

EPA-Funded Research: Water Quality

Reports from completed projects are available on the EPA website at <http://www.epa.ie/downloads/pubs/research/water/>

During the ERTDI Programme 2000-2006, 70 research projects were funded in the area of Water Quality, comprising of

2 Contributory scholarship projects

7 Desk-studies projects

9 Fellowship projects

17 Large-scale projects

12 Medium-scale projects

8 Postdoctoral fellowships

15 Small-scale projects

70 Total projects

70 EPA (2000 – 2006) Projects indexed by

[Year and Content](#)

[Lead Organisation](#)

[Project Leader](#)

[Year and Content:](#)

[Water Quality - Phase 1 \(2000\)](#)

- 2000-DS-5-M1: [Preparation for the Proposed EU Water Framework Directive \(WFD\)](#)
- 2000-MS-2-M1: [Endocrine Disrupting Substances in the Irish Aquatic Environment](#)
- 2000-MS-4-M1: [Relationship between Biological Quality Index and Fish Stocks in Rivers](#)
- 2000-MS-5-M1: [Impacts of Nutrients on the Zebra Mussel Population in Lough Key](#)
- 2000-MS-13-M2: [Impact Assessment of Highway Drainage on Water Quality](#)
- 2000-MS-15-M1: [Wastewater Treatment Efficiency of Subsoil and Stratified Sand Filters](#)
- 2000-FS-1-M1: [Monitoring Methodologies for the Ecological Assessment of Lakes](#)
- 2000-FS-2-M1: [Reference Conditions and Eutrophication Impacts in Irish Rivers: Meeting the Requirements of the Proposed EU Water Framework Directive](#)

Eutrophication from Agricultural Sources (2000)

- 2000-LS-2c-M2: [Eutrophication from Agricultural Sources - Phosphorus and Nitrogen](#)
- 2000-LS-2.1.1a-M2: [Eutrophication from Agricultural Sources \(Phosphorus and Nitrogen\) - Soil and Phosphorus](#)
- 2000-LS-2.1.1b-M2: [Eutrophication from Agricultural Sources \(Phosphorus and Nitrogen\) - Soil and Phosphorus](#)
- 2000-LS-2.1.2-M2: [Eutrophication from Agricultural Sources \(Phosphorus and Nitrogen\) - Grazed Pastures](#)
- 2000-LS-2.1.3-M2: [Eutrophication from Agricultural Sources \(Phosphorus and Nitrogen\) - Slurry Spreading](#)
- 2000-LS-2.1.4-M2: [Eutrophication from Agricultural Sources \(Phosphorus and Nitrogen\) - Fertiliser Spreading](#)
- 2000-LS-2.1.7-M2: [Eutrophication from Agricultural Sources \(Phosphorus and Nitrogen\) - Relative Eutrophic Effects of Seasonal Discharges of Phosphate to Water Bodies](#)
- 2000-LS-2.2.1-M2: [Eutrophication from Agricultural Sources \(Phosphorus and Nitrogen\) - Field by Field Assessment](#)
- 2000-LS-2.2.2-M2: [Eutrophication from Agricultural Sources \(Phosphorus and Nitrogen\) - Modelling P Losses from Soils](#)
- 2000-LS-2.3.1.1-M2: [Eutrophication from Agricultural Sources \(Phosphorus and Nitrogen\) - Effects of Agricultural Practices on Nitrate Leaching - Farm Scale Work Package](#)
- 2000-LS-2.3.1.2-M2: [Eutrophication from Agricultural Sources \(Phosphorus and Nitrogen\) - Effects of Agricultural Practices on Nitrate Leaching - Leaching Soil Investigation Work Package](#)
- 2000-LS-2.3.1.3-M2: [Eutrophication from Agricultural Sources \(Phosphorus and Nitrogen\) - Effects of Agricultural Practices on Nitrate Leaching - Groundwater Work Package](#)

Forestry & Water Quality (2000)

- 2000-LS-3.2.1a-M2: [Forestry and Environment Impacts Addressing Water Quality and Biodiversity – Forestry and the Potential for Surface Water Acidification](#)
- 2000-LS-3.2.1b-M2: [Forestry and the Potential for Surface Water Acidification - Liming Study](#)
- 2000-LS-3.2.2-M2: [Forestry and Environment Impacts Addressing Water Quality and Biodiversity - Forest Operations and Eutrophication](#)
- 2000-LS-3.2.4-M2: [Forest operations - quantification and management of erosion and siltation](#)

Doctoral Scholarships (2001)

2001-PHD-8-M1: [Identification and Initial Assessment of Phytases Suitable for Inclusion in Animal Feed for the Purposes of Phosphate Pollution Abatement](#)

2001-PHD-9-M1: [Development of A Generic Tool for Flushing Study Analyses](#)

Water Framework Directive – Phase 2 (2002)

2002-W-DS-7-M1: [Development of a Methodology for the Characterisation of Unpolluted Groundwater](#)

2002-W-DS-8-M1: [Development of a Methodology for the Characterisation of a Karstic Groundwater Body with Particular Emphasis on the Linkage with Associated Ecosystems, Such as Turloughs](#)

2002-W-DS-9-M1: [Hydromorphology of Rivers](#)

2002-W-DS-10-M1: [Identification and Ranking of Nature Conservation Designated Areas, where the Status of Water is an Important Factor](#)

2002-W-DS-11-M1: [An Assessment of the Mathematical Modelling in the Implementation Water Framework Directive in Ireland](#)

2002-W-LS-7-M1: [Characterisation of Reference Conditions and Testing of Typology of Rivers](#)

2002-W-MS-16-M1: [Recharge and Groundwater Vulnerability](#)

2002-W-MS-17-M1: [Palaeolimnological Investigation - Identification of Reference-Status for Irish Lakes Typologies using Palaeolimnological Methods and Techniques \(IN-SIGHT\)](#)

2002-W-FS-5: [Pilot River Basin](#)

Doctoral Scholarships (2002)

2002-PHD-2-30: [The Development of Liquid Chromatography-Mass Spectrometry \(LC-MS\) Methods for the Determination of Microcystins in Irish Freshwaters, Cyanobacteria and Drinking Water](#)

2002-PHD-2-34: [Irish Ecoregion Community Training-Set and Ecological Restoration Targets](#)

2002-PHD-2-36: [A Test of Different Ecological Response to Nutrient Loads of Soft- and Hard-Water Lakes](#)

2002-PHD-2-37: [Turlough Soils - Spatial and Temporal Fluxes in Plant Nutrients](#)

2002-PHD-2-38: [The Creation and Assessment of Digital Spatial Modelling Techniques for the Management of Lake Water Quality in the Lough Leane and Lough Feeagh Catchments](#)

Water Quality (2003)

2003-COE-FS-10-M4: [Improved Water Quality Data Analysis and Interpretation](#)

Water Framework Directive – Phase 5 (2005)

2005-FS-31-M1: [Application of Molecular Techniques to Determine the Origin of Faecal Contamination of Group Water Scheme Waters.](#)

2005-FS-35-M1: [Macroalgal Biomonitoring - Applying Phenolic Compounds As Biomarkers for Metal Uptake Characteristics in Irish Coastal Environments](#)

2005-GIS-FS-25: [Integrated GIS and Neuro-Fuzzy Analysis for Use in River Basin District Management](#)

2005-MS-15-M1: [An Investigation into the Effective Distribution of On-Site Wastewater Effluent into Percolation Areas and the Treatment Performance of Sandy Subsoils and Constructed Wetlands](#)

2005-W-DS-24-M1: [The Water Framework Directive, Assessment, Participation, and Protected Areas: What are The Relationships? \(WAPPA\)](#)

2005-W-MS-36-M1: [Marine Ecological Tools for Reference, Intercalibration and Classification \(METRIC\)](#)

2005-W-MS-37-M1: [Water Framework Directive – Interaction, Negotiation and Communication of Optimal Measures with Stakeholders \(WINCOMS\)](#)

2005-W-MS-39-M1: [The Impact of Plant Nutrients On Primary Productivity in Running Waters: Evaluating the Risk to Stream Health](#)

2005-W-MS-40-M1: [Past, Current and Future Interactions between Pressures, Chemical Status and Biological Quality Elements for Lakes in Two Contrasting Instrumented Catchments in Ireland \(ILLUMINATE\)](#)

2005-WFD-FS-5-M1: [Water Framework Directive Applied Testing and Evaluation Fellowship](#)

Other Projects 2006:

2006-FS-WQ-41-M4: [Decision Support Systems for the Ecological Assessment of Rivers](#)

Small-scale Studies:

- 2000-SS-7-M1: [GIS Software Development](#)
- 2002-SS-8-M1: [Environmental Impact of Agricultural Practices in Relation To Nutrient Management Planning to be carried out under the Auspices of the North/South Initiatives for Co-Operation in the Area of the Environment](#)
- 2003-SS-14: [The Efficiencies of Subsoils for On-Site Wastewater Disposal with Respect to Endocrine Disrupting Chemicals](#)
- 2003-SS-15: [Evaluation of the Water Framework Directive Guidance Document On Economies and the Environment With Respect to the Shannon Pilot River Basin District](#)
- 2003-SS-16: [Survey of Fish Communities in Oligotrophic Lakes in Ireland - Testing a Combined Technique Approach](#)
- 2003-SS-22-M1: [Design of An Internet Accessed Real Time Water Quality Monitor](#)
- 2004-SS-24-M1: [Establishment of Pre-Impact Biological Conditions in Types of Irish Ecoregion Lakes Lacking Reference Examples](#)
- 2004-SS-25-M1: [A Desk and Field Study of Biomass Estimations Techniques for Monitoring Green Tides in the Irish Environment](#)
- 2004-SS-26-M1: [Testing of REFTYPE Reference Validation and Additional Communities and Typologies](#)
- 2004-SS-28-M1: [Assessment of the Efficacy of the Shortened Percolation Test Method for Site Assessments for Single House Waste Water Treatment Systems](#)
- 2005-SS-43: [Phytoplankton Blooms and Species Succession in Cork Harbour, Ireland](#)
- 2006-SS-51-M1: [A Study of the Use of Novel Passive Sampling Materials for the Screening of Priority Pollutants](#)
- 2006-SS-52-M1: [Bathing Water Directive Study](#)
- 2006-SS-49: [A Study of the Phytoplankton of Kinvara Bay, Co. Galway, Eutrophicated Bay in County Galway](#)
- 2006-SS-57: [Validation of Solids Concentration in Effluent Outflow by Non-Contact Reflection Spectroscopy](#)

Contributory Scholarships:

- 2001-CS-5-M1: [An Analysis of Water Resources under Future Climate Scenarios Coupled with Projected Land Use Changes for Selected River Basins in Ireland](#)
- 2002-CS-17: [A Pollution Assessment of the Tolka River Estuary](#)

Lead Organisation:

Central Fisheries Board

2000-MS-4-M1: [Relationship between Biological Quality Index and Fish Stocks in Rivers](#)

2002-W-DS-9-M1: [Hydromorphology of Rivers](#)

Collingwood Environmental Planning (CEP)

2005-W-DS-24-M1: [The Water Framework Directive, Assessment, Participation, and Protected Areas: What are The Relationships? \(WAPPA\)](#)

Compass Informatics Limited

2000-SS-7-M1: [GIS Software Development](#)

2002-W-DS-10-M1: [Identification and Ranking of Nature Conservation Designated Areas, where the Status of Water is an Important Factor](#)

Cork Institute of Technology

2000-MS-2-M1: [Endocrine Disrupting Substances in the Irish Aquatic Environment](#)

2002-PHD-2-30: [The Development of Liquid Chromatography-Mass Spectrometry \(LC-MS\) Methods for the Determination of Microcystins in Irish Freshwaters, Cyanobacteria and Drinking Water](#)

Dublin City Council

2006-SS-52-M1: [Bathing Water Directive Study](#)

Dublin City University

2002-CS-17: [A Pollution Assessment of the Tolka River Estuary](#)

2006-SS-51-M1: [A Study of the Use of Novel Passive Sampling Materials for the Screening of Priority Pollutants](#)

Galway-Mayo Institute of Technology

2003-SS-22-M1: [Design of An Internet Accessed Real Time Water Quality Monitor](#)

Integrated Biomass Solutions

2002-SS-8-M1: [Environmental Impact of Agricultural Practices in Relation To Nutrient Management Planning to be carried out under the Auspices of the North/South Initiatives for Co-Operation in the Area of the Environment](#)

Institute of Technology, Sligo

2000-MS-5-M1: [Impacts of Nutrients on the Zebra Mussel Population in Lough Key](#)

Irish Char Conservation Group

2003-SS-16: [Survey of Fish Communities in Oligotrophic Lakes in Ireland - Testing a Combined Technique Approach](#)

KHSK Economic Consultants

2003-SS-15: [Evaluation of the Water Framework Directive Guidance Document On Economies and the Environment With Respect to the Shannon Pilot River Basin District](#)

Marine Institute

2005-W-MS-36-M1: [Marine Ecological Tools for Reference, Intercalibration and Classification \(METRIC\)](#)

National University of Ireland, Galway

2000-FS-1d-M1: [Monitoring Methodologies for the Ecological Assessment of Lakes](#)

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2000-LS-3.2.4-M2: [Forest operations - quantification and management of erosion and siltation](#)

National University of Ireland, Maynooth

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Spectral Signatories Limited

2006-SS-57: [Validation of Solids Concentration in Effluent Outflow by Non-Contact Reflection Spectroscopy](#)

Teagasc

2000-LS-2.1.1b-M2: [Eutrophication from Agricultural Sources \(Phosphorus and Nitrogen\) - Soil and Phosphorus](#)

2000-LS-2.1.2-M2: [Eutrophication from Agricultural Sources \(Phosphorus and Nitrogen\) - Grazed Pastures](#)

2000-LS-2.1.3-M2: [Eutrophication from Agricultural Sources \(Phosphorus and Nitrogen\) - Slurry Spreading](#)

2000-LS-2.1.4-M2: [Eutrophication from Agricultural Sources \(Phosphorus and Nitrogen\) - Fertiliser Spreading](#)

2000-LS-2.2.2-M2: [Eutrophication from Agricultural Sources \(Phosphorus and Nitrogen\) - Modelling P Losses from Soils](#)

2000-LS-2.3.1.1-M2: [Eutrophication from Agricultural Sources \(Phosphorus and Nitrogen\) - Effects of Agricultural Practices on Nitrate Leaching - Farm Scale Work Package](#)

2000-LS-2.3.1.2-M2: [Eutrophication from Agricultural Sources \(Phosphorus and Nitrogen\) - Effects of Agricultural Practices on Nitrate Leaching - Leaching Soil Investigation Work Package](#)

2000-LS-2c-M2: [Eutrophication from Agricultural Sources - Phosphorus and Nitrogen](#)

TMS Environmental Limited

2002-W-DS-7-M1: [Development of a Methodology for the Characterisation of Unpolluted Groundwater](#)

Trinity College Dublin

2000-DS-5-M1: [Preparation for the Proposed EU Water Framework Directive \(WFD\)](#)

2000-FS-1a-M1: [Monitoring Methodologies for the Ecological Assessment of Lakes](#)

Trinity College Dublin (continued)

- 2000-FS-1b-M1: [Monitoring Methodologies for the Ecological Assessment of Lakes](#)
- 2000-LS-2.1.7-M2: [Eutrophication from Agricultural Sources \(Phosphorus and Nitrogen\) -Relative Eutrophic Effects of Seasonal Discharges of Phosphate to Water Bodies](#)
- 2000-LS-2.3.1.3-M2: [Eutrophication from Agricultural Sources \(Phosphorus and Nitrogen\) - Effects of Agricultural Practices on Nitrate Leaching - Groundwater Work Package](#)
- 2000-LS-3.2.1b-M2: [Forestry and the Potential for Surface Water Acidification - Liming Study](#)
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- 2002-PHD-2-36: [A Test of Different Ecological Response to Nutrient Loads of Soft- and Hard-Water Lakes](#)
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- 2002-W-DS-8-M1: [Development of a Methodology for the Characterisation of a Karstic Groundwater Body with Particular Emphasis on the Linkage with Associated Ecosystems, Such as Turloughs](#)
- 2002-W-FS-5: [Pilot River Basin](#)
- 2002-W-MS-16-M1: [Recharge and Groundwater Vulnerability](#)
- 2002-W-MS-17-M1: [Palaeolimnological Investigation - Identification of Reference-Status for Irish Lakes Typologies using Palaeolimnological Methods and Techniques \(IN-SIGHT\)](#)
- 2003-COE-FS-10-M4: [Improved Water Quality Data Analysis and Interpretation](#)
- 2003-SS-14: [The Efficiencies of Subsoils for On-Site Wastewater Disposal with Respect to Endocrine Disrupting Chemicals](#)
- 2004-SS-24-M1: [Establishment of Pre-Impact Biological Conditions in Types of Irish Ecoregion Lakes Lacking Reference Examples](#)

Trinity College Dublin (*continued*)

- 2005-MS-15-M1: [*An Investigation into the Effective Distribution of On-Site Wastewater Effluent into Percolation Areas and the Treatment Performance of Sandy Subsoils and Constructed Wetlands*](#)
- 2005-WFD-FS-5-M1: [*Water Framework Directive Applied Testing and Evaluation Fellowship*](#)
- 2005-W-MS-40-M1: [*Past, Current and Future Interactions between Pressures, Chemical Status and Biological Quality Elements for Lakes in Two Contrasting Instrumented Catchments in Ireland \(ILLUMINATE\)*](#)

University College Cork

- 2000-LS-2.1.1a-M2: [*Eutrophication from Agricultural Sources \(Phosphorus and Nitrogen\) -Soil and Phosphorus*](#)
- 2000-LS-3.2.1a-M2: [*Forestry and Environment Impacts Addressing Water Quality and Biodiversity – Forestry and the Potential for Surface Water Acidification*](#)
- 2001-PHD-10-M1: [*Reaction of Nitrate Radicals with Dimethylphenols under Atmospheric Conditions*](#)
- 2005-W-MS-39-M1: [*The Impact of Plant Nutrients On Primary Productivity in Running Waters: Evaluating the Risk to Stream Health*](#)

University College Dublin

- 2000-FS-1c-M1: [*Monitoring Methodologies for the Ecological Assessment of Lakes*](#)
- 2000-FS-2-M1: [*Reference Conditions and Eutrophication Impacts in Irish Rivers: Meeting the Requirements of the Proposed EU Water Framework Directive*](#)
- 2000-LS-2.2.1-M2: [*Eutrophication from Agricultural Sources \(Phosphorus and Nitrogen\) - Field by Field Assessment*](#)
- 2000-LS-3.2.2-M2: [*Forestry and Environment Impacts Addressing Water Quality and Biodiversity - Forest Operations and Eutrophication*](#)
- 2000-MS-13-M2: [*Impact Assessment of Highway Drainage on Water Quality*](#)
- 2000-W-DS-1-M1: [*Preparation for the Proposed EU Water Framework Directive \(WFD\)*](#)

University College Dublin (continued)

- 2002-W-LS-7-M1: [Characterisation of Reference Conditions and Testing of Typology of Rivers](#)
- 2004-SS-26-M1: [Testing of REFTYPE Reference Validation and Additional Communities and Typologies](#)
- 2005-GIS-FS-25: [Integrated GIS and Neuro-Fuzzy Analysis for Use in River Basin District Management](#)
- 2005-W-MS-37-M1: [Water Framework Directive – Interaction, Negotiation and Communication of Optimal Measures with Stakeholders \(WINCOMS\)](#)
- 2006-FS-WQ-41-M4: [Decision Support Systems for the Ecological Assessment of Rivers](#)

University of Limerick

- 2001-PHD-8-M1: [Identification and Initial Assessment of Phytases Suitable for Inclusion in Animal Feed for the Purposes of Phosphate Pollution Abatement](#)
- 2002-PHD-2-34: [Irish Ecoregion Community Training-Set and Ecological Restoration Targets](#)

[Back to EPA-Funded Research: Water Quality](#)

Project Leader:

Allott, Dr Norman

2000-LS-3.2.1b-M2: [Forestry and the Potential for Surface Water Acidification - Liming Study](#)

Bruen, Dr Michael

2000-MS-13-M2: [Impact Assessment of Highway Drainage on Water Quality](#)

2005-W-MS-37-M1: [Water Framework Directive – Interaction, Negotiation and Communication of Optimal Measures with Stakeholders \(WINCOMS\)](#)

Buggy, Mr Conor

2002-CS-17: [A Pollution Assessment of the Tolka River Estuary](#)

Callanan, Mr Kevin

2006-SS-52-M1: [Bathing Water Directive Study](#)

Caroni, Ms Rosanna

2000-FS-1b-M1: [Monitoring Methodologies for the Ecological Assessment of Lakes](#)

Carton, Dr Owen

2000-LS-2.1.1b-M2: [Eutrophication from Agricultural Sources \(Phosphorus and Nitrogen\) - Soil and Phosphorus](#)

2000-LS-2.1.2-M2: [Eutrophication from Agricultural Sources \(Phosphorus and Nitrogen\) - Grazed Pastures](#)

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2000-LS-2c-M2: [Eutrophication from Agricultural Sources - Phosphorus and Nitrogen](#)

Champ, Mr Trevor

2000-MS-4-M1: [Relationship between Biological Quality Index and Fish Stocks in Rivers](#)

Connan, Dr Solène

2005-FS-35-M1: [Macroalgal Biomonitoring - Applying Phenolic Compounds As Biomarkers for Metal Uptake Characteristics in Irish Coastal Environments](#)

Dalton, Dr Catherine

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D'Alton, Ms Marcia

2002-SS-8-M1: [Environmental Impact of Agricultural Practices in Relation To Nutrient Management Planning to be carried out under the Auspices of the North/South Initiatives for Co-Operation in the Area of the Environment](#)

Donnelly, Ms Karol

2000-FS-1d-M1: [Monitoring Methodologies for the Ecological Assessment of Lakes](#)

Donohue, Dr Ian

2003-COE-FS-10-M4: [Improved Water Quality Data Analysis and Interpretation](#)

Farrell, Prof. Ted

2000-LS-3.2.2-M2: [Forestry and Environment Impacts Addressing Water Quality and Biodiversity - Forest Operations and Eutrophication](#)

Free, Mr Gary

2000-FS-1c-M1: [Monitoring Methodologies for the Ecological Assessment of Lakes](#)

Furey, Dr Ambrose

2002-PHD-2-30: [The Development of Liquid Chromatography-Mass Spectrometry \(LC-MS\) Methods for the Determination of Microcystins in Irish Freshwaters, Cyanobacteria and Drinking Water](#)

Gill, Dr Laurence

2000-MS-15-M1: [Wastewater Treatment Efficiency of Subsoil and Stratified Sand Filters](#)

2003-SS-14: [The Efficiencies of Subsoils for On-Site Wastewater Disposal with Respect to Endocrine Disrupting Chemicals](#)

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Giller, Prof. Paul

2000-LS-3.2.1a-M2: [Forestry and Environment Impacts Addressing Water Quality and Biodiversity – Forestry and the Potential for Surface Water Acidification](#)

Hannigan, Dr Kevin

2003-SS-15: [Evaluation of the Water Framework Directive Guidance Document On Economies and the Environment With Respect to the Shannon Pilot River Basin District](#)

Harrison, Dr Simon

2005-W-MS-39-M1: [The Impact of Plant Nutrients On Primary Productivity in Running Waters: Evaluating the Risk to Stream Health](#)

Hartnett, Dr Michael

2001-PHD-9-M1: [Development of A Generic Tool for Flushing Study Analyses](#)

Igoe, Dr Fran

2003-SS-16: [Survey of Fish Communities in Oligotrophic Lakes in Ireland - Testing a Combined Technique Approach](#)

Irvine, Dr Kenneth

2000-DS-5-M1: [Preparation for the Proposed EU Water Framework Directive \(WFD\)](#)

2000-LS-2.1.7-M2: [Eutrophication from Agricultural Sources \(Phosphorus and Nitrogen\) -Relative Eutrophic Effects of Seasonal Discharges of Phosphate to Water Bodies](#)

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Johnson, Dr Paul

2000-LS-2.3.1.3-M2: [Eutrophication from Agricultural Sources \(Phosphorus and Nitrogen\) - Effects of Agricultural Practices on Nitrate Leaching - Groundwater Work Package](#)

2002-W-DS-8-M1: [Development of a Methodology for the Characterisation of a Karstic Groundwater Body with Particular Emphasis on the Linkage with Associated Ecosystems, Such as Turloughs](#)

Kelly-Quinn, Dr Mary

2002-W-LS-7-M1: [Characterisation of Reference Conditions and Testing of Typology of Rivers](#)

2004-SS-26-M1: [Testing of REFTYPE Reference Validation and Additional Communities and Typologies](#)

Kiely, Prof Gerard

2000-LS-2.1.1a-M2: [Eutrophication from Agricultural Sources \(Phosphorus and Nitrogen\) -Soil and Phosphorus](#)

Kilroy, Dr Garrett

2002-W-FS-5: [Pilot River Basin](#)

2005-WFD-FS-5-M1: [Water Framework Directive Applied Testing and Evaluation Fellowship](#)

Little, Ms Ruth

2000-FS-1a-M1: [Monitoring Methodologies for the Ecological Assessment of Lakes](#)

Lucy, Dr Frances

2000-MS-5-M1: [Impacts of Nutrients on the Zebra Mussel Population in Lough Key](#)

Magette, Dr William L.

2000-LS-2.2.1-M2: [Eutrophication from Agricultural Sources \(Phosphorus and Nitrogen\) - Field by Field Assessment](#)

McGinnity, Dr Phillip

2002-W-DS-9-M1: [Hydromorphology of Rivers](#)

McHugh, Dr Sharon

2005-FS-31-M1: [Application of Molecular Techniques to Determine the Origin of Faecal Contamination of Group Water Scheme Waters.](#)

Mills, Mr Paul

2000-SS-7-M1: [GIS Software Development](#)

Misstear, Mr Bruce

2002-W-MS-16-M1: [Recharge and Groundwater Vulnerability](#)

Moore, Ms Sonja

2001-CS-5-M1:

[An Analysis of Water Resources under Future Climate Scenarios Coupled with Projected Land Use Changes for Selected River Basins in Ireland](#)

Mulqueen, Mr John

2000-LS-2.3.1.2-M2:

[Eutrophication from Agricultural Sources \(Phosphorus and Nitrogen\) - Effects of Agricultural Practices on Nitrate Leaching - Leaching Soil Investigation Work Package](#)

Nasr, Mr Ahmed

2005-GIS-FS-25:

[Integrated GIS and Neuro-Fuzzy Analysis for Use in River Basin District Management](#)

Ó Ríain, Mr Gearóid

2002-W-DS-10-M1:

[Identification and Ranking of Nature Conservation Designated Areas, where the Status of Water is an Important Factor](#)

Ó Suilleabháin, Mr Cormac

2004-SS-28-M1:

[Assessment of the Efficacy of the Shortened Percolation Test Method for Site Assessments for Single House Waste Water Treatment Systems](#)

O'Beirn, Dr Francis

2005-W-MS-36-M1:

[Marine Ecological Tools for Reference, Intercalibration and Classification \(METRIC\)](#)

O'Donovan, Mr Sean

2003-SS-22-M1:

[Design of An Internet Accessed Real Time Water Quality Monitor](#)

O'Mongain, Dr Eon

2006-SS-57:

[Validation of Solids Concentration in Effluent Outflow by Non-Contact Reflection Spectroscopy](#)

Raine, Dr Robin

2005-SS-43:

[Phytoplankton Blooms and Species Succession in Cork Harbour, Ireland](#)

Regan, Dr Fiona

2006-SS-51-M1:

[A Study of the Use of Novel Passive Sampling Materials for the Screening of Priority Pollutants](#)

Roden, Dr Cilian

2006-SS-49:

[*A Study of the Phytoplankton of Kinvara Bay, Co. Galway, Eutrophicated Bay in County Galway*](#)

Ryan, Mr Declan

2000-LS-2.1.3-M2:

[*Eutrophication from Agricultural Sources \(Phosphorus and Nitrogen\) -Slurry Spreading*](#)

2000-LS-2.1.4-M2:

[*Eutrophication from Agricultural Sources \(Phosphorus and Nitrogen\) - Fertiliser Spreading*](#)

Rybcazuk, Dr Krysia

2002-PHD-2-38:

[*The Creation and Assessment of Digital Spatial Modelling Techniques for the Management of Lake Water Quality in the Lough Leane and Lough Feagh Catchments*](#)

Shanahan, Dr Imelda

2002-W-DS-7-M1:

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Sheate, Mr William

2005-W-DS-24-M1:

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Tarrant, Dr Heloïse

2000-MS-2-M1:

[*Endocrine Disrupting Substances in the Irish Aquatic Environment*](#)

Taylor, Prof. David

2002-W-MS-17-M1:

[*Palaeolimnological Investigation - Identification of Reference-Status for Irish Lakes Typologies using Palaeolimnological Methods and Techniques \(IN-SIGHT\)*](#)

2004-SS-24-M1:

[*Establishment of Pre-Impact Biological Conditions in Types of Irish Ecoregion Lakes Lacking Reference Examples*](#)

2005-W-MS-40-M1:

[*Past, Current and Future Interactions between Pressures, Chemical Status and Biological Quality Elements for Lakes in Two Contrasting Instrumented Catchments in Ireland \(ILLUMINATE\)*](#)

Waldren, Dr Stephen

2002-PHD-2-37:

[*Turlough Soils - Spatial and Temporal Fluxes in Plant Nutrients*](#)

Walsh, Dr Aisling

2000-FS-2-M1:

[Reference Conditions and Eutrophication Impacts in Irish Rivers: Meeting the Requirements of the Proposed EU Water Framework Directive](#)

2006-FS-WQ-41-M4: [Decision Support Systems for the Ecological Assessment of Rivers](#)

Walsh, Dr Gary

2001-PHD-8-M1:

[Identification and Initial Assessment of Phytases Suitable for Inclusion in Animal Feed for the Purposes of Phosphate Pollution Abatement](#)

Wenger, Dr John

2001-PHD-10-M1:

[Reaction of Nitrate Radicals with Dimethylphenols under Atmospheric Conditions](#)

Wilkes, Dr Robert

2004-SS-25-M1:

[A Desk and Field Study of Biomass Estimations Techniques for Monitoring Green Tides in the Irish Environment](#)

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Water Quality - Phase 1 (2000)

PROJECT TITLE

*Preparation for the Proposed EU Water Framework Directive (WFD)
(2000-DS-5-M1)*

LEAD ORGANISATION

Trinity College Dublin

START DATE

01/11/2000

CONTACT

Dr Kenneth Irvine

STATUS

Completed (**ERTDI Report 1**)

PROJECT TYPE

Desk Study

TOTAL BUDGET (€)

38,295.30

PROJECT DESCRIPTION

The decline in water quality in Ireland, highlighted in recent EPA reports, coincides with the recent passing by the European Parliament of EC Directive 2000/60/EC establishing a framework for Community action in the field of water policy, commonly known as the Water Framework Directive (WFD). The WFD will, in due course, supersede and amalgamate a number of existing and more narrowly focused Directives which have arisen in response to environmental pressures on aquatic environments. The WFD is all about preserving and, where necessary, improving the quality of rivers, lakes, estuaries, coastal waters and groundwaters. This will be done by the implementation of River Basin Management Plans, designed to establish an integrated approach to catchment management. The WFD will require scientifically robust quality standards, relevant to individual European Member States.

Implementation of the WFD requires partnership among central and local government, independent statutory bodies such as the EPA and Heritage Council, Non-Governmental Organisations and national and local interest groups. Successful implementation can occur only through well-planned scientific and administrative strategies. The EPA contracted Trinity College Dublin in collaboration with Enterprise Ireland and a practising environmental lawyer to review preparations for the proposed EU WFD which are relevant to Ireland. The report which is now complete:

- identifies relevant organisations and their potential role in the WFD;
- evaluates applicability of existing legislation for the WFD;
- summarises previous, and current, research and monitoring programmes relevant for WFD implementation;
- identifies the requirements for new and/or modified monitoring techniques, and
- makes recommendations for a national strategy for the implementation of the WFD.

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PROJECT TITLE

*Endocrine Disrupting Substances in the Irish Aquatic Environment
(2000-W-MS-2-M1)*

LEAD ORGANISATION

Cork Institute of Technology

STATUS

Completed (**ERTDI Report 32**)
Main Report available for download

CONTACT

Dr Heloise Tarrant

TOTAL BUDGET (€)

298,830.70

PROJECT TYPE

Medium Sized

START DATE

22/02/2001

PROJECT DESCRIPTION

The Cork Institute of Technology, in partnership with University College, Cork and the Centre for Ecology and Hydrology, Wallingford, United Kingdom, is undertaking research to determine whether endocrine disrupting compounds (EDCs) are present in Irish rivers and lakes, and if so, whether they are having a significant effect on the aquatic life, particularly fish populations, in these freshwater systems.

What are EDCs?

The endocrine system is a hormone control network which exists in animals and humans to co-ordinate all of the fundamental life functions, including regulation of growth, sexual development and reproduction. A rapidly increasing number of man-made chemicals or their breakdown products are known to be capable of interfering with this system. Such chemicals are called endocrine disrupting compounds (EDCs).

Why should EDCs be studied?

There are many different sources of EDCs in the environment. Some fungicides, herbicides and insecticides have been shown to have endocrine disrupting effects, as have organo-metallic compounds from batteries, paints, petrol, *etc.* In addition, industrial detergents, plasticizers and waste from pulp, paper and textile industries are other possible sources of EDCs in the environment. Effluent from sewage treatment works may contain high concentrations of human hormones, and this effluent has been identified as a major source of EDCs in the UK.

As these EDCs may affect the general health and reproductive success of animals exposed to them, including fish,, it is of great interest to determine the levels of EDCs in the Irish environment in order to assess whether or not there is a risk.

What tasks are involved in this study?

This two-year study uses a number of approaches to examine levels of EDCs in Irish freshwaters and, ultimately, aims to ascertain whether there is any risk to fish populations at present. Chemical analysis will be carried out on wastewater samples from sewage treatment works, industry and agricultural sites. This analysis will be performed alongside a lab-based biological assay which will assess whether the compounds present are likely to have any significant effect on endocrine systems. A limited field-based biological analysis will also be performed to determine the effects

of sewage treatment works-effluent on fish over a short period of time. In addition, samples from the native wild fish population will be examined to determine the current situation in the wild.

How will this study benefit you?

This is the first detailed study to assess whether EDCs present a risk to the Irish freshwater environment. This work will provide knowledge about what EDCs are present and, perhaps more importantly, an assessment of whether they are likely to present a risk to aquatic life at these levels, and under these circumstances. Thus, the findings of this EPA-funded study will allow private industry, public bodies and government organisations to make informed decisions about this subject and, if necessary, allow sensible preventive measures to be taken to protect our environment.

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PROJECT TITLE

*Relationship between Biological Quality Index and Fish Stocks in Rivers
(2000-W-MS-4-M1)*

LEAD ORGANISATION

Central Fisheries Board

START DATE

01/11/2000

CONTACT

Mr Trevor Champ

STATUS

Completed (Report pending)

PROJECT TYPE

Medium Sized

TOTAL BUDGET (€)

326,473.78

PROJECT DESCRIPTION

The EPA primarily on the basis of biological communities has assessed water quality in Ireland for nearly three decades. The EPA quality rating system (Q-values) facilitates rapid and effective assessment of the water quality of rivers and streams. Good quality is indicated by Q5, Q4-5 and Q4. Some impairment is evident at Q4. The ecological conditions at such locations are considered to be acceptable to salmonids. However, this is an assumed relationship based on visual observations. The project will test this hypothesis and produce a robust statistical model correlating the existing quality rating system and fish community structure. It will also be necessary to broaden the model to incorporate other quality elements (*e.g.* flow, depth, streambed type, *etc.*) for classification of 'ecological status' required by the EU Water framework Directive. The aims are:

- To develop a protocol for assessing the status of riverine fish stocks by establishing a relationship between fish stocks and the EPA's Q-rating system.
- To develop a predictive model for the composition, abundance and age structure of the fish fauna based on
 - the physical and hydrological environment;
 - environmental variables (nutrient concentration, DO, *etc.*);
 - faunal and floral communities;
 - Q-values.

The primary objectives are to:

- Develop a monitoring protocol for the EU Water Framework Directive's ecological assessment of fish in rivers by sampling a large number of sites covering a wide range of habitat types and water quality status;
- Develop an increased understanding of the impacts of eutrophication on fish populations.

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PROJECT TITLE

*Impacts of Nutrients on the Zebra Mussel Population in Lough Key
(2002-W-MS-5-M1)*

LEAD ORGANISATION

Institute of Technology Sligo

START DATE

01/11/2000

CONTACT

Dr Frances Lucy

STATUS

Completed (**ERTDI Report 30**)
Main Report available for download

PROJECT TYPE

Medium Sized

TOTAL BUDGET (€)

118,999.85

PROJECT DESCRIPTION

The main objective of the project is to investigate the impact of the installation of phosphorus removal facilities at the Boyle Sewage Treatment Plant on reducing the phytoplankton levels in Lough Key and the effect of this on the zebra mussel population. This lake is situated on the Boyle River in the upper Shannon catchment and has a surface area of 9 km².

Zebra mussels were introduced to Ireland during the early-mid 1990s in the lower Shannon and were discovered in Lough Key in 1998, where they reproduced rapidly. A 1999 survey of the lake (Lucy and Sullivan, 2000) estimated the number of zebra mussels in Lough Key at 6 billion. Zebra mussels are highly efficient filter feeders and it has been estimated that during the summer period the total volume of lake water can be filtered in one month. This has already resulted in a change in water quality, *e.g.* transparency has increased significantly since 1998. A detailed survey will aim to quantify the zebra mussel populations within the lake. The first milestone is to construct a habitat map to show where the zebra mussels occur.

An acoustic survey (ROXANN) of the lake bottom will determine the distribution of these different substrate types within the lake with the aid of a digitised map and this will show where zebra mussels are likely to occur. This will be followed up by a video survey of all stony substrates on the periphery of the lake and islands, where it is currently believed that most of the zebra mussels are found. These surveys will provide bathymetric, substrate and habitat maps of Lough Key. Other sampling techniques, *e.g.* snorkelling will estimate the percentage cover of zebra mussels on these substrates and, hence, it will be possible to obtain yearly predictions of population size within the lake. In addition to the examination of adult zebra mussels the project will also look at other life stages. Part of the project will deal with weekly counts and measurements of this life stage. Settlement rates of the larva will be estimated by counting settled juveniles on artificial settlement plates placed in the lake during summer months.

The evaluation of the water quality is another fundamental aspect of the project. During the first two years of the Lough Key zebra mussel study (1998-1999) there were no major changes to water quality attributable to man. The commissioning of the new sewage treatment plant in Boyle in 2000 should markedly reduce the nutrient loading to the lake. The new phosphate removal system reduces the input of this nutrient to Lough Key with subsequent improvement in water quality and a reduction in phytoplankton growth. Assiduous monitoring of both phosphorous levels

and zebra mussel populations will give parallel information about the two major limiting factors for phytoplankton growth. Monitoring chlorophyll *a* (plant pigment) levels and transparency will evaluate the consequent reduction in phytoplankton which may in future have implications for the size of zebra mussel populations in Lough Key. Possible changes in types of phytoplankton will also be assessed as part of this project.

Characterising the surface water status of lakes by reviewing biological quality elements forms an integral part of the proposed water framework directive. These include composition and abundance of phytoplankton, other aquatic flora and also invertebrate fauna. Phosphorous is defined by this legislation as a chemical element supporting these biological elements. The introduction of zebra mussels to Irish lakes has added another factor to the equation of defining and improving water quality, for example, the phosphorous input to Lough Key is set to decrease due to the provision of the new treatment plant in Boyle. It will not however be possible to attribute all changes in primary productivity to this facility due to the filter feeding capacity of zebra mussels in the lake. This complex situation requires a carefully planned monitoring survey of nutrients and zebra mussel populations in order to make any possible predictions on long-term water quality in Lough Key. This project will continue zebra mussel research in Lough Key (1998-2000), extending the survey to provide more knowledge of the impacts of nutrients on zebra mussel populations in the lake.

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PROJECT TITLE

*Impact Assessment of Highway Drainage on Water Quality
(2000-W-MS-13-M2)*

LEAD ORGANISATION

University College Dublin

START DATE

01/12/2001

CONTACT

Dr Michael Bruen

STATUS

Completed (**ERTDI Report 39**)
Main Report available for download

PROJECT TYPE

Medium Sized

TOTAL BUDGET (€)

436,290

PROJECT DESCRIPTION

Over the past 20 years, the road-building programme has been increasing in intensity and the length of dual carriageway/motorway has also been dramatically increased. Vehicle ownership and traffic densities have correspondingly climbed. Highway runoff can contain a cocktail of more than 30 potential pollutants. The impact of the pollutants on adjacent watercourses, including groundwater, will be investigated in this project.

The project's objectives are divided into two components

- 1) (a) Review existing practice with respect to road drainage design and maintenance for rural dual carriageways and motorways in Ireland and the assessment of any environmental impacts of such runoff. Set this practice in the context of current practice elsewhere in Europe;
- (b) Identify suitable candidate sites for monitoring flow and quality of road drainage waters. Select at least two for detailed monitoring.
- 2) (a) Set up and operate at least two representative road drainage sub-catchments with instrumentation for monitoring rates of runoff and corresponding quality for a range of indicative parameters;
- (b) Analyse flow, rainfall and quality data so as to be able to predict likely runoff peaks, volumes and quality from predetermined design rainstorms.
- 3) A baseline hydrobiological/ecological survey of receiving waters will be undertaken to establish basic ecological states. This will include macro invertebrates, fish and aquatic flora. Thereafter, macro invertebrate samples will be collected at regular intervals and at additional periods following specific hydroenvironmental events.
- 4) Rainfall will be collected and analysed for the same parameters as the stream water quality samples.

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PROJECT TITLE

*Wastewater treatment Efficiency of Subsoil and Stratified Sand Filters
(2000-MS-15-M1)*

LEAD ORGANISATION

Trinity College Dublin

START DATE

01/11/2000

CONTACT

Mr Laurence Gill

STATUS

Completed (**ERTDI Report 26**)
Main Report available for download

PROJECT TYPE

Medium Sized

TOTAL BUDGET (€)

632,294.4

PROJECT DESCRIPTION

In Ireland, wastewater from one third of the population is treated in small-scale independent systems, usually in rural areas where connection to a sewer is deemed to be unfeasible. The most prevalent treatment application is the conventional septic tank system with over 350,000 systems currently installed in Ireland. In situations where septic tank installation is not suitable, mechanically aerated systems can be used which include rotating biological contractors (RBC), biologically aerated flooded filters (BAFF) and sequencing batch reactors (SBR). The recently published EPA guidance manual *Treatment Systems for Single Houses* determines whether a location is suitable for a septic tank installation by means of a percolation test on the subsoil of the proposed site. Suitable subsoil for septic tank effluent is currently defined as having a T (or P) value within the range 1 to 50. Where suitable subsoils do not exist for a conventional drainage area, the possibility of using a stratified sand filter to treat the effluent has been highlighted. The objective of this research project is to conduct a series of rigorous trials in order to enhance the understanding of the performance of both stratified sand filters and different subsoils for the treatment of typical domestic effluent from septic tanks and other small-scale secondary treatment installations.

The project is divided into four phases and will be completed within a 36-month framework:

- Phase I Initial desk study and site identification (6 months);
- Phase II Trials at two test sites (septic tank and secondary treatment effluent) on stratified sand filter and subsoil performance (12 months);
- Phase III Trials at two further sites (septic tank and secondary treatment effluent) on subsoil performance (12 months);
- Phase IV Collation of results, analyses and final report preparation.

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PROJECT TITLE

*Monitoring Methodologies for the Ecological Assessment of Lakes
(2000-FS-1a, b, c, d-M1)*

LEAD ORGANISATION

Trinity College Dublin

START DATE

26/10/2000

CONTACT

Ms Ruth Little, Ms Rosanna Caroni
Mr Gary Free, Ms Karol Donnelly

STATUS

Completed (**ERTDI Report 57**)

PROJECT TYPE

Fellowship

TOTAL BUDGET (€)

169,837.95

PROJECT DESCRIPTION

The overall objective of the project is to gather information which will assist in selecting suitable lakes for drawing up biological reference conditions and to develop an ecological assessment protocol for lakes which can be maintained on a long-term basis as a routine part of the national lake monitoring effort.

Specific objectives of the project are:

- The EU Water Framework Directive requires that reference conditions be established for each of the stated surface water categories. For each surface water category the waterbodies will be typed and reference conditions will be required for each type. In order to assist in establishing reference conditions for lakes, a detailed sampling of the phytoplankton, macrophyte and phytobenthos and macroinvertebrate populations in selected lakes is being carried out. Reference will be made to historical data on these lakes, where it exists, and information on catchment land use will be assembled.
- A monitoring protocol is being developed to be used in Ireland for the ecological assessment of lakes which will satisfy the requirements of the EU Water Framework Directive.
- The project will provide an estimate of the costs of establishing a long-term ecological assessment unit for Ireland. The provision of a detailed assessment of the logistics of the field and laboratory work involved in the ecological assessment of lakes will result in the presentation of an estimate of the costs of establishing an ecological assessment capability. At the end of the project, it should be possible to define a fully operational ecological assessment programme for Irish lakes under the EU Water Framework Directive.
- The assessment teams have the capability to produce regular comprehensive reports on lake ecological status. Reporting systems will be database driven and which make extensive use of desktop GIS systems. Provision of online, World Wide Web [www] reports will be an important part of the reporting.

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PROJECT TITLE

Reference Conditions and Eutrophication Impacts in Irish Rivers: Meeting the Requirements of the Proposed EU Water Framework Directive (2000-FS-2-M1)

LEAD ORGANISATION

University College Dublin

START DATE

25/09/2000

CONTACT

Ms Aisling Walsh

STATUS

Completed (**ERTDI Report 59**)

PROJECT TYPE

Fellowship

TOTAL BUDGET (€)

178,283.60

PROJECT DESCRIPTION

The EU Water Framework Directive (WFD) requires ecological assessment of Irish rivers relative to reference conditions. Because of human impacts on the environment, it can prove difficult to find pristine rivers of high ecological quality - a problem particularly prevalent in Europe's mainland. The EPA's River Quality Rating System has been used since 1970 for the ecological assessment of Irish rivers. This system provides a useful set of historical reference conditions for Irish rivers with, perhaps, Q5 representing reference conditions as defined by the Water Framework Directive. There is a need, however, for an in-depth analysis of the impacts of eutrophication on river ecosystems relative to the reference or pristine state.

River water quality trends show that many rivers have declined in quality over the past 30 years. There has been a notable loss of species and widespread eutrophication of Irish rivers. In establishing reference conditions, therefore, understanding the detailed mechanisms by which eutrophication affects river ecology is of key importance in the Irish context.

Project FS-2 has selected a number of near-pristine reference river sites for detailed study. These sites still have ideal conditions for the most sensitive macroinvertebrate taxa. In addition a range of sites which have departed from reference conditions in the recent past are being studied. These latter sites now lack the key sensitive taxa previously found there but they were close to pristine in surveys carried out in the 1970s, 1980s or 1990s.

The research is attempting to define the gradient from pristine to eutrophic in a range of river types in order to provide a thorough understanding of what constitutes true reference conditions across a range of river ecotypes within the Irish Ecoregion. The Irish Quality Rating System is particularly sensitive to eutrophication impacts. The changes in the early stages of eutrophication may be quite subtle, perhaps affecting the balance of algal species at the base of the food chain or affecting, for example, the physical nature of the environment through siltation. Thus, the study is attempting to obtain a more detailed understanding of such effects in order to be able to better define true reference conditions for rivers as required by the WFD.

The project is being undertaken as an EPA Research Fellowship over three years beginning in October 2000 (enabling a graduate the opportunity to prepare a PhD

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thesis). The research fellow is working in conjunction with the EPA's river biologists. The project will benefit from liaison with other related research projects such as Fish Stocks and Q-values (MS-4) and the pilot project on Ecological Assessment of Lakes (FS-1).

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Eutrophication from Agricultural Sources (2000)

PROJECT TITLE

Eutrophication from Agricultural Sources - Phosphorus and Nitrogen (2000-LS-2c-M2)

LEAD ORGANISATION

Teagasc

START DATE

01/11/2000

CONTACT

Dr Owen Carton

STATUS

Completed (Report Pending)

PROJECT TYPE

Large Scale

TOTAL BUDGET (€)

212,976

PROJECT DESCRIPTION

The primary objective of this co-ordination project is to ensure the effective delivery and the required level of integration between the individual projects so that the individual and overall project objectives are achieved. The Co-ordinator will ensure the quality of the science and have responsibility for the project administration, reporting and linkages. It is an objective of all project leaders to publish the results of their research in peer reviewed scientific literature. The Co-ordinator will provide an overall element of scientific quality control and may from time to time secure the services of External Experts to support them in achieving this. A scientific conference will be organised to present the results of the research following the publication of the final report. The Co-ordinator has responsibility for the management of the Contract Agreements between the project participants and the EPA, the precise, complete and effective accounting of all project expenditure (including visiting participants to audit their systems), the reimbursement of eligible costs to all participants, and serve as a direct line of communication between the EPA and project participants. All technical and financial reports from the projects will be submitted through the project co-ordinator including the final and synthesis reports. The final report will consider how nutrient losses can be most effectively controlled. The Co-ordinator will have responsibility for recognising and fostering appropriate linkages within the project itself and between other national or international research programmes with similar objectives.

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PROJECT TITLE

*Eutrophication from Agricultural Sources (Phosphorus and Nitrogen) -Soil and Phosphorus
(2000-LS-2.1.1a-M2)*

LEAD ORGANISATION

University College Cork

START DATE

01/11/2000

CONTACT

Prof. Gerard Kiely

STATUS

Completed (Report Pending)

PROJECT TYPE

Large Scale

TOTAL BUDGET (€)

813,855.13

PROJECT DESCRIPTION

This project examines phosphorus (P) migration from soil to water. Three catchments are being instrumented (the Dripsey in Cork, the Clariana in Tipperary and the Oonagh in Tyrone) for hydrochemistry and hydrometeorology. Each catchment is being examined using a nested catchment approach, going from the farm scale of 20-50 ha to the micro-catchment scale of 1-4 km² to the mini-catchment scale of 30 to 90 km². The objectives are to:

- Quantify the water balance and P budget at each scale;
- Identify the mechanisms of P migration within these catchments under various seasonal, meteorological, soil type texture and land use conditions (e.g. schedules of fertiliser and application of manure to grasslands).

The influence of hydrology and soil type on P loss from soil to water is being examined by quantifying the flux of P via surface and near surface flows. Soil water and soil P analysis, stream water chemistry, hydrology and meteorology and land use monitoring will be carried out over the 18-month period from March 2001 to September 2003. A hydrological model (Soil Vegetation Atmosphere Transfer type) is being developed with a new P module which will predict the time series of P levels in streams using hydrological, meteorological and land use practices as input. The model will be used to evaluate mitigation proposals to reduce the amount of P entering surface waters. The wider goal is to develop specific guidelines for Irish agricultural practice.

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PROJECT TITLE

Eutrophication from Agricultural Sources (Phosphorus and Nitrogen) -Soil and Phosphorus (2000-LS-2.1.1b)

LEAD ORGANISATION

Teagasc

START DATE

01/11/2000

CONTACT

Dr Owen Carton

STATUS

Completed (ERTDI Reports 38 & 40)

PROJECT TYPE

Large Scale

TOTAL BUDGET (€)

240,681.39

PROJECT DESCRIPTION

This project will be conducted in conjunction with project 2000-LS-2.1.1a-M1 'Catchment Studies' (UCC, UL and UU). This project will help integrate the results from the 2000-LS-2.1 Group '*Pathways for nutrient loss to water with emphasis on phosphorus losses*' and Group 2.2 '*Models and risk assessment schemes for predicting P loss to water*' projects.

The aims of this project are to:

- Study the most important soil factors influencing the loss of P to water in the three catchments being studied in 2.1.1a (Dripsey, Clarianna and Oona);
- Study the mechanisms of increasing P concentrations in water with increasing flow and the factors influencing this phenomenon under local environmental conditions;
- Integrate these with the results from the other relevant Group 2.1 and Group 2.2 projects in Eutrophication from Agricultural Sources (2000-LS-2-M2) and make recommendations on the most appropriate remedial actions. A PhD student will work on the relationship between flow and P concentration.

It is a three-year project and is due for completion at the end of 2003. Professor Louise Heathwaithe, University of Sheffield, is providing external assistance for this project.

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PROJECT TITLE

*Eutrophication from Agricultural Sources (Phosphorus and Nitrogen) -
Grazed Pastures
(2000-LS-2.1.2-M2)*

LEAD ORGANISATION

Teagasc

START DATE

01/11/2000

CONTACT

Dr Owen Carton

STATUS

Completed (ERTDI Report 41 & 3
Reports Pending)

PROJECT TYPE

Large Scale

TOTAL BUDGET (€)

391,191.07

PROJECT DESCRIPTION

The objectives of this project are as follows:

- Measure the P (and N) loss from grazed and cut grassland on a number of soils taking account the most important influencing variables;
- Identify the most important factors influencing P loss from soil to water under grazed grassland conditions;
- Investigate at laboratory scale the interactions between physical, chemical and biological processes in the soil which affect P fluxes and loss to water under grazing conditions;
- Recommend possible remedial actions necessary to reduce P loss to water from grazed grassland, based on the results obtained and other available information.

Most of the work on this project will be carried at Teagasc, Johnstown Castle. A temporary research officer and a Walsh Fellow will work as part of this team.

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PROJECT TITLE

*Eutrophication from Agricultural Sources (Phosphorus and Nitrogen) -
Slurry Spreading
(2000-LS-2.1.3-M2)*

LEAD ORGANISATION

Teagasc

START DATE

01/11/2000

CONTACT

Mr Declan Ryan

STATUS

Completed (Report Pending)

PROJECT TYPE

Large Scale

TOTAL BUDGET (€)

56,886.81

PROJECT DESCRIPTION

Previous studies have shown that P and N can be lost to water by overland flow following slurry applications to agricultural land. The quantities of nutrient lost depend on the timing and intensity of rainfall events, soil hydrology and the quantity of slurry applied to the land. The loss of nutrient remains high even if heavy rain does not fall for up to six weeks after spreading. This project will include a review of aspects of hydrology, meteorology and spreading technology to define criteria for ranking conditions which contribute to nutrient loss. Overland flow data from previous slurry spreading trials will be analysed and published. The information gathered will be summarised in two maps, one showing regional slurry spreading opportunities and the other showing regional requirements for slurry storage.

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PROJECT TITLE

Eutrophication from Agricultural Sources (Phosphorus and Nitrogen) - Fertiliser Spreading (2000-LS-2.1.4-M2)

LEAD ORGANISATION

Teagasc

START DATE

01/12/2002

CONTACT

Mr Declan Ryan

STATUS

Completed (Report pending - combined with report from LS-2.1.3)

PROJECT TYPE

Large Scale

TOTAL BUDGET (€)

71,835.2

PROJECT DESCRIPTION

The application of fertiliser can result in the loss of P and N from fields when there is a transporting agent such as overland flow to carry nutrients into drains or surface water. This may cause pollution. The quantities of nutrient lost depend on the timing and intensity of rainfall events, soil hydrology, and the chemistry and application rates of fertiliser. This project will include a review of aspects of hydrology, meteorology and spreading technology to define criteria for ranking conditions, which contribute to nutrient loss. A survey of fertiliser use will extend an earlier study of Irish supplies.

Overland flow data from previous slurry spreading trials will be analysed and published. The information gathered will be used to rank the principal causes of pollution associated with spreading fertiliser.

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PROJECT TITLE

*Eutrophication from Agricultural Sources (Phosphorus and Nitrogen) -
Environmental Soil P Test
(2000-LS-2.1.6-M2)*

LEAD ORGANISATION

Teagasc

START DATE

01/01/2001

CONTACT

Dr Owen Carton

STATUS

Completed (**ERTDI Report 14**)

PROJECT TYPE

Large Scale

TOTAL BUDGET (€)

62,311.13

PROJECT DESCRIPTION

Ireland employs the Morgan's soil P test to measure plant available P, for agronomic advise using a sampling depth of 10 cm, to rapidly estimate the quantity of plant-available P in soil. The interpretation of soil test results for P has focused on predicting the likelihood of a crop response to P added in fertilizers, manures or other soil amendments, rather than predicting the potential for P loss from fields to water. The objective of this research is to develop an environmental soil P test which reflects the process of P loss from soil to water in the field during rainfall events. The research will determine the effect of varying soil sample depths, employing different soil P extractants, and also an investigation into different solution to soil ratios. Field studies will also be conducted to determine the relationship between soil test P levels in soil and both dissolved reactive P and suspended solids in overland water.

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PROJECT TITLE

*Eutrophication from Agricultural Sources (Phosphorus and Nitrogen) - Relative Eutrophic Effects of Seasonal Discharges of Phosphate to Water Bodies
(2000-LS-2.1.7-M2)*

LEAD ORGANISATION

Trinity College Dublin

START DATE

01/11/2000

CONTACT

Dr Kenneth Irvine

STATUS

Completed (**ERTDI Report 13**)

PROJECT TYPE

Large Scale

TOTAL BUDGET (€)

37,172.85

PROJECT DESCRIPTION

While impacts of phosphorus on surface freshwaters are well documented, our understanding of seasonal movement of P through catchments and water bodies is often limited by a lack of analysis at a sufficiently fine temporal resolution. Models relating P loads from catchments to lakes are often summarised on an annual basis while, at the same time, it has been well demonstrated that P movements is highly dependent on short-term events. Flood events, for example, are particularly important in the mobilisation of P from soil to water and temperature related drivers have major influence on cycling of P within water bodies and between water and sediments. This study reviews the literature which relates to seasonal changes in the export of nutrients from land to freshwaters and provides a short critique of available models for the prediction of P movement from catchments to water and the extent that they incorporate seasonal effects. The review summarises geographical and management factors important for the assessment of seasonal risk of eutrophication of surface waters. The work identifies gaps in our understanding of seasonal catchment processes in order to help with future decisions on research effort.

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PROJECT TITLE

Eutrophication from Agricultural Sources (Phosphorus and Nitrogen) - Field by Field Assessment (2000-LS-2.2.1-M2)

LEAD ORGANISATION

University College Dublin

START DATE

01/07/2002

CONTACT

Dr William L. Magette

STATUS

Completed (Report Pending)

PROJECT TYPE

Large Scale

TOTAL BUDGET (€)

83,315

PROJECT DESCRIPTION

This project will critically examine Magette's (1998) Ranking Schemes for the risks of losing N and P from the landscape to water resources. Magette's schemes include an assessment of pollutant loss risks associated with farmyards. Cost and time constraints prohibit field-scale and farmyard-scale water quality monitoring for this sub-project. Making use of existing data sources (*e.g.* Derg-Ree and Three Rivers Catchment Management Studies) and integrating this sub-project with other components will ameliorate these unfortunate limitations. Magette's ranking schemes will be evaluated at two levels of detail. An intensive evaluation will be conducted on 3 small catchments of diverse physical characteristics: the Oona catchment (Northern Ireland), the Dripsey catchment (Co. Cork), and the Clarianna catchment (Co. Tipperary). These catchments will be examined in detail under other sub-projects. Sub-project leaders of these studies have agreed to tailor data collection on nutrient use and physical catchment characteristics to match the requirements of Magette's ranking schemes. These catchments will thus provide comprehensive data sets for use in evaluating the ranking schemes. In particular owing to their size, these catchments will make it feasible to visit each farmyard and conduct a detailed assessment as prescribed in the rank schemes.

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PROJECT TITLE

*Eutrophication from Agricultural Sources (Phosphorus and Nitrogen) -
Modelling P Losses from Soils
(2000-LS-2.2.2-M2)*

LEAD ORGANISATION

Teagasc

START DATE

01/11/2000

CONTACT

Dr Karen Daly

STATUS

Completed (ERTDI Reports 39, 42
& 43)

Main Report available for download

PROJECT TYPE

Large Scale

TOTAL BUDGET (€)

247,395.77

PROJECT DESCRIPTION

This project will focus on developing and validating models which predict phosphorus (P) loss from soil to water. The project has adopted two parallel but complimentary streams of modelling research. These are process-based models and empirical or predictive models. The distributed catchment models SHETRAN, SWAT and BASINS will include a phosphorus component which predicts event-based P loading to surface waters which are spatially distributed in a catchment. The empirical approach combines risk assessment precepts and statistical techniques to derive a model based on catchment characteristics such as soil type, land use, topography to predict river P levels. The project will utilise water quality and stream flow data collected from other EPA RTDI studies (2.1.1) and also from the catchment management and monitoring studies of the Lough Derg/Ree and the Three Rivers Project.

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PROJECT TITLE

Eutrophication from Agricultural Sources (Phosphorus and Nitrogen) - Effects of Agricultural Practices on Nitrate Leaching - Farm Scale Work Package (2000-LS-2.3.1.1-M2)

LEAD ORGANISATION

Teagasc

START DATE

01/11/2000

CONTACT

Dr Michael Ryan (Retired)

STATUS

Completed (Integrated Report 2000-LS-2.3-M2: **ERTDI Report 58**)
Final Report available for download

PROJECT TYPE

Large Scale

TOTAL BUDGET (€)

573,116.6

PROJECT DESCRIPTION

This project will measure nitrate leaching, over three drainage seasons, from an intensively managed dairy farm on a free-draining soil typical of those occurring in nitrate-vulnerable zones. A version of N-CYCLE, a mass-balance N model, will be developed for Irish conditions from data generated in the project and from existing leaching data. Leaching will be measured using replicated ceramic cups placed at one depth in the soil of:

- (a) plots which are grazed receiving 350 kg fertiliser N per ha annually;
- (b) plots cut for silage and grazed receiving fertiliser and slurry N;
- (c) plots treated with dirty water and grazed.

The project is one of a three-pronged approach to investigate nitrate leaching. The results will be collated with those emanating from the Soil Investigation and Groundwater Projects.

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PROJECT TITLE

Eutrophication from Agricultural Sources (Phosphorus and Nitrogen) - Effects of Agricultural Practices on Nitrate Leaching - Leaching Soil Investigation Work Package (2000-LS-2.3.1.2-M2)

LEAD ORGANISATION

Teagasc

START DATE

01/11/2000

CONTACT

Dr Michael Rodgers

STATUS

Completed (Integrated Report 2000-LS-2.3-M2: **ERTDI Report 58**)
Final Report available for download

PROJECT TYPE

Large Scale

TOTAL BUDGET (€)

475,951.16

PROJECT DESCRIPTION

Many of the intensive dairy farming areas of Ireland are located on free-draining fertile soils in Munster and Leinster. In some of these areas, well-water nitrate-nitrogen (NO₃-N) concentrations are high and some are in excess of the levels permitted by the EU regulations governing the quality of water for human consumption. Moorepark Research Centre, which has a department specializing in animal and land management for dairy farming, lies in this nitrate sensitive area. The factors (including husbandry factors) which predispose to NO₃-N movement through soil and into the groundwater are unknown. The sources of the NO₃-N and the pathways which lead to high NO₃-N in the groundwater are principal components. This study will quantify the sources and elucidate the pathways of NO₃ -N leaching to groundwater to develop a fundamental understanding of the way nitrate-nitrogen moves through soil so that excess concentrations can be avoided. The study will provide management guidelines for the use of nitrogen on dairy farms to optimize grass growth and minimize leaching of nitrate-nitrogen. Following on soil investigations and a geophysical survey to establish the nature, depth and properties of the soils, experimental plots of land will be established on-site at the Teagasc Research Centre, Moorepark and soil columns will be constructed in the laboratory at the National University of Ireland, Galway.

Experimental treatments will include:

- levels of chemical fertilizer application including urea;
- rates of farmyard slurry spreading;
- rates of irrigation with soiled water;
- seasonal behaviour of the experimental treatments;
- behaviour of the experimental treatments under husbandry practices such as silage, and
- grazing and late season grazing.

Both the on-site plots and the laboratory columns will be fully instrumented to quantify pore water movement through the soil, the chemical concentrations of the soil pore water and the chemical loads leaving the soil to enter the groundwater. This will contribute to a fundamental understanding of the physical, chemical and biological processes involved. Mathematical modelling of the processes will be carried

out to aid in the transfer of the technology to other applications. The methodology and results from this project will be relevant to studies on the movement of other contaminants through soils.

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PROJECT TITLE

Eutrophication from Agricultural Sources (Phosphorus and Nitrogen) - Effects of Agricultural Practices on Nitrate Leaching - Groundwater Work Package (2000-LS-2.3.1.3-M2)

LEAD ORGANISATION

Trinity College Dublin

START DATE

01/11/2000

CONTACT

Mr Paul Johnston

STATUS

Completed (Integrated Report 2000-LS-2.3-M2: **ERTDI Report 58**)
Final Report available for download

PROJECT TYPE

Large Scale

TOTAL BUDGET (€)

180,950.37

PROJECT DESCRIPTION

The research will indicate the role of the subsoil profile in the migration and attenuation of nitrates from various agricultural practices in well-drained grassland in a presumed nitrate vulnerable zone. It will provide a measure of the likely levels of nitrate being received in the groundwater in response to different loading levels and subsoil and hydrometeorological conditions. An important result will be the development of a model for use in defining nitrate vulnerable zones, which will partly depend on the nature of the loading (the outputs from the soil zone modelled by NCYCLE) and partly on the nature of the subsoil (vulnerability). The results will provide an indication of the potential for optimal production on intensive dairy systems without creating the risk of a nitrate concentration problem in groundwater. Using the model developed will enhance the potential for the application of the results to other areas for the delineation of nitrate vulnerable zones. The model should be usable by the policy maker, researcher and advisor to provide site-specific and numerically accurate relationships between N inputs, economic outputs and N receipts in groundwater for readily obtainable or measurable inputs.

Project objectives:

- To measure and evaluate the attenuation of nitrates migrating through to groundwater from the soils under an intensively managed dairy farm on a free-draining soil which is typical of a nitrate vulnerable zone. To explore the use of isotope analysis in identifying the particular sources of those nitrates reaching groundwater.
- To develop an indicative model (probably based on NCYCLE) for use in predicting likely N concentrations in groundwater, for application to typical Irish systems and locations and based on existing models for groundwater protection.

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Forestry & Water Quality (2000)

PROJECT TITLE

Forestry and Environment Impacts Addressing Water Quality and Biodiversity – Forestry and the potential for Surface Water Acidification (2000-LS-3.2.1a-M2)

LEAD ORGANISATION

University College Cork

START DATE

01/12/2001

CONTACT

Prof. Paul Giller

STATUS

Completed (**ERTDI Report 48**)
Main Report available for download

PROJECT TYPE

Large Scale

TOTAL BUDGET (€)

259,310.99

PROJECT DESCRIPTION

The overall objective of this project is to help to determine and contribute to management practices which could prevent and ameliorate impacts of some forest operations on acidification of aquatic systems at different scales. This will be achieved through studies at three nested scales: Supra-catchment or regional scale to identify sensitive areas helping to plan:

- forest development with minimum impact on water quality and ecology;
- catchment and sub-catchment scale to investigate the efficacy of some management tools related to forest operations;
- sub-catchment, riparian or river reach scale to study the role of riparian management to ameliorate the effects of forestry on acidification.

Specific targets of the projects include:

- to further test the utility of the sodium dominance index as a measure of sensitivity to acidification and as a tool for evaluating the impact of forestry on acidity of streams;
- to determine biological indicators for and sensitivity grades within the index;
- through the use of field experiments assess the impact of some silviculture systems on water quality and particularly acidification;
- to assess the potential efficacy of buffer strips to ameliorate acidification in forested catchments on sensitive geologies.

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PROJECT TITLE

*Forestry and the potential for surface water acidification - Liming Study
(2000-LS-3.2.1b-M2)*

LEAD ORGANISATION

Trinity College Dublin

START DATE

22/10/2001

CONTACT

Dr Norman Allott

STATUS

Completed (Report Pending)

PROJECT TYPE

Large Scale

TOTAL BUDGET (€)

25,459.26

PROJECT DESCRIPTION

Streams in afforested softwater catchments may be markedly more acidic than those outside forest arising from the fact that mature trees 'scavenge' atmospheric pollutants and also can release organic acidity to surface water. Application of lime in affected catchments is a common counter-measure which aims to restore such systems so that they support salmonid fish and other aquatic biota. The purpose of the project is to review methods of applying lime which have been used in other countries and to assess their suitability for use in Ireland.

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PROJECT TITLE

Forestry and Environment Impacts Addressing Water Quality and Biodiversity - Forest Operations and Eutrophication (2000-LS-3.2.2-M2)

LEAD ORGANISATION

University College Dublin

START DATE

18/12/2001

CONTACT

Prof. Ted Farrell

STATUS

Completed (Report Pending)

PROJECT TYPE

Large Scale

TOTAL BUDGET (€)

539,638.68

PROJECT DESCRIPTION

The overall objective of this project is to determine the impact of forestry and forestry practices on phosphorus in surface waters.

There are three major tasks in the project:

- Task 1 will determine the impact of forest operations on nutrient concentrations in surface run-off at sub-catchment level. The study will be conducted in the King's River catchment in Co Wicklow. The catchment is already fully instrumented and has been monitored under the Three Rivers Project.
- Task 2 involves the monitoring of phosphorus from an afforestation site, which had previously been in intensive agricultural management. The site will be monitored for a period of several months before planting in order to collect appropriate baseline data.
- Task 3 is a factorial experiment designed to measure surface-runoff of phosphate following the afforestation of a peat or peaty-gley soil.

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PROJECT TITLE

Forest operations - quantification and management of erosion and siltation (2000-LS-3.2.4-M2)

LEAD ORGANISATION

NUI Maynooth

START DATE

01/12/2004

CONTACT

Dr Michael Rodgers

STATUS

Ongoing

PROJECT TYPE

Large Scale

TOTAL BUDGET (€)

273,169.45

PROJECT DESCRIPTION

Forest erosion rates of 100Mg/ha year can be caused by ground preparation, drainage channels, harvesting and reforestation activities, forest roads and fire. Erosion of soil and its export to aquatic zones, which includes environmental damage, can be controlled through the use of best management practices which include suitable ground preparation and drainage techniques, proper road construction and maintenance, and the use of silt traps and buffer zones strategically located.

The aim of the study is

- to quantify the nature and extent of soil erosion in a representative Irish catchment where current forestry practices are employed;
- to evaluate;
- to make recommendations on – where appropriate – current best management practices in controlling erosion losses.

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Doctoral Scholarships (2001)

PROJECT TITLE

Identification and Initial Assessment of Phytases Suitable for Inclusion in Animal Feed for the Purposes of Phosphate Pollution Abatement (2001-PHD-8-M1)

LEAD ORGANISATION

University of Limerick

START DATE

01/12/2001

CONTACT

Dr Gary Walsh

STATUS

Completed

PROJECT TYPE

Doctoral Scholarship

TOTAL BUDGET (€)

73,487.36

PROJECT DESCRIPTION

Phosphate pollution derived from animal slurry is of major environmental concern, both nationally and internationally. Levels of phosphate in slurry derived from monogastric animals can be reduced by inclusion of the enzyme phytase in animal feed. This provides the animal with the digestive capacity to release inorganic phosphate from phytic acid, the major storage form of phosphate found in cereal grain. The released phosphate is then assimilated by the animal, as opposed to being excreted in the form of intact phytic acid. Current commercial phytase preparations are not particularly suited to in-feed application. This project seeks to establish the criteria which would render phytase enzymes maximally effective in abating slurry derived phosphate pollution. This will facilitate more rational choice of future effective phytase enzymes for application in the feed industry. The project also aims, through knowledge based screening, to identify and characterize one or more phytases likely to be significantly more efficient in reducing the level of phosphate pollution associated with monogastric animal slurry when compared to those currently commercially available.

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PROJECT TITLE

*Development of A Generic Tool for Flushing Study Analyses
(2001-PHD-9-M1)*

LEAD ORGANISATION

NUI Galway

START DATE

01/12/2001

CONTACT

Dr Michael Hartnett

STATUS

Completed

PROJECT TYPE

Doctoral Scholarship

TOTAL BUDGET (€)

76,184.28

PROJECT DESCRIPTION

A review will be carried out of the various approaches which are used to perform flushing studies of estuaries. Following this review, detailed intercomparisons will be carried out between various flushing study methodologies and against detailed pollutant transport models to assess the accuracy and suitability of the various approaches. A computer based flushing analysis model (FLUSHMOD) will then be developed for carrying out flushing studies of Irish estuaries within a user friendly GIS (ArcView) framework. The model will include characteristics of 10 of the most environmentally important estuaries in Ireland and will be developed in a general-purpose way so that users can easily add other estuaries. The model will allow users to perform flushing analyses using 3 or 4 of the most reliable of the above methodologies for different conditions of tide and river inflows.

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Water Framework Directive – Phase 2 (2002)

PROJECT TITLE

*Development of a Methodology for the Characterisation of Unpolluted Groundwater
(2002-W-DS-7-M1)*

LEAD ORGANISATION

TMS Environment Ltd

START DATE

01/11/2002

STATUS

Completed (**ERTDI Report 30**)
Main Report available for download

CONTACT

Dr Imelda Shanahan

PROJECT TYPE

Desk Study

TOTAL BUDGET (€)

47,930

PROJECT DESCRIPTION

TMS Environment Ltd and Environmental Simulations International (ESI) have been commissioned by the Environmental Protection Agency (EPA) to undertake a research project to help satisfy Ireland's commitment to assess the chemical status of groundwater bodies under the Water Framework Directive.

The detailed objectives of the project are as follows:

- To review international methodologies for groundwater characterisation with a focus on those proposed by other European Union states;
- To develop a methodology for an approach to characterising groundwater bodies in Ireland. This will include consideration of the following aspects for each groundwater body: aquifer lithology, groundwater chemistry, rainfall chemistry, hydrogeological conditions and geographical location;
- To test the developed methodology using available monitoring data. A number of catchments or groundwater bodies will be identified in conjunction with the EPA which provide stringent tests of the methodology developed.

Professor John Lloyd, an internationally renowned expert on chemical characterisation of groundwater, will be assisting ESI and TMS in the completion of this research project. The methodology developed will include detailed descriptions of data management protocols and the processing and presentation procedures required to ensure consistency of reporting.

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PROJECT TITLE

Development of a methodology for the characterisation of a karstic groundwater body with particular emphasis on the linkage with associated ecosystems, such as turloughs (2002-W-DS-8-M1)

LEAD ORGANISATION

Trinity College Dublin

START DATE

09/12/2002

CONTACT

Mr Paul Johnston

STATUS:

Completed (Report Pending)

PROJECT TYPE

Desk Study

TOTAL BUDGET (€)

49,920

PROJECT DESCRIPTION

Objectives of the study:

1. The development of a risk assessment framework for karst groundwater dependent habitats with particular reference to turloughs.
2. To identify and assess the qualitative and quantitative pressures in Ireland It is understood that the majority of karst groundwater-dependent habitats (specifically 'protected' habitats) are turloughs, albeit of varying types and characteristics. Other habitats (*e.g.* spring related) will be identified and included, as required. The risk assessment framework will be constructed around the basic source-pathway-receptor concept as has already been used for the national groundwater protection schemes. On the basis of available ecological and hydrological data (collated as part of the study), the objective would be to identify the hazards/sources of potential impact, the means of impact and the potential receptors in terms of ecology. The risk evaluation is embodied in a ranking of the importance of the sources and potential impacts, as revealed in a wide variety of studies conducted to date. Thus, the strategy of the study will be to identify the key habitats and to classify them, as far as is possible, in terms of their known ecology and hydrology. Available information on the ecologies and hydrology would be compiled on a database. A supporting database would be compiled on the nature of potential hazards for the identified sites and any available interpretation on measured or assessed impacts in terms of flora and fauna. The final stage is to develop an interpretation of these collected results and to identify the key hazards in the context of type habitats (based on the hydro-ecological classification of the turloughs) - and how to recognize them in the context of the required response to the Water Framework Directive.
3. To examine the response of turlough ecosystems to hydrological inputs in the context of the time constraints of the study, this component can only be undertaken in the light of sufficient existing data - which are only available for the turlough area of South Galway, albeit a protected habitat complex. The objective here would be to develop a methodology for quantitative assessment of risk in terms of appropriate hydrological criteria for use in assessing impacts on turlough ecology. Based on collected data, the method would be to develop frequency-duration responses for typical turlough water

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levels and to relate these to known changes in corresponding vegetation response in the turlough. The risk in this context is developed in terms of a likely 'return period' for a particular level of inundation which may be related to consequential vegetation.

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PROJECT TITLE

*Hydromorphology of Rivers
(2002-W-DS-9-M1)*

LEAD ORGANISATION

Central Fisheries Board

START DATE

13/01/2003

CONTACT

Dr Philip McGinnity

STATUS:

Completed (ERTDI Report 26)

PROJECT TYPE

Desk Study

TOTAL BUDGET (€)

49,648

PROJECT DESCRIPTION

This project aims to develop, test and provide instruction in a protocol and guidance for a national hydromorphology survey, applicable to the WFD and organisations involved therewith, based on the following elements:

- Review of current practice in Ireland and dialog between practitioners;
- Assessment of the potential to achieve greater synergy and inter-operability between existing survey schemes;
- Assessment of guidance emerging from EU sponsored initiatives such as CEN, REFCOND and other Common Implementation Strategy projects;
- Review of international 'best' practice in the EU, USA and elsewhere;
- Specification of enhanced GIS based techniques and design of 'GIS pre-survey report' for field survey personnel;
- Field-testing of protocol;
- Field training in the proposed methodology to appropriate field staff.

The deliverables from the project will include:

- Literature review and review of technical guidance documents;
- Review of current Irish practice and a perspective on the potential for further development and integration thereof;
- A protocol and methodology for a WFD hydromorphology survey of rivers;
- Training of personnel in field survey techniques for hydromorphology assessment;
- Specification of enhanced GIS hydromorphology 'toolbox' and provision of sample GIS output for field survey personnel;
- Field workshop (1-2 day) on the application of the proposed protocol and use of GIS outputs.

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PROJECT TITLE

*Identification and Ranking of Nature Conservation Designated Areas, where the Status of Water is an Important Factor
(2002-W-DS-10-M1)*

LEAD ORGANISATION

Compass Informatics Limited

START DATE

11/11/2002

CONTACT

Mr Gearóid O'Riain

STATUS:

Completed (ERTDI Report 24)

PROJECT TYPE

Desk Study

TOTAL BUDGET (€)

49,976

PROJECT DESCRIPTION

The Water Framework Directive 2000/60/EC (WFD) establishes a comprehensive basis for the management of water resources in the EU and will replace several of the existing directives which deal with individual aspects of the aquatic environment. Under Article 6 of the Directive the requirement to provide for the protection of surface water and groundwater of water dependent habitats within designated sites is set out. This article has as its aim the conservation of habitats and species within those sites. As outlined in the EPA project call, the situation regarding these protected habitats needs assessment. It is necessary to establish if the quality and quantity status of the associated waters is sufficient to meet the needs of the habitat or needs improvement. It is also necessary to develop a Register of these Protected Areas.

The current project focuses on those areas listed under Annex IV, 1. (V): "areas designated for the protection of habitats or species where the maintenance or improvement of the status of water is an important factor in their protection, including relevant Natura 2000 sites designated under Directive 92/43/EEC and Directive 79/409/EEC", and aims to develop an initial Register while also providing an assessment tool for determining if the quality and quantity status of associated waters is sufficient. As stated in Article 6, "for each River Basin District, the register or registers of Protected Areas shall be kept under review and up to date". Therefore it is important that any approach taken in the proposed project be readily repeatable and extendible to facilitate ongoing and regular update of this section of the Register of Protected Areas.

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PROJECT TITLE

*An Assessment of the Mathematical Modelling in the Implementation Water Framework Directive in Ireland
(2002-W-DS-11-M1)*

LEAD ORGANISATION

Trinity College Dublin

START DATE

18/11/2002

CONTACT

Dr Kenneth Irvine

STATUS

Completed (**ERTDI Report 29**)

PROJECT TYPE

Desk Study

TOTAL BUDGET (€)

50,000.00

PROJECT DESCRIPTION

This proposal is based on the belief that effective implementation of the WFD requires well focussed mathematical modelling which needs to be simple in its application and/or well supported by appropriate expertise. The objectives of this study are to produce an assessment of the application of mathematical modelling to the implementation of the WFD. It will:

- Identify, and categorise by generic type, models of potential use for the WFD and with due regard to the application of modelling for this purpose in other EU countries;
- Provide a review, and recommendation for the use, of models to assess risk of catchment activities to quality standards in waters;
- Review application of models for the identification and quantification of important internal processes which impact on ecological quality of surface waters and chemical and quantitative status of groundwaters;
- Recommend best practice for use of large data sets in each waterbody type;
- Examine the AI based models developed for use in England and Wales, assessing the potential of these techniques for the development of models based on Irish data;
- Identify and critically assess models of potential use in order to make recommendations of a cost-effective use and development of models to assist with the implementation of the WFD in Ireland.

The project will test a number of 'off-the-shelf' models for ease and reliability of use. It will, however, embark on this process at an early stage, as testing of models after a complete literature search is considered unfeasible within the timescale of the project. It is unlikely, given the breadth of expertise within the Consortium, that any major modelling approach used currently will be overlooked. This approach to pilot testing does not preclude a balanced approach to the study. Any new models which are revealed in the course of the review which appear to have high potential for implementation of the Directive in Ireland will be identified as such, and tested as far as possible within the duration of the project.

Finally, the project will assess the feasibility of linking models with GIS in order to provide a predictor of the effect of changes within the catchment on type-specific quality scores.

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PROJECT TITLE

*Characterisation of Reference Conditions and Testing of Typology of Rivers
2002-W-LS-7*

LEAD ORGANISATION

University College Dublin

START DATE

04/11/2002

CONTACT

Dr Mary Kelly-Quinn

STATUS

Completed (**ERTDI Report 31**)

PROJECT TYPE

Large Scale

TOTAL BUDGET (€)

334,368.39

PROJECT DESCRIPTION

This project is intended to generate a full description of the biological elements (excluding fish stocks) of candidate reference sites identified for certain river types. The high quality status of the sites is to be verified by assessment of the chemical and hydromorphological characteristics. In addition, the data are to be used for the testing of the differences in biological characteristics between the river types indicated so as to determine whether these are valid distinctions, which should be taken account of in future monitoring.

This project is also intended to assist in the generation of information on reference conditions for those river types where such conditions are no longer extant. This project should mainly consist of field surveys and laboratory work to provide a full description of the biological characteristics (excluding fish stocks) at the candidate reference sites. In order to confirm the high quality status of the sites, measurements of chemical parameters, including the priority substances listed in Annex X of the WFD, and an examination of hydromorphological characteristics are also to be undertaken.

The information arising from the surveys and laboratory analyses must be reported in full detail. The results of the survey work are to be further used to assess the differences between the biological characteristics of the river types and to determine if these are significant and justify the recognition of such types for the purposes of the monitoring and assessment to be carried out under the WFD. This project should encompass the generation of appropriate reference conditions for rivers types where extant examples are unavailable. This may involve the use of historical data, where available and modelling approaches involving either prediction or hindcasting.

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PROJECT TITLE

*Recharge and Groundwater Vulnerability
(2002-W-MS-16-M1)*

LEAD ORGANISATION

Trinity College Dublin

START DATE

27/01/2003

CONTACT

Mr Bruce Misstear

STATUS

Completed (Report Pending)

PROJECT TYPE

Medium Sized

TOTAL BUDGET (€)

246,900

PROJECT DESCRIPTION

The objectives are to:

1. Review and evaluate current methods for the estimation of groundwater recharge at sub-catchment level;
2. Review current data availability and identify suitable sub-catchments, which will form the basis of the experimental studies. (These would preferably comprise areas where vulnerability mapping and relevant, long-term, monitoring data already exist);
3. Examine relationships between information from detailed instrumented sites with sub-catchment scale maps of groundwater vulnerability and aquifer potential;
4. Develop a preliminary GIS based assessment tool for the estimation of groundwater recharge (recharge acceptance).

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PROJECT TITLE

Palaeolimnological Investigation - Identification of Reference-Status for Irish Lakes typologies using palaeolimnological methods and Techniques (IN-SIGHT) (2002-W-MS-17-M1)

LEAD ORGANISATION

Trinity College Dublin

START DATE

01/01/2003

CONTACT

Prof. David Taylor

STATUS

Completed (**ERTDI Report 55**)
Main Report available for download

PROJECT TYPE

Medium Sized

TOTAL BUDGET (€)

239,139.31

PROJECT DESCRIPTION

Key elements of the WFD are typology and the description of type-specific reference conditions for sites subject to zero or minimal anthropogenic pressures. The basis for the typology of lakes is given in Annex II 1.2 and for the identification of reference conditions is given in Annex II 1.3 of the WFD. A key factor in defining types is whether these support significantly different biota. In order to establish this, each hydromorphological type should be tested to verify if it supports a significantly distinct biological community using biological data from sites subject to zero or minimal anthropogenic pressures now or at any time in the past. Type specific reference condition sites should be identified in order to further describe reference biological communities and can be

- (i) spatially based *i.e.* at existing lake sites;
- (ii) based on modelling; or
- (iii) derived using a combination of these methods (Annex II 1.3 iii).

The methodology for sediment coring and the techniques for reconstructing sediment nutrient and pH profiles are well established with a satisfactory level of expertise in this area within the State and in Northern Ireland. Using existing data and judgment, it may be sufficient in many instances to describe conditions at the top, middle and bottom layers of each core.

Research Objectives:

- Review and develop a methodology for the examination of historical anthropogenic pressure on lakes as required under WFD;
- Review existing palaeolimnological data sets for Irish lakes identifying those suitable for reference conditions;
- Demonstrate and confirm the present and past absence or very limited presence of anthropogenic pressures at candidate reference sites (up to 50 lakes) using palaeolimnology (or other suitable methodology) to construct profiles of historical nutrient and pH conditions;
- Where spatially based sites are not available for a lake type, use palaeolimnology in conjunction with other techniques to reconstruct and describe at least partially, reference biological communities.

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Water Quality (2002)

PROJECT TITLE

*Pilot River Basin
(2002-W-FS-5)*

LEAD ORGANISATION

Trinity College Dublin

START DATE

02/12/2002

CONTACT

Dr Garrett Kilroy

STATUS

Completed (Report Pending)

PROJECT TYPE

Fellowship

TOTAL BUDGET (€)

183,397.20

PROJECT DESCRIPTION

The Water Framework Directive (WFD) will for the first time provide a comprehensive legislative basis for the protection, enhancement and regulation of water quality and quantity for rivers, lakes, estuaries, coastal waters and ground waters in the European Union. Fundamental to the successful implementation of the WFD will be the establishment of River Basin Districts and River Basin Management Plans, which will ensure an integrated approach to catchment management .

The development of guidance documents from Working Groups at EU level will form the basis for a common strategy for the WFD. To ensure coherence between the different guidance documents and cross applicability, the guidance documents will be tested in selected pilot river basins (PRB). The proposed PRB Fellowship will contribute, from an Irish perspective, to ensuring that the guidance documents are applicable to and workable within all River Basin Districts across Europe. Ireland has proposed the Shannon River Basin as the PRB.

Key to the assessment of these guidance documents will be collaboration with participants of the Shannon River Basin District Project. In addition, contact will be required with WFD Working Groups, representatives from other PRB and other related international projects. Several projects initiated by Phase 1 and 2 of the ERTDI programme will have a direct relevance to the implementation of the WFD. Communication with representatives of these projects will provide an opportunity to incorporate findings of these studies to the assessment of the guidance documents.

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Doctoral Scholarships (2002)

PROJECT TITLE

*The Development of Liquid Chromatography-Mass Spectrometry (LC-MS) Methods for the Determination of Microcystins in Irish Freshwaters, Cyanobacteria and Drinking Water.
(2002-PHD-2-30)*

LEAD ORGANISATION

Cork Institute of Technology

START DATE

01/10/2002

CONTACT

Dr Ambrose Furey

STATUS

Ongoing

PROJECT TYPE

Doctorate

TOTAL BUDGET (€)

75,000.00

PROJECT DESCRIPTION

Liquid chromatography-mass spectrometry (LC-MS) methods will be developed to analyse microcystin toxins (hepatotoxins) in cyanobacteria (blue-green algae) and freshwater samples. There are only six commercially available microcystin standards out of a family of > 65 hepatotoxins. An ion trap MS (LC-MSn) method and a tandem quadrupole time-of-flight (QqTOF) mass spectrometry method will be developed to aid in the isolation of known and unknown microcystins from Irish cyanobacteria.

These MS methods will aid in the structurally elucidation of isolated microcystins based on the characteristic fragmentation pattern produced from multiple MS experiments. A triple quadrupole MS method will be developed to quantify the concentration of microcystins in isolation fractions and natural samples. These LC-MS methods will be applied to identify new and unknown microcystins in Irish freshwater and to establish their geographical distribution in Irish lakes. These sensitive LC-MS methods will also be used for the rapid screening of microcystins in drinking water to determine if Irish drinking water is compliant with the WHO guideline on microcystins levels (1ppb).

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PROJECT TITLE

*Irish Ecoregion Community Training-Set and Ecological Restoration Targets
(2002-PHD-2-34)*

LEAD ORGANISATION

University of Limerick

START DATE

01/05/2003

CONTACT

Dr Catherine Dalton

STATUS

Completed

PROJECT TYPE

Doctorate

TOTAL BUDGET (€)

75,000.00

PROJECT DESCRIPTION

This project will examine aquatic planktonic and benthic elements in Irish lake typologies to develop ecological restoration targets. This will be achieved via the development of a community-based training-set (incorporating diatoms and cladocera), application of palaeolimnological techniques and the use of analogue matching. Diatoms and cladocera are the most abundant of freshwater organisms, are very sensitive to a wide range of chemical and environmental factors, and leave readily identifiable signatures in the sediment record. The project will utilise the historical record in lake sediments by comparing it to contemporary communities in a range of modern reference lakes. Examination of a range of sediment time slices, prior to deterioration in lake water quality, will help determine a range of target conditions for partial or complete restoration in water quality.

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PROJECT TITLE

*A Test of Different Ecological Response to Nutrient Loads of Soft- and Hard-Water Lakes
(2002-PHD-2-36)*

LEAD ORGANISATION

Trinity College Dublin

START DATE

01/11/2002

CONTACT

Dr Kenneth Irvine

STATUS

Ongoing

PROJECT TYPE

Doctorate

TOTAL BUDGET (€)

73,920.00

PROJECT DESCRIPTION

The project will investigate the different ecological responses to catchment pressures as defined by nutrient inputs in three hard water and three soft water lakes. The work will include seasonal field measurements indicative of lake quality, assessment of ecological processes and use of laboratory experiments to identify and quantify mechanisms important for the translation of nutrient load to ecological quality. The project will assess the validity of using scores of quality elements to describe overall ecological status and investigate the potential of parameters of trophic response of biota to nutrients and nutrient deficiency as descriptors of ecological status.

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PROJECT TITLE

*Turlough Soils - Spatial and Temporal Fluxes in Plant Nutrients
(2002-PHD-2-37)*

LEAD ORGANISATION

Trinity College Dublin

START DATE

01/11/2002

CONTACT

Dr Steven Waldren

STATUS

Ongoing

PROJECT TYPE

Doctorate

TOTAL BUDGET (€)

72,300.00

PROJECT DESCRIPTION

This project will compare soil type and nutrient status in soils of hydrologically linked turloughs within two different catchments. Variation in soils will be described within individual turloughs, among turloughs within a single drainage system, and between contrasting drainage systems. Soils will be described morphologically, mechanically and chemically. Typical soil profiles within each of the turloughs will be selected as sampling sites to monitor seasonal changes in soil chemistry. A smaller number of turloughs within each catchment will be selected for detailed mapping of soil type, depth and nutrient status, and this will be related to variation in vegetation type.

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PROJECT TITLE

The Creation and Assessment of Digital Spatial Modelling Techniques for the Management of Lake Water Quality in the Lough Leane and Lough Feeagh Catchments
(2002-PHD-2-38)

LEAD ORGANISATION

Trinity College Dublin

START DATE

01/11/2002

CONTACT

Dr Krysia Rybcazuk

STATUS

Ongoing

PROJECT TYPE

Doctorate

TOTAL BUDGET (€)

74,250.00

PROJECT DESCRIPTION

This project will apply and evaluate digital spatial modelling techniques to the management of water quality in two lake catchments in the west of Ireland. Data for the Lough Leane catchment will be evaluated via a data audit and any data gaps identified. These gaps will be augmented where possible with fieldwork and remotely sensed technologies. A spatial catchment model will be developed within a Geographic Information System (GIS) to spatially simulate and visualize the delivery and internal dynamics of phosphate nitrate and dissolved organic carbon within the catchment. Once developed the methodology will be tested in the Lough Feeagh catchment.

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Water Quality (2003)

PROJECT TITLE

*Improved Water Quality Data Analysis and Interpretation
(2003-COE-FS-10-M4)*

LEAD ORGANISATION

Trinity College Dublin

START DATE

01/01/2004

CONTACT

Dr Ian Donohue

STATUS

Completed

PROJECT TYPE

Fellowship

TOTAL BUDGET (€)

138,918.36

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Water Framework Directive – Phase 5 (2005)

PROJECT TITLE

Application of Molecular Techniques to Determine the Origin of Faecal Contamination of Group Water Scheme Waters (2005-FS-31-M1)

LEAD ORGANISATION

NUI Galway

START DATE

01/12/2005

CONTACT

Dr Sean Connaughton

STATUS

Ongoing

PROJECT TYPE

Fellowship

TOTAL BUDGET (€)

170,941.20

PROJECT DESCRIPTION

Some 36% of private Group Water Schemes (GWS) monitored in Ireland in 2003 were contaminated by faecal coliforms (EPA, 2004). Remediation of this problem requires identification of the origin of faecal contamination. This aim of this project is to develop molecular biology techniques for the routine identification and monitoring of faecal contamination sources in water bodies. These developed techniques, which should allow discrimination between animal and human sources of faecal contamination, will then be used, in combination with established microbiological techniques, to fully characterise the microbiological quality of both source and finished water supplies for a selected number of GWS.

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PROJECT TITLE

*Macroalgal Biomonitoring - Applying Phenolic Compounds As Biomarkers for Metal Uptake Characteristics in Irish Coastal Environments
(2005-FS-35-M1)*

LEAD ORGANISATION

NUI Galway

START DATE

03/01/2006

CONTACT

Dr Solène Connan

STATUS

Ongoing

PROJECT TYPE

Fellowship

TOTAL BUDGET (€)

149,869.80

PROJECT DESCRIPTION

Although brown seaweeds are commonly applied as biomonitors for metal contamination in coastal and transitional waters, the environmental impacts (*e.g.* eutrophication, salinity) on phenol contents, which are largely responsible for their metal-binding properties, are poorly understood. This project quantifies variation in seaweed metal accumulation caused by environmental impacts on phenol production, composition and exudation both in situ and in culture experiments. Research outputs include a report on the contaminative status of selected coastal sites, the development of a standard protocol in brown algal biomonitoring of metals in Irish waters, considering environment-induced variation in algal phenols in situ, and recommendations for improved coastal management including seaweed harvesting.

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PROJECT TITLE

Integrated GIS and Neuro-Fuzzy Analysis for Use in River Basin District Management (2005-GIS-FS-25)

LEAD ORGANISATION

University College Dublin

START DATE

01/11/2005

CONTACT

Mr Ahmed Nasr

STATUS

Ongoing

PROJECT TYPE

Fellowship

TOTAL BUDGET (€)

126,856.48

PROJECT DESCRIPTION

In this study, a new tool is proposed for use in the management of River Basin Districts as required by the Water Framework Directive. The tool will be primarily used to predict the impact of management scenarios on water quality and quantity variables. It will be built on an ArcGIS framework and it will incorporate the-state-of-the-art Neuro-fuzzy systems as a time series model. Moreover, an Auto-Regressive-Moving-Average model will be added to allow of using the tool in a forecasting mode when future data becomes available. Finally, a GIS module for processing input/output data will be written to enable identification of spatial and temporal patterns.

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PROJECT TITLE

An Investigation into the Effective Distribution of On-Site Wastewater Effluent into Percolation Areas and the Treatment Performance of Sandy Subsoils and Constructed Wetlands

(2005-MS-15-M1)

LEAD ORGANISATION

Trinity College Dublin

START DATE

01/01/2005

CONTACT

Dr Lawrence Gill

STATUS

Ongoing

PROJECT TYPE

Medium-scale

TOTAL BUDGET (€)

380,827.85

PROJECT DESCRIPTION

The following document contains several outline proposals into further research required in terms of on-site treatment systems as a result of the experience gained due to both the MS-15 project and also involvement in the EPA/GSI/FÁS course on on-site assessment.

The first two projects (Project A and B) have been prepared in response to projects which the EPA have currently put together in a draft specification form. However, several other areas are also felt to be essential, particularly the area of on-site effluent being discharged into more freely draining sandy soil (T-value 1-5) which, although allowed in the current EPA manual, seems to attract a degree of scepticism both from local councils, practitioners and other bodies who have an intuitive feel that the effluent is percolating too fast. There was also a need for further research into stratified sand filters, particularly in terms of using available sand sizes and characteristics more common to Ireland. The issue of nutrient removal also needs to be carefully considered with the ultimate objective being groundwater protection and, as such being able to quantify the permissible concentrations at the base of the percolation profile.

Hence, several combined projects have been proposed in order to address the above issues and gaps identified from the MS-15 project which will also maximise the benefit of site identification, construction, instrumentation and travelling costs, *etc.* The benefits of recent experience gained during the first project (for example, in site selection) and also the equipment available (lysimeters, samplers, rain gauges, pumps, *etc.*) will also help to optimise the projects in terms of both time and costs. Finally, it should be pointed out that the costs for each project at this stage are indicative only since they have not been compiled by a rigorous costing exercise.

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PROJECT TITLE

*The Water Framework Directive, Assessment, Participation, and Protected Areas: What are the Relationships? (WAPPA)
(2005-W-DS-24-M1)*

LEAD ORGANISATION

Collingwood Environmental Planning
(CEP)

START DATE

09/01/2006

CONTACT

William Sheate

STATUS

Completed (Report Pending)

PROJECT TYPE

Desk Study

TOTAL BUDGET (€)

51,219.20

PROJECT DESCRIPTION

The Water Framework Directive (WFD) has significant interconnections and linkages with other EU legislation. The focus of this study is on the similarities and overlaps between the WFD and the Environmental Assessment Directives (EIA and SEA), the Public Participation Directive and the Birds and Habitats Directives.

The study will involve a close examination of the legal texts of the above Directives to provide an initial theoretical analysis of areas of overlap. This will be followed by an email-based questionnaire survey of key stakeholders in the seven River Basin Districts (RBDs) under the WFD in Ireland, to identify more specific issues of overlap for further detailed case study examination across the RBDs. A maximum number of four case studies will then be selected (to be manageable within the time and resource constraints of this project). The purpose of the case studies is to provide illustrative cases (rather than representative) of where the WFD is most likely to interact with the other key Directives in Ireland, and to provide the basis of recommendations for policy makers and stakeholders in how to address potential problem areas arising out of these overlaps.

PROJECT WEBSITE

www.cep.co.uk/WAPPA%20-%20Irish%20EPA.htm

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PROJECT TITLE

*Marine Ecological Tools for Reference, Intercalibration and Classification (METRIC)
(2005-W-MS-36-M1)*

LEAD ORGANISATION

Marine Institute

START DATE

23/01/2006

CONTACT

Dr Francis O'Beirn

STATUS

Completed (Report Pending)

PROJECT TYPE

Medium-scale study

TOTAL BUDGET (€)

373,256.40

PROJECT DESCRIPTION

The METRIC project has been designed specifically to meet a key WFD deliverable for Irish Coastal and Transitional waters. This project is being proposed by two scientific agencies which have a wealth of experience in scientific research and data collection directly relevant to the project. The main objective of this project is to support EU Intercalibration exercise in order to set harmonised ecological quality criteria for the assessment of transitional and coastal waters in Ireland. The aim is to acquire a harmonised classification throughout Europe based on Ecological Quality Ratios (EQR). This project will enable Ireland to participate in the exercise which requires Ireland to have supporting quantitative EQRs derived and validated using classification tools developed by UK-Ireland WFD task teams. Intercalibrated and harmonised ecological marine water quality assessment systems will involve:

- Networking of national and international research activities;
- Provide guidance for competent authority regarding implementation and compliance with WFD;
- Development of ecological water quality indicators.

PROJECT WEBSITE

www.marine.ie/home/services/rnd/projects/METRIC.htm

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PROJECT TITLE

*Water Framework Directive – Interaction, Negotiation and Communication of Optimal Measures with Stakeholders (WINCOMS)
(2005-W-MS-37-M1)*

LEAD ORGANISATION

University College Dublin

START DATE

09/01/2006

CONTACT

Dr Michael Bruen

STATUS

Ongoing

PROJECT TYPE

Medium-scale

TOTAL BUDGET €

298,915.60

PROJECT DESCRIPTION

This project will provide a detailed assessment of available measures, recommendations for and practical demonstrations of decision support systems which integrate knowledge of the performance of the best available measures with the criteria and preferences of all relevant stakeholders and which can be used for decision analysis, negotiation and mediation in developing WFD policy and measures.

The principle objectives are as follows:

- Produce a comprehensive scientific and technical description of all measures available to meet the requirements of the WFD together with a ranking.
- Survey existing decision support systems and identify a short-list of 2 or 3 of the most suitable for WFD decision-making. Implement, adopt and test these in a case-study situation (using the ERBD project), evaluate their performance.
- Identify and study the knowledge, opinions and preferences of all relevant stakeholders and integrate the results with the decision support systems implemented in the project.

PROJECT WEBSITE

www.ucd.ie/arcel/civileng/research/cwrr/projects.htm

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PROJECT TITLE

The Impact of Plant Nutrients on Primary Productivity in Running Waters: Evaluating the Risk to Stream Health (2005-W-MS-39-M1)

LEAD ORGANISATION

University College Cork

START DATE

28/02/2006

CONTACT

Dr Simon Harrison

STATUS

Ongoing

PROJECT TYPE

Medium-scale study

TOTAL BUDGET (€)

330,424.80

PROJECT DESCRIPTION

Excessive plant growth is the main factor associated with the degraded health of eutrophic streams and rivers. Our capacity to effectively manage the nutrient economy of running waters is hindered by a poor understanding of the relationship between nutrient inputs – mainly phosphorus and nitrogen - and ecological responses. In some rivers, for example, high nutrient levels may be associated with high algal and/or macrophyte growth, whereas in other systems primary productivity may be curtailed by confounding physical, chemical and biological factors.

In this project, we will quantitatively assess the impact of these confounding factors on the relationship between plant nutrients and primary and secondary producers in flowing waters, across a range of nutrient-rich streams in Munster. We will also determine the quantitative responses of benthic algae to variable nutrient concentrations, light levels (shading) and grazing pressure in both natural streams and experimental stream channels at UCC.

The deliverables of this project will include methods for identifying streams most at risk of ecological degradation through excessive nutrient inputs, management guidelines aimed at mitigating the impact of eutrophication in flowing waters and fundamental insights in nutrient economies of Irish streams.

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PROJECT TITLE

Past, Current and Future Interactions Between Pressures, Chemical Status and Biological Quality Elements for Lakes in Two Contrasting Instrumented Catchments in Ireland (ILLUMINATE) (2005-W-MS-40-M1)

LEAD ORGANISATION

Trinity College Dublin

START DATE

28/02/2006

CONTACT

Prof. David Taylor

STATUS

Ongoing

PROJECT TYPE

Large-scale study

TOTAL BUDGET €

374,742.30

PROJECT DESCRIPTION

Using a combination of existing and new data for instrumented catchments located in two RBDs within a dynamic coupled ecological pressure-response modelling framework, ILLUMINATE will address important WFD-relevant knowledge gaps relating to ecological responses to individual and combined pressures on fresh surface waters.

The two case study catchments comprise cascading systems of inter-connected fresh water lakes and are relatively rich in high quality data which are often lacking for European catchments. The two catchments also comprise examples of 'at risk' categories for lakes, from 'not at risk' to 'at significant risk' and encompass a range of pressures, all of which are likely to vary in the years up to and beyond the deadline for implementation of the WFD. Examining and modelling the significant ecological pressures on lakes, as receptacles for integrations of information relating to overall catchment conditions, over the last c. 200 years and into the future, will form the main focus of ILLUMINATE. ILLUMINATE is scheduled to operate for three years and is based on collaboration between representatives of four universities, the Marine Institute, RBD management groups and a major environmental consultancy, all of whom have extensive, relevant experience.

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PROJECT TITLE

*Water Framework Directive Applied Testing and Evaluation Fellowship
(2005-WFD-FS-5-M1)*

LEAD ORGANISATION

Trinity College Dublin

START DATE

03/01/2006

CONTACT

Dr Garrett Kilroy

STATUS

Ongoing

PROJECT TYPE

Fellowship

TOTAL BUDGET (€)

274,092.00

PROJECT DESCRIPTION

The primary goal of the WATER Fellowship is to provide highly applied research to contribute to EPA's role in the next phases of WFD implementation within three years, coinciding with the delivery of RBMPs by 2009.

To achieve this goal the WATER Fellowship proposes the following key objectives:

1. (Approx. 50% of time) Develop case studies and best practice, linking with national and European researchers, to demonstrate how groundwater-surface water issues can be best integrated and addressed in the RBMPs.
2. (Approx. 50% of time) Research support for EPA activities related to WFD:
 - a. Provide scientific advice and carry out testing and evaluation of project deliverables from the NS-SHARE project.
 - b. Provide scientific support to EPA funded WFD ERTDI projects and to the relevant national WFD working groups, and linking with other EPA Research Fellows and the Centre of Excellence on WFD issues.

Note: the particular research emphasis on groundwater-surface water interaction issues in objective 1 reflects technical competencies of the project leader. This research will build on the significant contribution made in this area during the PRB project. A minimum of 2.5 days per week will be dedicated on objective 1.

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Other Projects 2006:

PROJECT TITLE

*Decision Support Systems for the Ecological Assessment of Rivers
(2006-FS-WQ-41-M4)*

LEAD ORGANISATION

University College Dublin

START DATE

15/01/2007

CONTACT

Dr Aisling Walsh

STATUS

Ongoing

PROJECT TYPE

Fellowship

TOTAL BUDGET (€)

145,366.00

PROJECT DESCRIPTION

The research will provide a decision support system for the assessment of ecological status of Irish rivers from the results of the analysis and interpretation of existing datasets, biological, chemical and catchment characteristics. The aim is to deliver the results of such analysis and interpretation via handheld tablet computers to biologists undertaking ecological assessments in the field using GIS, statistical and modelling approaches. The development of a computer-based expert system to assist in Q-Value diagnosis will be a key focus for the project. Improved risk assessment of catchment factors which result in less than 'good' ecological status in rivers will also be an important goal.

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Small-scale Studies

PROJECT TITLE

*GIS Software Development
(2000-SS-7-M1)*

LEAD ORGANISATION

Compass Infomatics Ltd

START DATE

18/03/2002

CONTACT

Mr Paul Mills

STATUS

Completed

PROJECT TYPE

Small-scale Study

TOTAL BUDGET (€)

7,500.00

PROJECT TITLE

*Environmental Impact of Agricultural Practices in Relation To Nutrient Management Planning to be carried out under the Auspices of the North/South Initiatives for Co-Operation in the Area of the Environment
(2002-SS-8-M1)*

LEAD ORGANISATION

Integrated Biomass Solutions

START DATE

04/01/2002

CONTACT

Ms Marcia D'Alton

STATUS

Completed

PROJECT TYPE

Small-scale Study

TOTAL BUDGET (€)

25,066.00

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PROJECT TITLE

*The Efficiencies of Subsoils for On-Site Wastewater Disposal with Respect to Endocrine Disrupting Chemicals
(2003-SS-14)*

LEAD ORGANISATION

Trinity College Dublin

START DATE

14/07/2003

CONTACT

Mr Laurence Gill

STATUS

Completed (Report available for download)

PROJECT TYPE

Small-scale Study

TOTAL BUDGET (€)

6,348.00

PROJECT TITLE

*Evaluation of the Water Framework Directive Guidance Document On Economies and the Environment With Respect to the Shannon Pilot River Basin District
(2003-SS-15)*

LEAD ORGANISATION

KHSK Economic Consultants

START DATE

01/08/2003

CONTACT

Dr Kevin Hannigan

STATUS

Completed

PROJECT TYPE

Small-scale Study

TOTAL BUDGET (€)

6,348.00

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PROJECT TITLE

Survey of Fish Communities in Oligotrophic Lakes in Ireland - Testing a Combined Technique Approach (2003-SS-16)

LEAD ORGANISATION

Irish Char Conservation Group

START DATE

01/08/2003

CONTACT

Dr Fran Igoe

STATUS

Completed

PROJECT TYPE

Small-scale Study

TOTAL BUDGET (€)

7,681.08

PROJECT TITLE

Design of An Internet Accessed Real Time Water Quality Monitor (2003-SS-22-M1)

LEAD ORGANISATION

Galway-Mayo Institute of Technology

START DATE

25/08/2003

CONTACT

Mr Sean O'Donovan

STATUS

Completed

PROJECT TYPE

Small-scale Study

TOTAL BUDGET (€)

6,348.00

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PROJECT TITLE

Establishment of Pre-Impact Biological Conditions in Types of Irish Ecoregion Lakes Lacking Reference Examples (2004-SS-24-M1)

LEAD ORGANISATION

Trinity College Dublin

START DATE

01/05/2004

CONTACT

Prof. David Taylor

STATUS

Completed

PROJECT TYPE

Small-scale Study

TOTAL BUDGET (€)

6,348.00

PROJECT TITLE

A Desk and Field Study of Biomass Estimations Techniques for Monitoring Green Tides in the Irish Environment (2004-SS-25-M1)

LEAD ORGANISATION

NUI Galway

START DATE

01/05/2004

CONTACT

Dr Robert Wilkes

STATUS

Completed

PROJECT TYPE

Small-scale Study

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PROJECT TITLE

*Testing of REFTYPE Reference Validation and Additional Communities and Typologies
(2004-SS-26-M1)*

LEAD ORGANISATION

University College Dublin

START DATE

01/05/2004

CONTACT

Dr Mary Kelly-Quinn

STATUS

Completed

PROJECT TYPE

Small-scale Study

TOTAL BUDGET (€)

6,348.00

PROJECT TITLE

*Assessment of the Efficacy of the Shortened Percolation Test Method for Site Assessments for Single House Waste Water Treatment Systems
(2004-SS-28-M1)*

CONTACT

Mr Cormac Ó Suilleabháin

START DATE

28/07/2004

PROJECT TYPE

Small-scale Study

STATUS

Completed

TOTAL BUDGET (€)

7,681.08

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PROJECT TITLE

*Phytoplankton Blooms and Species Succession in Cork Harbour, Ireland
(2005-SS-43)*

LEAD ORGANISATION

NUI Galway

PROJECT TYPE

Small-scale Study

CONTACT

Dr Robin Raine

STATUS

Completed

PROJECT TITLE

*A Study of the Phytoplankton of Kinvara Bay, Co. Galway, Eutrophicated Bay
in County Galway
(2006-SS-49)*

LEAD ORGANISATION

Dr Cilian Roden

START DATE

04/06/2006

CONTACT

Dr Cilian Roden

STATUS

Ongoing

PROJECT TYPE

Small-scale Study

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PROJECT TITLE

*A Study of the Use of Novel Passive Sampling Materials for the Screening of Priority Pollutants
(2006-SS-51-M1)*

LEAD ORGANISATION

Dublin City University

START DATE

01/10/2006

CONTACT

Dr Fiona Regan

STATUS

Ongoing

PROJECT TYPE

Small-scale Study

TOTAL BUDGET (€)

12,000.00

PROJECT TITLE

*Bathing Water Directive Study
(2006-SS-52-M1)*

LEAD ORGANISATION

Dublin City Council

START DATE

31/07/2006

CONTACT

Mr Kevin Callanan

STATUS

Ongoing

PROJECT TYPE

Small-scale Study

TOTAL BUDGET (€)

5,100.00

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PROJECT TITLE

*Validation of Solids Concentration in Effluent Outflow by Non-Contact Reflection Spectroscopy
(2006-SS-57)*

LEAD ORGANISATION

Spectral Signatories Ltd

STATUS

Completed

CONTACT

Dr Eon O'Mongain

TOTAL BUDGET (€)

6,348.00

PROJECT TYPE

Small-scale Study

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Contributory Scholarships

PROJECT TITLE

An Analysis of Water Resources under Future Climate Scenarios Coupled with Projected Land Use Changes for Selected River Basins in Ireland (2001-CS-5-M1)

LEAD ORGANISATION

NUI Maynooth

START DATE

01/11/2001

CONTACT

Ms Sonja Moore

STATUS

Completed

PROJECT TYPE

Contributory Scholarship

TOTAL BUDGET (€)

7,618.43

PROJECT DESCRIPTION

This project will examine the impact of future climate change on water resources in Ireland. Hydrological simulations will be carried out to compare runoff generated under future climate scenarios with runoff generated under baseline conditions. Downscaled GCM predictions of rainfall and evaporation will be used to drive the physical, process-based hydrological model HYSIM.

Emphasis will be placed upon the effects of climate change on the frequency and duration of low flows and the magnitude and recurrence intervals of flood events. The impact of future land use changes will also be simulated under each scenario. The analysis will focus on several river catchments which will be selected on the basis of a number of criteria.

PROJECT TITLE

A Pollution Assessment of the Tolka River Estuary (2002-CS-17)

LEAD ORGANISATION

Dublin City University

START DATE

01/11/2002

CONTACT

Mr Conor Buggy

STATUS

Completed

PROJECT TYPE

Contributory Scholarship

TOTAL BUDGET (€)

11,400.00

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End of EPA Water Quality projects listing 2000-2006