Incorporation of **E**cosystem **S**ervices Values in the Integrated **Manage**ment of Irish Freshwater Resources

Mary Kelly-Quinn[1]*, Michael Bruen[2], Craig Bullock[3], Michael Christie[4], Hugh B. Feeley[1], Thibault Hallouin[2], Fiona Kelly[5] and Ewa Siwicka[4]

[1] UCD School of Biology & Environmental Science, University College Dublin, Dublin 4, Ireland, [2] UCD School of Civil, Structural & Environmental Engineering, University College Dublin, Dublin 4, Ireland, [3] UCD School of Geography, Planning & Environmental Policy, University College Dublin, Dublin 4, Ireland, [4] Blue Island Consulting Ltd, Ceredigion, SY24 5LA, United Kingdom, [5] Inland Fisheries Ireland, Citywest Business Campus, Dublin 24, Ireland

Introducing ESManage

ESManage is a 3-year project, funded by the Irish Environmental Protection Agency focusing on freshwater ecosystem services (ES) in Ireland. The overall aim is to **harness the knowledge and tools required to embed the ES framework into policy and decision-making for sustainable management of water resources, as required by the Water Framework Directive.** ES are defined as *"the contributions that ecosystems make to human well-being"* (Millennium Ecosystem Assessment, 2005). They can be organised and defined using various classification systems (e.g. CICES 2013). These generally include provisioning, regulating and maintenance, cultural and supporting services or processes (see Table 1 for overview). The research is being undertaken by a multi-disciplinary team involving biologists, ecologists, hydrologists, modellers and environmental economists.

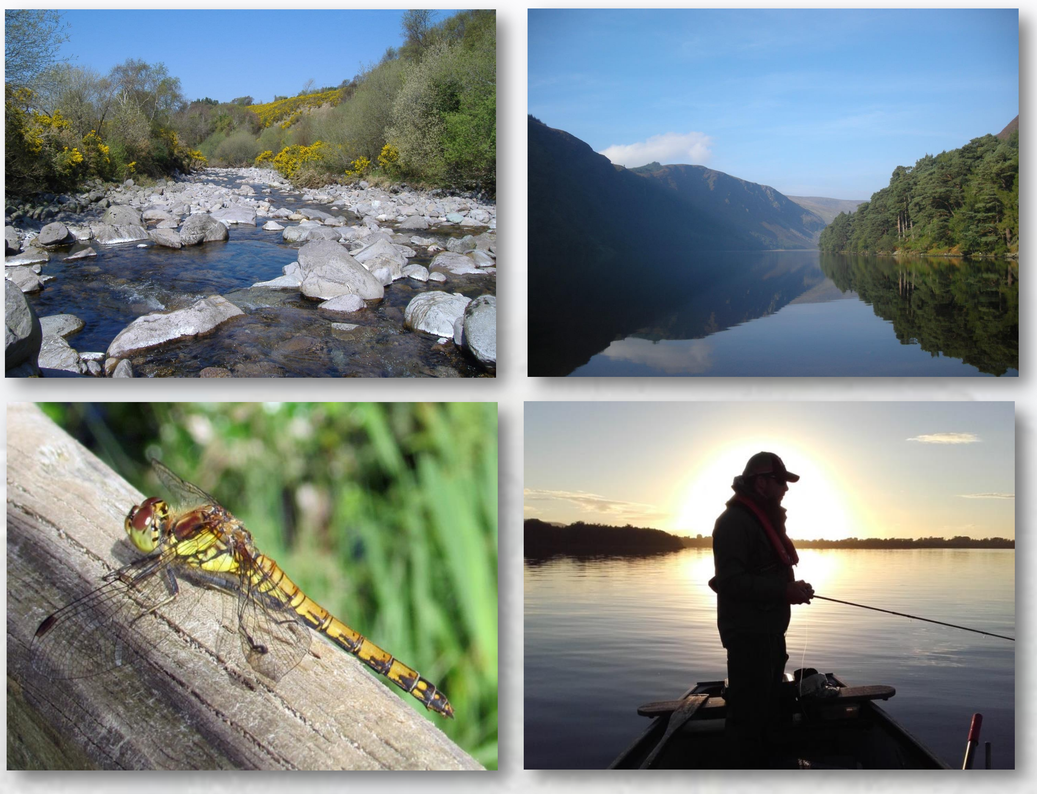
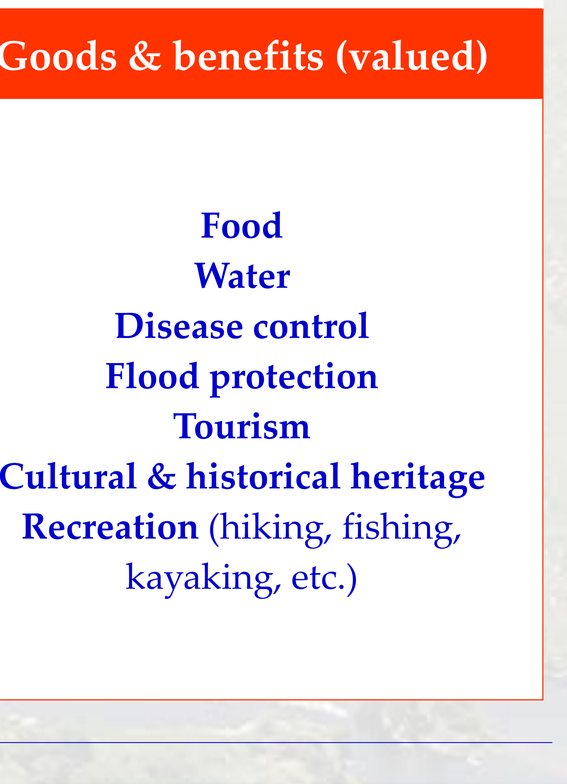


Table 1: Overview of the breakdown of ecosystem processes, the ecosystem services provided and the goods derived from freshwater ecosystems which can be valued for human well-being.

Ecosystems processes ➡	**Ecosystem services ➡**			**Goods & benefits (valued)**
Supporting processes/services	**Provisioning services**	**Regulating & maintenance services**	**Cultural services**	
Biodiversity Energy transfer Food-web dynamics Nutrient cycling Primary production	Potable water Fish Water for agriculture & industry	Water quality Flood regulation Flow regulation Decomposition Carbon regulation Nitrogen regulation Climate regulation Pathogens/ human health Waste disposal & dilution	Recreation Landscape aesthetics Spiritual/ Religious Education Wildlife	**Food** **Water** **Disease control** **Flood protection** **Tourism** **Cultural & historical heritage** **Recreation** (hiking, fishing, kayaking, etc.)

Specific tasks of ESManage

1. Literature review of the state of knowledge of ES in freshwaters (available online at http://www.epa.ie/pubs/reports/research/water/)
2. Provide a synthesis of current knowledge on the Irish freshwater resource in the context of ecosystem services and select key ES for analysis and valuation (*completed – currently in press*)
3. Scenario analysis to show how changes in drivers (land-use) affect inputs to rivers and associated physical and chemical water quality stressors.
4. Analyse existing and new biological data to investigate biological responses to stressors/drivers and links to selected ecosystem services. Combine with Obj. 3 to illustrate change in ecological condition/ES provision.
5. Estimate the economic impact of future changes to the provision of key aquatic ecosystem services in Irish rivers.
6. Recommend how the ecosystem services approach can best be embedded into policy and decision-making for sustainable management of water resources.



References: Millennium Ecosystem Assessment (2005) Millennium ecosystem assessment, ecosystems and human well-being: a framework for assessment. Washington (DC), Island Press. CICES [Common International Classification of Ecosystem Services](2013) http://cices.eu/ **Photo credits:** River and Lake: Hugh Feeley (UCD); Dragonfly: Siobhan Atkinson (UCD); Angler: Fiona Kelly (Inland Fisheries Ireland)

***Contact**: Dr Mary Kelly-Quinn (Project Leader) mary.kelly-quinn@ucd.ie

Twitter: @ESManage | **Website**: www.ucd.ie/esmanage

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