the GWS sector's history, Water Policy and Environmental Policy at the EU and Irish level. We will soon have a timeline on agricultural policy to help trace some of the reasons why rural landscapes, and their water supplies, have changed overtime.

Each timeline allows you to advance through different events, providing brief summaries regarding their significance and links to legislation and archival images.



Some of the images from field trips, taken by the Wisdom project team.



Key timelines for Ireland's Group Water Schemes.

ARTICLES

Blog

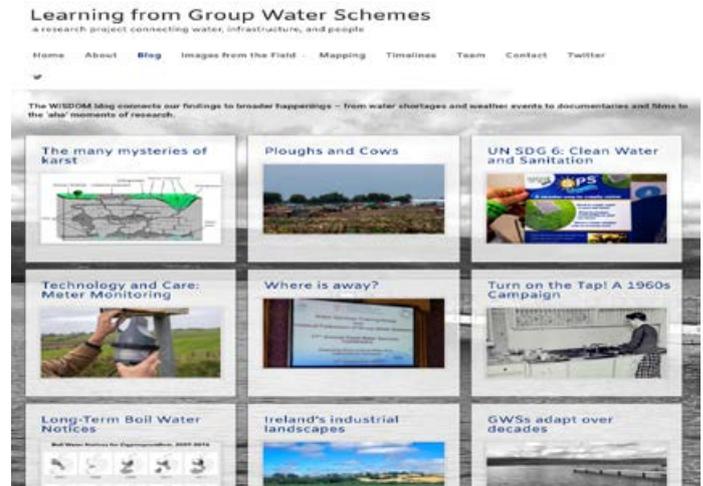
This page on the website hosts short reflections from fieldwork. These cover a wide range of topics: the importance of karst to water quality in GWSs, the role of technology in shaping GWSs operational activities and agriculture's historical and present-day role in rural water supplies.

We use photographs and graphics to help tell these stories and highlight elements of water quality and provision that may be less well known to many. Examples include the telemetry technology used to detect leaks and monitor and manage water supplies in a GWS.

Maps

The website will also feature maps in the coming months. These will combine existing data sets with our own research to make sense of rural water infrastructure in rural Ireland, and to illustrate the challenges of delivering safe and clean drinking water in visually stimulating and interactive ways.

Patrick Bresnihan, WISDOM Research Project Leader

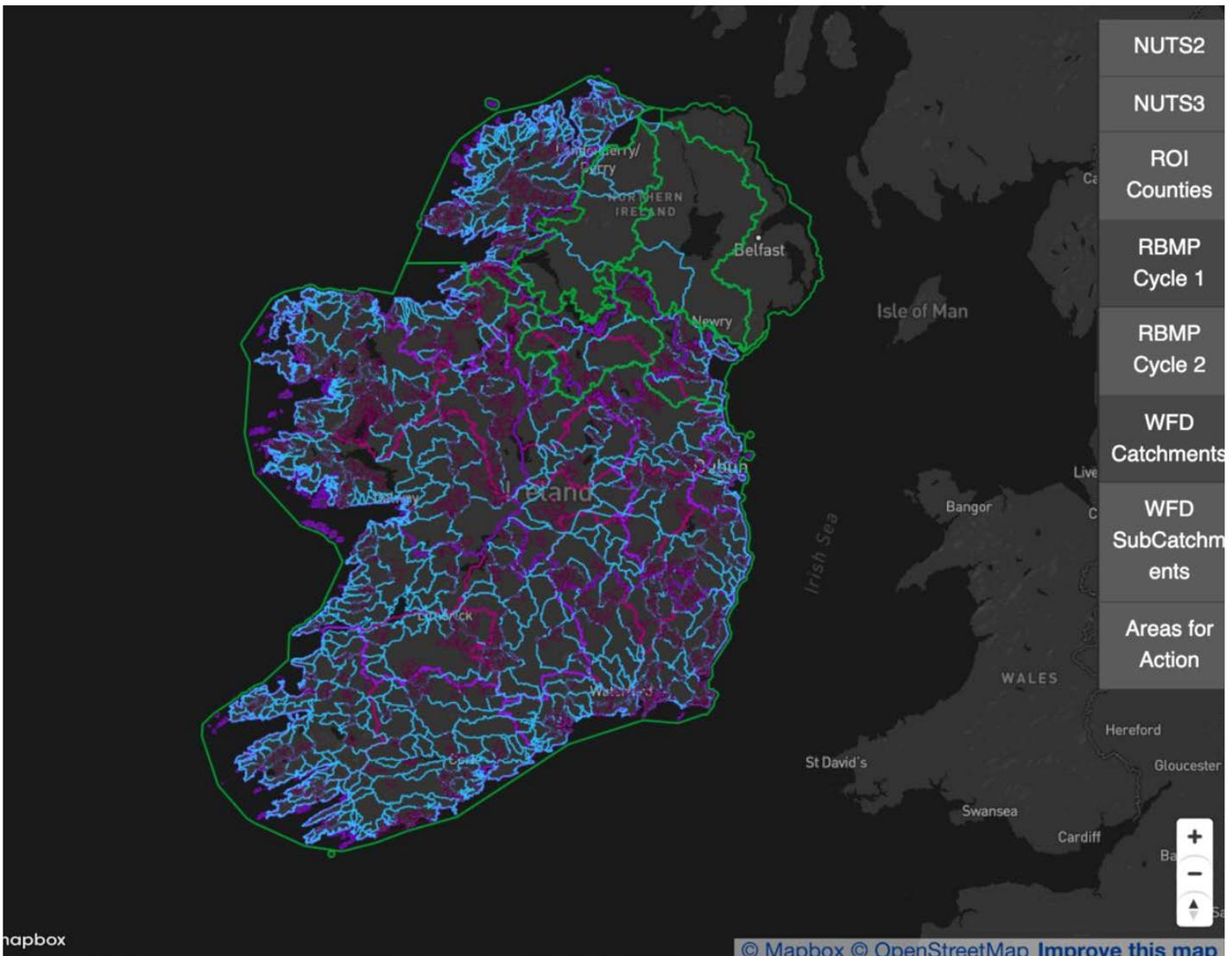


Some of the blogs available on www.waterschemes.ie

Learn More:

www.waterschemes.ie

Twitter: @WSchemes

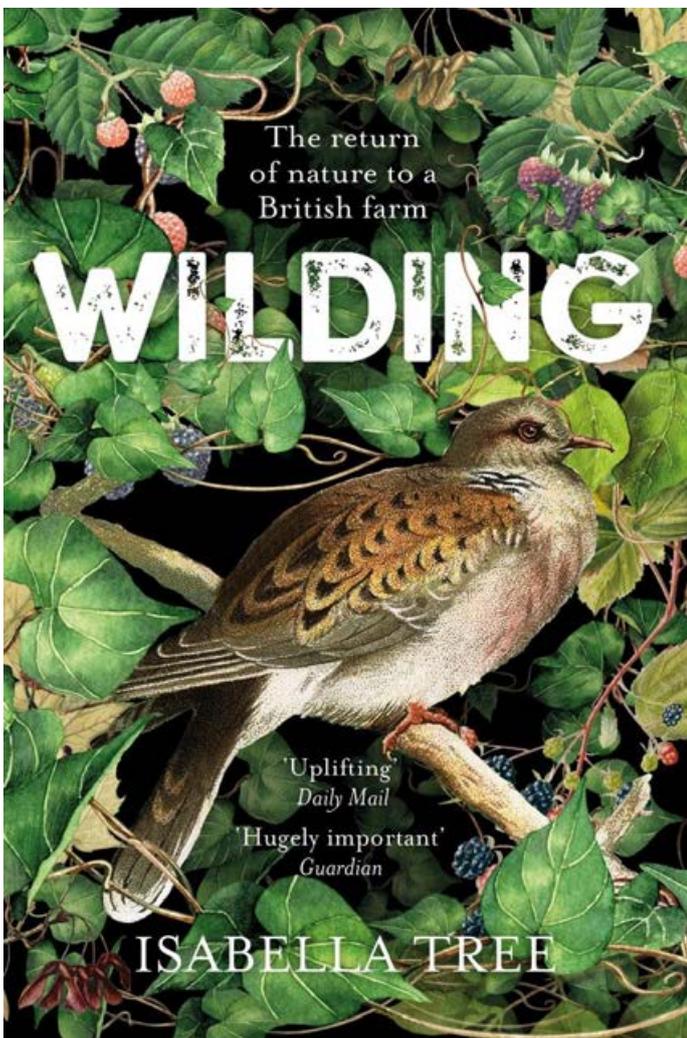


BOOKS

Books

Wilding: the return of nature to a British farm

This is the rather wonderful story of what happens on a farm where the owners decided to do less, and ended up with much more than they imagined was possible.



Inheriting a fantastically large farm (by Irish standards anyway) in the late eighties, the nineties saw the author, Isabella Tree, and her husband Charlie Burrell farm their 3,500 acres in a largely conventional way – intensifying and maximising efficiency, with a focus on dairy. By the late nineties however, it was clear that their marginal land could no longer support this capital-intensive business and deliver a decent profit.

The story gets going in the early noughties, when the Knepp estate gives up on dairying after looking at the possibility of yet another million-pound investment to intensify further and gain efficiency by moving from three dairies to two. Selling all their cattle and dairying equipment, they start over from scratch. Looking at what they want to preserve, and how some experimental projects in Europe are going, gives them the initial seeds of ideas for what to do.

Knepp is slowly let go wild, but with the benefits of some continued support from CAP payments, and a somewhat structured approach. Their farm is divided into 3 large blocks, managed somewhat independently of each other. They looked at the whole ecosystem, and realised that larger animal species that would have lived there previously were missing. Old-breed grazing animals have been used to create habitat, restoring natural processes long lost from our landscapes. They focused on older breeds, like Longhorn Cattle and Exmoor Ponies. These species were relatively hardy, and they tried to intervene as little as possible, letting them roam free on the estate. Too many animals would turn the estate back to grassland; too few and it will become closed canopy forest. Getting the balance right allows them to maintain a rich and diverse wood pasture landscape. They also sell about 75 tonnes of free roaming, pasture fed meat each year, which allows them to manage numbers and provides a valuable source of income.

One of the most surprising things about what they did is that there were no plans, or targets for wild species – the land was let go wild, and some of the best results were completely unplanned. Within a decade, some very rare species made Knepp their home, and the range of what lives there now is truly astounding – including some rare purple emperor butterflies, peregrine falcons, nightingales, and orchids.

The book also tells us the fascinating history of farming, fields and most especially the soil in England – telling the story of how the landscape has developed over millennia. It challenges the conventional wisdom of dark closed canopy forests and open pasture being in competition with each other, and instead outlining the idea of a more mixed wood-pasture system, with trees and pasture being part of one resilient, diverse, and complex ecosystem.

This is an inspiring book and is worth reading. Its most valuable lesson may be simply that nature does not need us to plan, set targets, or do much - it just needs some space, and to be largely left alone to its own devices. As Jeff Goldblum once said in Jurassic Park, 'life finds a way...'

Paddy Morris, EPA Catchment Science and Management Unit

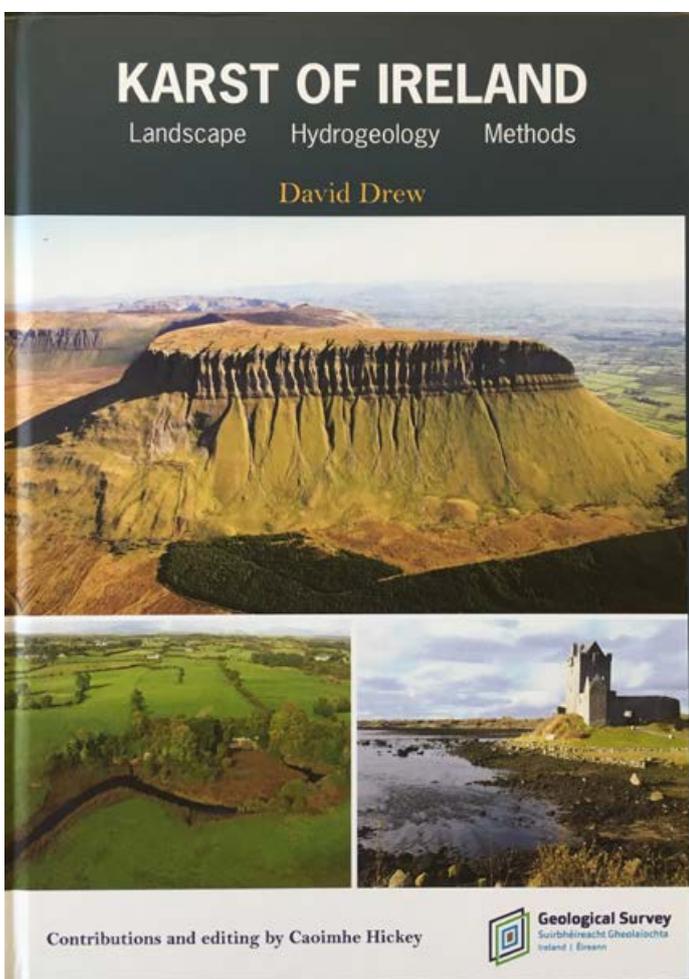
Learn more:

www.knepp.co.uk

BOOKS

Karst of Ireland – Landscape Hydrology Methods

David Drew, the author of this book, has over 45 years of applied research and practical work on karst in Ireland. Karst is a landscape with distinctive hydrology and landforms that arise when the underlying rock is soluble. The vast majority of karst landforms are found on carbonate rocks, such as limestones. Karst landscapes may have sinkholes, caves, enclosed depressions, disappearing streams, springs and sinkholes. The following is an extract from the introduction to the book, written by Donal Daly:



Whether you are a hydrogeologist, hydrologist, environmental scientist, catchment scientist, environmental or infrastructural engineer, planner, public health specialist, ecologist, environmental regulator or member of the public with an interest and concern for the natural environment, an understanding of the characteristics of the limestones – the predominant bedrock in Ireland – particularly those that have a significant degree of solutional features, is essential for the wise use, protection and management of the natural capital that these limestones in the Irish landscape provide. Can I justify this claim? The overriding reason is that knowing and understanding the characteristics of our natural environment is

the foundation of successful environmental management. So, what are the specific reason for having a proper understanding of limestones, particularly karstified limestones and karst groundwater? Look at the evidence:

- Limestones underlie 40% of the land surface of Ireland and 45% of the Republic of Ireland, with half of this area having a significant degree of karstification.
- Karstification dictates the landscape in many areas. In upland areas, such as the Burren, Bricklieve Mountains and Cuilcagh Mountains, karstification has provided distinctive and beautiful landscapes, that are the main basis for local tourism. In certain lowland karstified areas, such as mid Galway, mid Clare and parts of Mayo and Roscommon, an unusually dry landscape with free draining soils, a low density of streams and many stone walls, springs, sinking streams and dolines (collapse features) are present.
- Approximately 30% of Ireland's drinking water comes from groundwater; most of which is sourced from our limestone aquifers.
- In many areas, karst groundwater is vulnerable to pollution, particularly by microbial pathogens, and therefore can pose a health hazard for those drinking untreated water.
- The presence of one of Ireland's unique and valuable ecosystems – turloughs – is due to karstification.

However, while there are good reasons for understanding the karst physical environment, it is perhaps the most difficult possible environment to understand, as I know after almost 40 years trying as a groundwater and catchment scientist. Why is this?

While limestones are the framework for a large proportion of the Irish landscape, it is the role of water that makes karstified areas distinctive and also difficult to characterise and to deal with. Over millions of years, it has produced landscapes of dominantly solutional origin, with bare rock sculpted by karren (small (mm-cm) solution channels), and with sinking streams, dry valleys and caves. Beneath the surface, water flow is concentrated into underground streams and conduits before issuing at large springs. In somewhat less karstified areas, water flow is in both conduits and rock fractures. The issue is that, unlike with surface water systems, we cannot 'see' what is happening underground and this

BOOKS

makes conceptualisation difficult. This then poses a challenge to the hydrogeologist either looking for a water supply or developing protection measures, particularly as 'standard' hydrogeological investigations will usually be ineffective. It also poses a challenge to the regulator of developments in karst areas. Both must be able to conceptualise the underground effectively - the so called 'cook book' approach will not work.

In this book 'Karst of Ireland: Landscape Hydrogeology Methods' we now have a publication that can be the 'bible' for water scientists and engineers, particularly hydrogeologists, who will work in karst areas in the future in Ireland and abroad. Karst, karstic processes, landforms and hydrogeology are explained. Each karst region in the country is described - this information is essential reading for those undertaking development or environmental protection functions in these areas. And, importantly, the specific investigation methods needed for karst areas are described. This is a practical book for both specialists and non-specialists. All chapters contain excellent photos and illustrations to enable

the 'mental image' of karstified areas that is needed for effective environmental management.

Without the karst applied research and practical work of David Drew for over 45 years in Ireland, this book would not be possible. The book is a fabulous legacy of one of Ireland's foremost hydrogeologists. However, we must make it an ongoing legacy by making sure that it influences relevant decision-making in a way that benefits Irish people now and in the future. I ask that you read, learn (every time I read it, I learn more), use and enjoy.

Donal Daly

Learn more:

Karst of Ireland costs €20, and is available in hardback from the Geological Survey of Ireland online shop.

www.gsi.ie/en-ie/publications/Pages/Karst-of-Ireland-Landscape-Hydrogeology-Methods.aspx

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Do you have a story you would like to tell, or a resource you would like to share?

If you would like to submit an article, please email hello@catchments.ie and let us know. The only rule is you need to avoid acronyms, if at all possible.



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