



WORKSHOP: Wednesday Afternoon 20th October, 13.00 to 17.30

DIFFUSE POLLUTION - How to Develop Solutions to Identify and Tackle Critical Sources

Theme 3: Characterisation of Pressures and Risk of Impacts related to Diffuse Pollution

**INTERNATIONAL NETWORK OF BASIN ORGANISATIONS
EUROPEAN GROUP BASIN AUTHORITIES**

13th International Conference “EUROPE-INBO 2015”

FOR THE IMPLEMENTATION OF THE EUROPEAN WATER DIRECTIVES

21-24 October – Thessaloniki-Greece – Mediterranean Palace Hotel

BACKGROUND TO SIGNIFICANCE OF DIFFUSE POLLUTION

Diffuse Pollution is one of the most significant pressures affecting Water Bodies in Europe and has been highlighted especially since 2012 as follows:

- The EU Blueprint to Safeguard Europe's Water (2012)
- The "Report from the EU Commission to the European Parliament and the Council"---on the Implementation of the WFD (2000/60/EC) and the assessment of each EU Member State River Basin Management Plan in November 2012 (for Ireland, COM (2012) 670 final)---Article 13 Reports from each MS
- The Bi-Lateral Meetings solely between the EU Commission and representatives from each Member State in almost all cases had *deep concerns about managing nitrates, phosphates and pesticides* and essentially required a Supplementary Cross-Compliance legal basis to address the worrying deteriorating trends in the face of the parallel EU identified necessity to increase food production, food safety and food security due to population increase, urbanisation, migration and climate change
- March 2015 Communication of the Commission on WFD and FD Implementation
- Assessment of Programmes of Measures (SWD(2015) 50 final) - Article 11 Reports from each MS
- **All reiterated that Diffuse Pollution Significantly affects ---90% of River Basin Districts, 50% of Surface Waters and 33% of Groundwater Bodies across Europe**

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- Critically, two-thirds of RBDs reported that Basic Measures such as the Nitrates Directive are NOT sufficient to tackle diffuse pollution from Agriculture and Supplementary Statutory and Compulsory Cross Compliance Measures are required
- The March 2015 Communication highlighted that the Agricultural Sector is the Primary Source of Diffuse Pollution across EU
- Despite declining fertiliser consumption, the Implementation of Effective Measures to tackle the unacceptable Nitrate, Phosphate and Pesticide (Diffuse Mobile Organics) Emissions to Waters remains a Key Priority to address the requirements of the WFD and reach GES for all Water Bodies
- **CHARACTERISATION and IMPACT of HUMAN ACTIVITY on STATUS of SW and GW**
- WFD Article 5 requires a Review of the Impact of Human Activity on the Status of Surface Waters and Ground Waters
- **Characterisation:** Critically for Diffuse Pollution we are charged with Identifying and Quantifying Pressures on all Waters such as those from Nitrogen, Phosphorous and Pesticides that are critical to farming needs but many other factors
- **Impact:** Again, critically for Diffuse Pollution we are charged with estimating the Risk of Impact on receiving waters from “excess” nitrates, phosphates and/or pesticides reaching water bodies but again hugely interactive and complex
- The Process must address Identification, Quantification and Impact by “Potential Polluting Parameters” for a range of **Biological, Physio-Chemical, Hydromorphological and Hydrological Environmental Quality Standards**
- It must consider what tools to use to identify **Critical and Hydrological Source Areas** for Flashy and/or different “Types” of Catchments, **Preferential Flow-Paths** and Time-of-Travel and Bio-Chem Changes in Motion and “**Sensitive/Protected Waters**” as the likely receiving water for the modified “pollutant” after a flow and impact lag period – Evidence Based Risk Assessment

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- The **First-Wave of Specific Water Parameters/Uses Directives** addressed such as DW, BW, Abstraction Water for DW etc. were very focussed and directly applicable from a Scientific Viewpoint
- The **Second Wave of Sector Specific Directives** such as UWWT Directive (Municipalities), Nitrates Directive (Agriculture), IPPC Directive (Industry—now IED Directive) were not as focussed and left quite some room for interpretation
- The **Current Third Wave of Framework Directives** which Set EU Overall Requirements and charge Member States with proper Transposition and delivery with support from the Common Implementation Strategy and Harmonisation Requirements across Europe with Support from EEA, ISPRA, IMPEL etc. have widened interpretation for the various eco-regions which is adding complexity in relation to EU-Wide agreed Methodologies for various water “Quality Elements” and for example, Sampling, Monitoring and Test Methodologies for many Biological QEs are still not agreed
- There are still **Major Differences in Interpretation across Europe and its Very Different Eco-Regions** with the basic Pillars underlying the Common Implementation of all the EU Directives but especially Diffuse Pollution Challenges including:
 - a) Science/BMP/ Peer Review/Training,-Planning, Eco-Systems ,EAF, NWRM, Biodiversity, Wetlands, Animal Access
 - b) Science-Policy Interface, Local vs. EU Policy, Regulatory Regime, Financing, Economics, Funding and Cost Recovery,
 - c) Governance being Top-Down and/or Bottom Up to include ALL Stakeholders and Interested Parties,
 - d) Citizen Science, Social Learning, Communities-in-Practice, Integration of “Professional” NGOs, Integration of Professional Lobbyists etc.
 - e) Apparently no form of Agreed Certification re Expert Personnel in the various Sectors, Best Management Practices

- **SOME KEY EMERGING ISSUES for DIFFUSE POLLUTION and CATCHMENT MANAGEMENT**
- **Value of Characteristics of Control Catchment** - Value of “Agreed” Baseline for Research/Implementation Comparison and Value of Control Catchment for N, P, Pesticide Analysis – e.g. Pilot River Odense, Denmark
- **Scientific Policy Interface, Inconsistencies and Acceptance of Schemes/Recommendations by Stakeholders** e.g. Nitrate Concentration Targets – Baltic Sea Agreement, Nitrates Directive Surface and Groundwater, Groundwater Directive, NVZ Derogations, Policies in Emergency, Protocols for Biosphere elements of Core, Buffer and Transitional
- **Sustainable Agricultural Pillar**- Recent Research shows 38 Compounds Exceeding Current Published Thresholds – New Measures are Required such as Compulsory Integrated Pest Management (IPM)
- **Scale** – Urban Water Cycle and Water Recovery in a City as a Multiple Barrier Concept and demonstrating value of for example Detailed Laboratory Droplet Analysis. Similarly Best Scale at which to engage in P-recovery (Globally Limited and Real Concern)
- **Relevance of DF/NPS and Public Health** – Natural, Built and Individual Determinants – Ecosystems, Building Materials, Traffic and Fine Particle Matter, Smoking---affects us via Water, Air-PM/odour, Light/Sight, Noise etc
- **Precautionary Approach/No Regret** – There is a Potential Nitrogen and Pesticide Time Bomb building as we speak
- **Lack of Monitoring of Metabolites and Change Processes of Primary Pollutant** e.g. What metabolites emerge from breakdown of Cypermethin, Lyphosate, Atrazine, DDT (radioactive!!) – Stable, Unstable, Carcinogenic etc.

SOME KEY EMERGING ISSUES for DIFFUSE POLLUTION and CATCHMENT MANAGEMENT

- **Nitrogen Science**: Rate of Mineralisation of Nitrogen unknown---cannot get Certification for Slurry-N etc.
- **Phosphorous Science**: Relation between Soil Mogden-P Index, MRP in water, Ortho-Phosphate/Bio-Valent Phosphate for Agronomy
- **Pesticide Science** (Diffuse Mobile Organics-MicroPollutantScience)
- **Fractionation and Reaction**: N,P, Pesticide Fractionation and Reaction with Trace Elements, Biological Species (e.g. Earth Worms), Invasive Species etc---- Triggers for Metabolites etc.
- **Soil Directive**: Need Guidance for CIS for Soil: N,P influenced by pH, Potash, Silica, Temperature etc; also need guidance on poaching, erosion, sedimentation, substrate for Fish and other Species/Taxa/Habitats, hydromorphology etc
- **Hydropower** - China, India building furiously vs. Removal in Sweden etc.
- **Traffic Impacts** – Break Pads, Oils, Benzothiazoles as Diffuse Pollution Sources---need Collection/Storage if Steep Banks

SOME KEY EMERGING ISSUES for DIFFUSE POLLUTION and CATCHMENT MANAGEMENT

- **Bio-Pharma** – Ibuprofen
- **Pesticides** – POPs, DMO, Glycerol, Mecoprop –Metabolites
- **Nicotineoids** – Now of real concern for water, air and soil media
- **Phthalates** – PVC Tubing, Blood Bags, Medical Devices, Clothing, Floors, Packaging, Toys, Car Parts, Building/Roofing materials
- **P-Sorption and Recovery** – Hydrotalcite Type Sorbent Materials, Zero Valent Iron to Solve “P” Problem, Microbial Electrochemical Systems (MES)
- **Different Wastewaters Treatment Technologies**– e.g. Beverage Industry and Xanthan
- **Micro-Pollutants** – Monitoring and Measures at Catchment Scale (Source/Stormwater) and at City Scale - **OGRE**

SOME KEY EMERGING ISSUES for DIFFUSE POLLUTION and CATCHMENT MANAGEMENT

- **Emerging Compounds (REACH):** Organotin Compounds, Flame Retardants, PCPs, Membranes, Filter Media,
- **Catchment Characterisation-** DEM Physiography, Better Modelling and Prioritisation of Critical Source Areas, Preferential Flowpaths, Specific Pollutants requiring URGENT attention, Sensitive Receptors
- **Planning and Development in Urban and Rural Areas---**Must Introduce Stormwater Management Techniques (SuDS, BAT, NWRM, EAF, Citizen Science, Social learning, Community Spirit AT BEGINNING and full continuous engagement with Newsletters etc.
- **Science Policy Interface and Legislation/Governance/Enforcement as a Last resort** – Political Local Understanding is Critical, Business Cases to Include Environmental Economics, Valuation of Ecosystem Services, Trading Options,-- (TMDL, Cap and Trade etc.), Funding Sources (Green Bonds and Access to Venture Capital) and Applications via Logical Framework Analysis Decision Trees , Trust of Governance arrangements, Certified Science/BMP

TOOLS---Monitoring (Sampling), Modeling, Lab, Demo, Commercial

Passive vs. Active Sampling

Limit of Quantification vs. Limit of Detection

The quality of monitoring data requires the presentation of no detects in combination with the limit of quantification (LOQ) or detection (LOD) to avoid misleading conclusions about the potential presence of compounds. The LOQ resp. LOD should be based on the following:

All results have to be field blank corrected using the average of all field blanks. In the case of detected blank signals the LOQ has to be calculated on the basis of 3 times standard deviation of mean blank value (X) when more than 2 blank values are available or 3 times of $0.25 X$ when only 1 or 2 blanks are available.

A result R is valid when the sample value is larger than the LOQ and is reported as a result after subtraction of the average blank value X . Otherwise R is reported as less than LOQ. When blank signals for a compound are not detected, the LOD is calculated on the basis of a signal-to-noise of 3:1 of the signal traces of the compounds of interest. Every signal below this limit is treated as not detectable. LOD or LOQ have to be reported.



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