ESManage

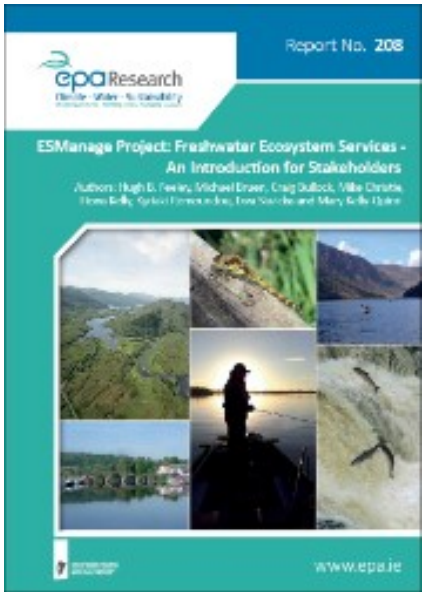
Incorporation of Ecosystem Services Values in the Integrated Management of Irish Freshwater Resources

Newsletter compiled by Thibault Hallouin

Issue 4, November 2017

ESManage News

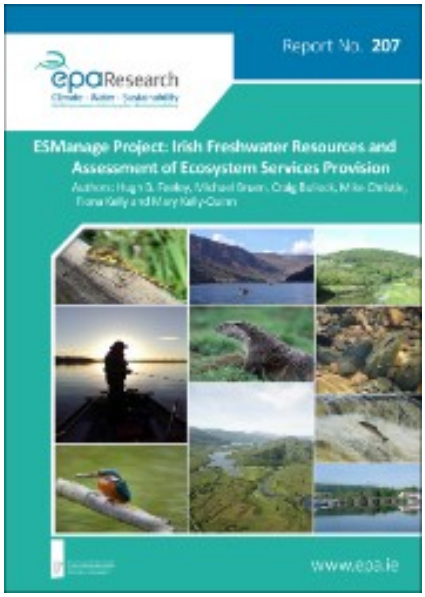
Since the last issue of our newsletter last year, the ***ESManage*** project has produced two reports published by the EPA (see below). The work of our team is well underway and this summer the team was in the field to survey people in three study catchments. Insights into the results of this survey and other progress updates are outlined in this newsletter.



Freshwater Ecosystem Services: An introduction for stakeholders

Hugh B. Feeley, Michael Bruen, Craig Bullock, Mike Christie, Fiona Kelly, Kyriaki Remoundou, Ewa Siwicka and Mary Kelly-Quinn

This report (link) is a shorter, more concise synopsis of the larger and more comprehensive review in EPA Publication 187 tailored to non-scientific stakeholders and the general public.



Irish Freshwater Resources and Assessment of Ecosystem Services Provision

Hugh B. Feeley, Michael Bruen, Craig Bullock, Mike Christie, Fiona Kelly and Mary Kelly-Quinn

This is the second major project output that is available to all ***ESManage*** stakeholders (link). This report summarises the freshwater resources found in Ireland and the biological communities living within them. More importantly this report outlines in detail the freshwater ecosystem services derived from these resources, their importance, future sustainability and likely responses to management options.

In this issue:

Project team:

Assoc. Prof. Mary Kelly-Quinn[1]
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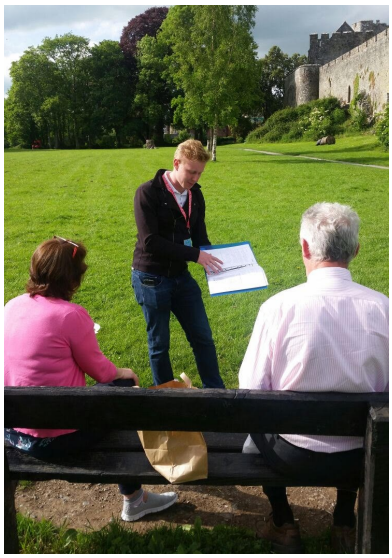
Click here for more details on the ESManage Team

Funding body:

EPA Research
Climate - Water - Sustainability
Identifying pressures • Informing policy • Developing solutions

Valuing the benefits of improving water quality in Irish rivers

A key component of ***ESManage*** is the economic valuation of the benefits people derive from enhancements to Irish river ecosystem services. 'Ecosystem services' are defined as the benefits that people attain from the natural environment. In the context of Irish rivers, these services include improvements to: water quality (e.g. reducing algae blooms and scum), water health (e.g. reducing risks of minor gastro-intestinal infection from direct contact with river water), buffer strip (e.g. enhancing bankside vegetation), river wildlife (e.g. increasing the number and diversity of species), and angling (e.g. increasing the number of 'catchable' salmon and trout).



Paweł Szymończyk (ESManage) interviewing the general public

To assess the economic value of these river services, we interviewed 470 people at three river catchments (Dodder, Moy, and Suir) using the 'Choice experiment' method. In a choice experiment, survey respondents are asked to compare a number of future scenarios, for managing freshwater ecosystems services and their costs (see Figure 1 for an example). Respondents then choose their preferred scenario.

River aspect	Option A	Option B	Current
Water quality	0% Proportion of algae and scum in the river	0% Proportion of algae and scum in the river	58% Proportion of algae and scum in the river
Water health	10 in 100 risk Moderate risk to human health	1 in 100 risk Negligible risk to human health	10 in 100 risk Moderate risk to human health
Buffer strip	No change	15% Bankside with new buffer strip	No change
Wildlife	Increased number and diversity of river wildlife	No change	No change
Angling	Increased number of catchable fish	Increased number of catchable fish	No change
Cost (Per annum for 10 years)	€25	€100	€0

Figure 1: Example of choice experiment 'choice task'

Analysis of respondent choices allows marginal change values to be elicited for each service included in the choice design (Louviere et al. 2000 [a]). Across all rivers, improving the wildlife in and around rivers was most highly valued by Irish people, followed by improvements to water quality and water health. Lowest values were found for improvements to Angling (although it should be noted that Anglers tended to highly value angling).

Stay tuned to our website and twitter for updates

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ESManage at the National Hydrology Conference

In November, ***ESManage*** team members Michael Bruen and Thibault Hallouin were at the National Hydrology Conference in Athlone to give an oral presentation on their latest investigations on the performance and suitability of hydrological and water quality models used in ***ESManage*** for the scenarios analyses in work.

Irish National Committees for the IHP & ICID

Indeed, comparison of remediation measures to improve or restore the provision of freshwater ecosystem services requires models with fine spatial resolution to account for diverse land management practices in the catchment, and with no calibration requirements to be applied in ungauged catchments and for prospective scenarios where the landscape is modified (i.e. restoration of riparian zones).

The ESManage team wrote a short conference paper entitled ***"Assessing the validity of scaling catchment parameters from lumped to semi-distributed models"***. The paper is published in the proceedings of the conference.

[a] *Louviere J., Hensher D., and Swait J. 2000 —Stated Choice Methods Analysis and Applications— Cambridge University Press*

ESManage talking Hydrology and Water Quality in Ireland for Science Week 2017

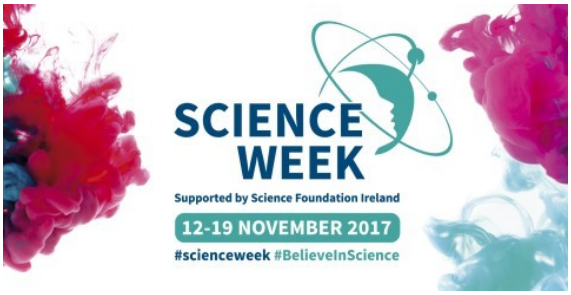
This year the ***ESManage*** team took part in Science Week 2017. This event is organised every year by Science Foundation Ireland (SFI). Our PhD student Thibault Hallouin was kindly invited by two dedicated teachers of a primary school in Foxrock (*Lycée Français d'Irlande*) to describe the journey of water through Irish landscapes and the main threats to the water quality of our waterbodies in Ireland.

Thibault running an experiment on water percolation through soil samples in front of a young and enthusiastic audience

Three classes of 28 pupils attended this interactive presentation. They were very enthusiastic and they enjoyed the practical activities involved. Thibault hopes that a few of them will be part of the next generation of hydrologists and that all of them will remember the many values of our high quality waters in Ireland and why it is essential to protect them.

Thibault Hallouin is a member of the French researchers and scientists in Ireland and he was supported by the French Embassy for this event. Science Foundation Ireland also provided souvenirs for the pupils.

#BelieveInScience



Insights into other Ecosystem Services projects: AQUACROSS

The AQUACROSS project (Knowledge, Assessment, and Management for AQUAtic Biodiversity and Ecosystem Services aCROSS EU policies) aims to support EU efforts to protect aquatic biodiversity and ensure the provision of aquatic ecosystem services. Funded by Europe's Horizon 2020 research programme, AQUACROSS seeks to advance knowledge and application of ecosystem-based management for aquatic ecosystems to support the timely achievement of the EU 2020 Biodiversity Strategy targets.

In general, assessing the drivers and pressures in relation to affected ecosystem components, ecosystem functions and ecosystem services, is key for making educated decisions about the response of those components to changes. Such changes can be evaluated by models that allow to spatially prioritise biodiversity and ecosystem services, to assess their irreplaceability, and how potential environmental or management scenarios could impact the patterns. In practice, the modelling framework consists of three components: biodiversity models, ecosystem service models and a joint prioritisation. All elements run spatially-explicitly, allowing to pinpoint locations and magnitude of overlap and dependency among the three components and any changes thereof:

→ ***Biodiversity models:*** Species distribution models provide the basis. This model family, which constitutes a variety of model types and algorithms, create a standardised output regarding potential habitat suitability of a species at a given location within the area. If using Bayesian Inference (given high-quality survey data), then the models can also provide the credible interval of the predictions that allow to quantify the uncertainty in the model output.

→ ***EF and ESS models:*** The spatial layers can be computed using a variety of available tools, while each ecosystem service type has specific data requirements. Ecosystem services may be compatible with the conservation of biodiversity (e.g., regulation and/or cultural services), while others might entail risks to the conservation of biodiversity

and/or other services (e.g., provisioning services). Likewise to the biodiversity models, if the spatial ecosystem service layers are created in a Bayesian framework, the uncertainty can be quantified and communicated.

→ **Spatial prioritisation:** The model coupling within a spatial prioritisation framework allows identifying priority areas for the conservation of aquatic biodiversity and different ecosystem services related to marine, coastal and freshwater ecosystems within specific management zones. These different management zones include i) only conservation and compatible ecosystem service zone (co-benefits zone) and ii) a zone for accessing provisioning services (trade-off zone). The software Marxan with Zones provides such a tool.

The modelling framework is being tested in selected case studies. More information of the project is available at www.aquacross.eu. For details on the modelling framework, please see the full report and executive summary.

By **Dr. Sami Domisch**, Leibniz-Institute of Freshwater Ecology and Inland Fisheries

ESManage is a 3-year project (February 2015 to January 2018), funded by the Irish Environmental Protection Agency. The overall project objective is to ***harness the knowledge and tools required to embed the ecosystem services approach into policy and decision-making for sustainable management of water resources, as required by the Water Framework Directive (WFD).***

Project Partners

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