**Catchment Science & Management Training Course 2023**

**Course rationale**

Local authorities and other implementing bodies will have a greater role in the delivery of the River Basin Management Plan (2022-2027). This course is designed to support local authorities (and others) deliver on their roles in this regard and is in response to requests for upskilling in the field of catchment science from local authority operational staff and management.

The course will cover the practical steps involved in the catchment science essentials, including the principals and practical applications unpinning Integrated Catchment Management, desktop and field investigations, interrogating the data, using best available information, databases and maps, stakeholder participation and public engagement. The course takes a holistic approach and should serve as a key tool in assisting each local authority apply catchment science to their water service delivery remit.

**Context**

The variability and complexity of our biophysical environment – soils, subsoils, bedrock, ecosystems and weather – makes assessing and determining water movement in the Irish landscape both interesting and demanding. Add to this situation the heterogeneity of human activities locally and regionally, whether in towns or in rural areas, then the challenge of achieving effective water resources and related ecosystem management is apparent.

The key to successful protection and management of our water resources is **understanding** the situation in catchments and then basing the **actions/measures** to protect water quality, where it is satisfactory, or improve/restore, where it is unsatisfactory, on this understanding.

Catchment science is the study of the dynamic interactions between the physical catchment landscape, the ecosystems that sit within that landscape, and the human activities that can cause impacts to ecosystems in that landscape (Deakin, 2017). These three elements are all linked within the source-pathway-receptor (SPR) framework, which is illustrated in the diagram below. Therefore, catchment science is critical to providing the understanding mentioned above.



*Illustration of the catchment science and management nexus (Copied from Deakin (2017). Catchments Newsletter, Issue 7* [*https://www.catchments.ie/download/catchments-newsletter-sharing-science-stories-winter-2017/*](https://www.catchments.ie/download/catchments-newsletter-sharing-science-stories-winter-2017/)*)*

But if there is a science called ‘catchment science’, then catchment scientists are needed! According to Deakin (2017), ‘*the ideal catchment scientist has a firm knowledge and understanding of all the source and pathway receptor elements of catchments, a good grounding in measures, and most importantly, the capacity to integrate, analyse and synthesise that knowledge to gain new understanding for the purposes of answering relevant catchment science and management questions.* As is obvious from this quote and from the above illustration, knowledge of many disciplinary areas is essential. Those of us working in the area are from a wide variety of backgrounds; we have detailed knowledge and experience of our own area and have gained and are still learning from our colleagues with different disciplines.

For those of us that are now undertaking catchment science and management, one of the features is how interesting and rewarding the work is, not to mention the satisfaction of arriving at conclusions that we feel will achieve the objectives set for the water bodies we deal with. One of our objectives for this course will be to show how enjoyable and relevant knowledge and application of catchment science and management is for mitigating the impacts of human activities on not only our water resources but also our ecosystems and our climate.

**General Course Content**

The Course will cover the catchment science and management aspects for the following areas:

1. Water Framework Directive (WFD) and River Basin Management Plan implementation.
	1. Protecting water quality where it is *Not at Risk* of meeting the required status objectives.
	2. Restoring water quality where it is *At Risk* of not meeting the required status objectives.
2. Drinking water source protection.
	1. Protecting untreated source water where it is satisfactory.
	2. Improving untreated source water where it is unsatisfactory.
3. Compliance checking.
4. Site environmental assessments.
5. Co-benefits of measures/actions, thereby linking with terrestrial ecosystem management and climate actions.

While the focus will be oriented primarily towards watercourses in a catchment/sub-catchment context, the content, processes, and approaches described are also applicable to groundwater, water abstraction, developments on sites and inspections.

**Learning Objectives**

* To highlight and outline a systematic, focussed approach to deciding on and implementing protection (where situation is satisfactory) and mitigation (where situation is unsatisfactory) measures and actions as a means of increasing the likelihood of achieving the desired environmental outcomes in an efficient and effective manner.
* To show the relevance of the combined integrated catchment management (ICM) and the Framework for Integrated Land and Landscape Management (FILLM)[[1]](#footnote-2) as an overarching framework for water resources and ecosystems management.
* To communicate the necessary catchment science principles, processes, and methods for all the relevant discipline areas.
* To outline a recommended integrated approach to evaluating data and reporting.
* To highlight the role of community participation in management of our water resources.

**Summary of Course Programme**

The Course will consist of three Modules:

* ***Module 1 (2023) – Setting the Scene, Catchment Science and Pressures***
	+ To concentrate on the fundamental catchment science aspects and deal with the various pressures.
	+ To provide supporting information for the development of operational work plans.
	+ **via Online recorded presentations. (3 days)**
* ***Module 2 (2023) – Characterisation and Field Element***
	+ Characterisation is critical to providing the understanding on which protection and mitigation actions/measures are based; 3 days, one of which will be a fieldtrip, will outline and consider all the various desk and field aspects.
	+ **Two full training days in training centre and one field day. (3 days)**
* ***Module 3 (2023) – Protection and Mitigation***
	+ Outline a recommended approach, with some examples, to decide on protection and mitigation strategies and measures/actions. In particular, it will cover public engagement and collaboration.
	+ **One day in training centre and one day in the field. (2 days)**

The dates and location of the roll out of the training for 2023 to be confirmed. Proposed timelines are as follows:

**Dates for Module 1:**

Module 1 will involve a number of pre-recorded presentations for viewing over a period of 3 weeks which will begin once registration has been finalised, to enable maximum flexibility for the learner.

Learners will receive a link via the email address provided at registration, and it is planned that it will also be accompanied by relevant access credentials to view the recorded presentations. These will be available in **mid-March** once registrations have been finalised.

Also, as part of Module 1 there will be two live Q&A sessions hosted virtually (via Zoom) by LAWPRO on **25th April 2023**; a morning session and an afternoon session. Learners are only required to join one of these sessions which best suits their availability.

Learners are also strongly encouraged to submit questions and answers in advance of these live sessions (and/or as they progress through the recorded material) to allow for preparation of answers. This will be particularly pertinent for content provided by external speakers who may not be in attendance at the Q&A, allowing LAWPRO to liaise in advance and provide the relevant response.

Questions and queries should be submitted to **csmtraining@lawaters.ie**

**Dates for Module 2:**

Intake 1: **15th,16th and 17th May 2023** (16th will be a field trip, transport provided)

Intake 2: **22nd ,23rd and 24th May 2023** (23rd will be a field trip, transport provided)

This course will be held in Roscrea Regional Training Centre or a location nearby.

Address:

Monastery Road, Roscrea, Co. Tipperary

Phone: 0505 23425

e-mail: roscreartc@tipperarycoco.ie

**Dates for Module 3:**

Intake 1: **19th & 20th September 2023** (20th will be a field trip, transport provided)

Intake 2: **26th & 27th September 2023** (27th will be a field trip, transport provided)

This course will be held in a location yet to be confirmed, but it will be in the vicinity of Newcastle West, Co. Limerick, with field element looking at implementation of measures in the ‘Deel Spatially Targeted Buffers EIP’

**Field Trip Equipment List**

1. Wellingtons/waders
2. Rain gear
3. Sunscreen (weather dependent)
4. Note book
5. Pencils/Pen
6. Small Stream Impact Score (SSIS) field guide
7. Hand lens (if have one)
8. Disposable gloves
9. Insect repellent
10. Hi-Viz vest
11. Clipboard/ weather-writer if available
12. Life jacket if available.

**Module 1 Materials to be viewed in full before Monday 17th April 2023**

**Module 1(a) – Setting the scene**

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| **Topics** | **Duration** | **Topic Components** | **Speaker** |
| **Introduction and Setting the Scene** | **24mins** | Welcome, introductions and objectives. | **Carol McCarthy, LAWPRO** |
| **Principles of catchment science and management** | **34mins** | * Having a systems approach
* Focusing on the objective
* Monitoring is a means not an end
* Understanding the land and landscape setting
* Picking important problems and fixing them
* The ‘right measure in the right place’
* A pressure does not necessarily mean an impact
* Catchment science requires multidisciplinary inputs and approaches
* Co-benefits for biodiversity, soil protection, carbon sequestration and GHG emission reductions are an essential part of the ‘story’
 | **Donal Daly** |
| **Relevant EU Directives** | **37mins** | * WFD
* Groundwater Directive (GD)
* Other linked directives
 | **Donal Daly** |
| **Water quality** | **30mins** | * Outline of water quality situation
* Status results
* Local level examples to inform work programmes
 | **EPA** |
| **Catchments** | **27mins** | * Catchments as landscape features
* ICM & FILLM
 | **Donal Daly** |

**Module 1(b) – Catchment Science**

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| **Topics** | **Duration** | **Topic Components** | **Speaker** |
| **Catchment science** | **1hr 14mins** | * Source-pathway-receptor model for environmental management
* Water movement in the landscape (hydrological and hydrogeological characteristics)
 | **Donal Daly** |
| **20mins**  | * Karst areas
* YouTube on rivers and groundwater: <https://www.youtube.com/watch?v=ci-ABWPG7LQ>
 | **Donal Daly** |
| **EPA Characterisation approach** | **27mins** | * General approach
* 3rd River Basin Management cycle work.
* Objective setting/ extended EO/HMWB
* dRBMP – Areas for Action categories
* Tracking and reporting
 | **EPA** |

**Module 1(c) – Catchment Science**

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| **Topics** | **Duration** | **Topic Components** | **Speaker** |
| **Catchment science** | **39mins****30mins****29mins** | * Pollutants in the landscape
* The Pressures
* Pathway conceptual models
 | **Donal Daly** |
| **18mins** | * Sediment as a *significant issue* and pressure
 | **Anna Rymszewicz, LAWPRO** |
| **47mins** | * Pathway susceptibility maps
* Critical source areas
* Pollution Impact Potential (PIP) maps
* Source Load Apportionment
* Nitrogen load reduction report
 | **EPA** |

**Module 1(d) – Catchment Science**

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| --- | --- | --- | --- |
| **Topics** | **Duration** | **Topics Components** | **Speaker** |
| **Biology** | **37mins** | * Introduction to biological aspects
* High status objective water bodies
 | **LAWPRO** |
| **Blue Dot** | **15-20mins** | * Overview of Blue Dot Programme
 | **Paul O’Callaghan, LAWPRO** |
| **Pathway conceptual models** | **23mins** | * Developing pathway conceptual models
 | **Donal Daly** |
| **Desk study** | **34mins** | * Desk study
* “How to use PIP maps?” – Jenny Deakin, EPA video tutorial <https://www.youtube.com/watch?v=LRp0TRi5j8w>
 | **Donal Daly** |
| **32mins****27mins** | * Desk study example 1 - River
* Desk Study example 2 - Lake
 | **LAWPRO** |

**Module 1(e) – Potential *Significant Pressures***

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| --- | --- | --- | --- |
| **Topics** | **Duration** | **Topic Components** | **Speaker** |
| **WWTPs & Section 4** | **41mins** | * Dealt with in the context of catchment assessments
 | **Maeve Ryan** |
| **Domestic Wastewater Treatment Systems** | **42mins** | * What are the pollutants from DWWTs?
* New EPA Code of Practice
* NIP – significant pressure layer
* Local impacts – protect function
* Planning application assessment
* Cumulative impacts and seasonal impacts
 | **Robbie Meehan** |
| **Forestry** | **60mins approx** | * Description of pressures and potential impacts
* Licence application reviews
* Mitigation measures
* Co-benefits
* Example
 | **Ken Bucke****Forest Service** |
| **Peatlands/Peat soils** | **22mins** | * Ammonium, phosphate, silt
* Restoration
 | **Donal Daly** |

**Module 1(f) – Potential *Significant Pressures***

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| **Topics** | **Time** | **Topic Components** | **Speaker** |
| **Hydromorphology** | **46mins** | * Identifying pressures
* MQI
* RHAT
 | **EPA** |
| **Channel Maintenance**  | **27mins** | * Channel Maintenance
 | **Tony Brew, OPW** |
| **24mins** | * Drainage Districts
 | **Bernie White, LAWPRO** |
| **Farming** | **25mins** | * Background
* Water, climate and biodiversity issues
* Main sources
* Main *significant issues*
 | **Donal Daly** |
| **26mins** | * Rogerstown Estuary case study
 | **Eoin McAleer** |
| **Drainage** | **11mins** | * Agricultural drainage
 | **Mairead Shore, LAWPRO** |

**Q&A sessions – Tuesday 25th April 2023**

***(Questions can be submitted via email by Mon 17/04/23***

***to*** ***csmtraining@lawaters.ie******)***

**Two 1.5 hour sessions – 11:00-12:30 and 14:30-16:00**

**DRAFT: Module 2 – Roscrea RTC**

**Group 1 - 15-17 May 2023**

**Group 2 – 22-24 May 2023**

**Module 2: Day 1 - Characterisation**

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| **Topics** | **Time** | **Topic Components** |  |
| **Introduction**  | **09:00 - 09:15** | * Outline of day and Learning objectives
 | **LAWPRO** |
| **09:15 – 10:00** | * Recap – conceptual model and objective
 | **Donal Daly** |
| **10:00 -10:30** | * Overview of the Catchment Walk
* Field sheet template
 | **Maeve Ryan** |
| **10.30-10.45** | ***Tea/coffee break*** |  |
| **Catchment walk** | **10:45-11:45** | * Physio-chemical indicators
* Examples
* Practical demonstration
 | **Maeve Ryan** |
| **11:45-12:15** | * Landscape indicators
* Visual assessments
 | **Donal Daly** |
| **12.15-13:00** | **Lunch break** |  |
| **13:00-14:45** | * Biological indicators
* SSISs
* Rapid assessments
* Field sheets
 | **LAWPRO** |
| ***14:45-15:00*** | ***Tea/coffee break*** |  |
| **15:00-15:45** | * Hydromorphology Assessment
* Sediment Assessment
 | **LAWPRO** |
| ***15:45-16:30*** | Discussion & Outline of details on field area, schedule, meeting point | **All** |

**Module 2: Day 2 - Fieldtrip**

* **9am start:** Bus transport and packed lunch provided
* The sub-catchment chosen will be representative of the biophysical setting and the issues in the region. Freely draining and poorly draining scenarios will be covered where possible in the field day.
* SSIS and Rapid Assessments will be demonstrated.

**Module 2: Day 3 Characterisation**

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| **Topics** | **Time** | **Topic Components** | **Speaker** |
| **Catchment walk** | **09:00-09:15** | * Discussion on catchment walks
 | **Donal Daly/****LAWPRO field team** |
| **09:15-11:00** | * Workshop on pathway conceptual models
* Phosphate loading exercise
 | **Donal Daly** |
| **11:00 –11:15** | ***Tea/coffee break*** |  |
| **11:15-13:00** | * Case histories of different typical scenarios and issues
* Case study examples – P, High Status, Sediment, Drainage
 | **LAWPRO Recordings** |
| **13:00-13:45** | ***Lunch break*** |  |
| **WFD App** | **13:45-15:30** | * WFD App Workshop
 | **EPA/LAWPRO** |
| **Discussion** | **15:30-16:15** | * General discussion
 | **All** |

**DRAFT: Module 3 – Upper Deel EIP**

**Group 1 - 19-20 Sep 2023**

**Group 2 – 26-27 Sep 2023**

**Module 3: Day 1 Protection & Mitigation**

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| **Topics** | **Time** | **Topic Components** | **Speaker** |
| **Introduction** | 09:00-09:15 | Outline of day | **Maeve Ryan** |
| Learning objectives |
| **Protection and Mitigation Actions** | 09:15-11:00 | Approach, using farming as the example[[2]](#footnote-3)Include examples of Measures | **Donal Daly** |
| ***11:00-11:15*** | ***Tea/coffee break*** |
| 11:15-12:15 | ASSAP case histories | **ASSAP** |
| 12:15-12:45 | Nature-based catchment management solutions | **LAWPRO**  |
| ***13:00 -14.00*** | ***Lunch break*** |
| 14.00 -15:00 | A discussion on the ‘***protect***’ objective | **Donal Daly** |
| ***15.00 – 15.10*** | ***Stretch legs break*** |
| 15:10-16:00 | Intro to Collaborative working | **LAWPRO CWOs** |
| Case study examples |
| 16:00-16:45 | Looking towards future opportunities | **LAWPRO** |
| Helicopter view | **Donal Daly** |
| **Field trip** | 16:45-17:00 | Outline of details on field area, schedule, meeting point | **Deel EIP Team** |

**Day 2 – Fieldtrip**

* **9am start:** Bus transport and packed lunch provided
* This fieldtrip will focus on examples of protection/mitigation measures.
* Location to be confirmed for 2023
1. [https://thewaterforum.ie/app/uploads/2020/07/An-Fóram-Uisce\_Framework-for-Integrated-Land-and-Landscape-Management.pdf](https://thewaterforum.ie/app/uploads/2020/07/An-F%C3%B3ram-Uisce_Framework-for-Integrated-Land-and-Landscape-Management.pdf) [↑](#footnote-ref-2)
2. Participants are requested to check out in advance the NFGWS (2020) 'A Handbook of Source Protection and Mitigation Actions for Farming' at this link: <https://nfgws.ie/nfgws-source-protection-publications/> [↑](#footnote-ref-3)