NORMAN IN SUPPORT OF NATIONAL STRATEGIES ON EMERGING SUBSTANCES

BRUXELLES, 26 OCTOBER 2016

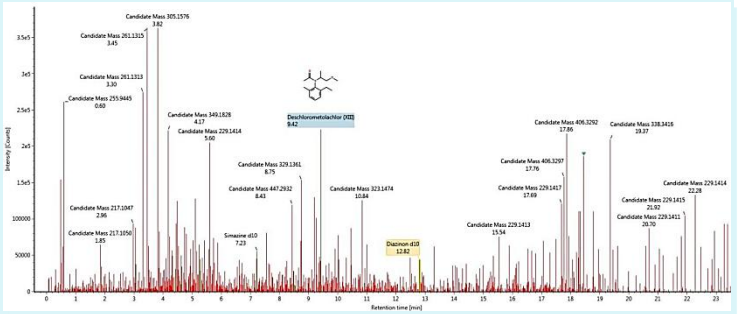
Emerging pollutants in the EU – 10 years of Norman in support of environmental policies and regulations

Pierre-F. Staub, Onema
France

ONEMA
Office national de l'eau et des milieux aquatiques

WATER FRAMEWORK DIRECTIVE: THE NEED FOR SOLUTION-ORIENTED INNOVATIVE APPROACHES

- WFD sets ambitious targets not only for environmental improvements, but also for environmental quality assessment.
- The required quality standards are a real challenge to the available monitoring and diagnostic tools.
- Innovative methods are therefore needed, along with clear implementation plans.



Liberté • Égalité • Fraternité
RÉPUBLIQUE FRANÇAISE

Ministère de l'Environnement, de l'Énergie et de la Mer

MICROPOLLUTANTS POLICY IN FRANCE

TWO NATIONAL PLANS SINCE 2010

Various key actions in the Plans connected to NORMAN

CEP - French Prioritization Expert Commitee

Prioritisation

ONEMA
Office national de l'eau et des milieux aquatiques

INERIS
maîtriser le risque pour un développement durable

norman

AQUAREF - French Reference Lab. for Monitoring of Aquatic Environment

Bioassays
Passive sampling
Non-target screening

AQUAREF
Consortium scientifique et technique
BRGM, Cemagret, IFREMER, INERIS et LNE

ONEMA AND NORMAN

- Onema is in charge of an R&D roadmap dedicated to improving aquatic micropollutant management
- Its budget is ~4M€/yr, covering monitoring, risk assessment and emission reduction measures
- This programme includes supporting:
  - NORMAN coordination activities (INERIS)
  - French experts' contributions to NORMAN prioritisation activities (INERIS, Aquaref and BRGM for groundwater)
  - Editing of the NORMAN Bulletin (INERIS)
- Onema is an associate member of NORMAN

EARLY ACHIEVEMENTS (2011): ADOPTION OF A FRENCH REFERENCE SCHEME FOR SUBSTANCES PRIORITISATION

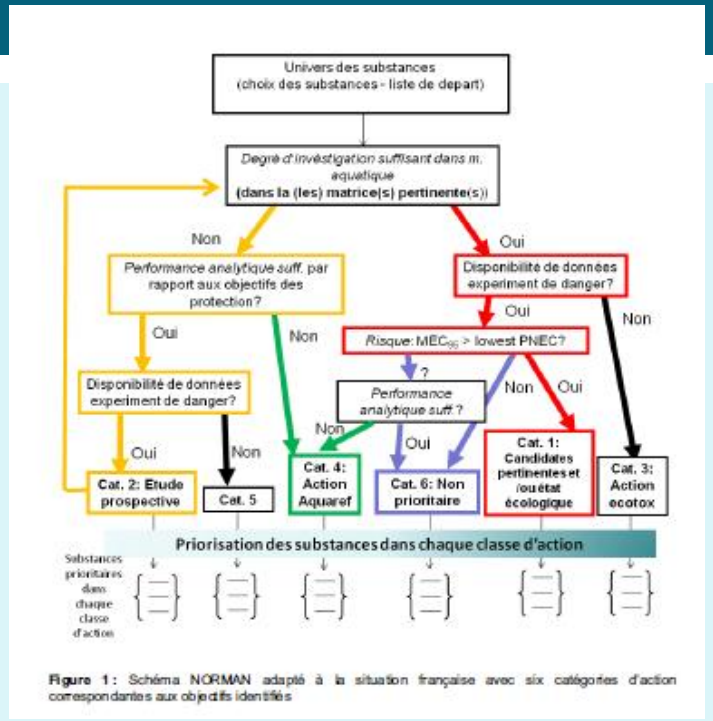
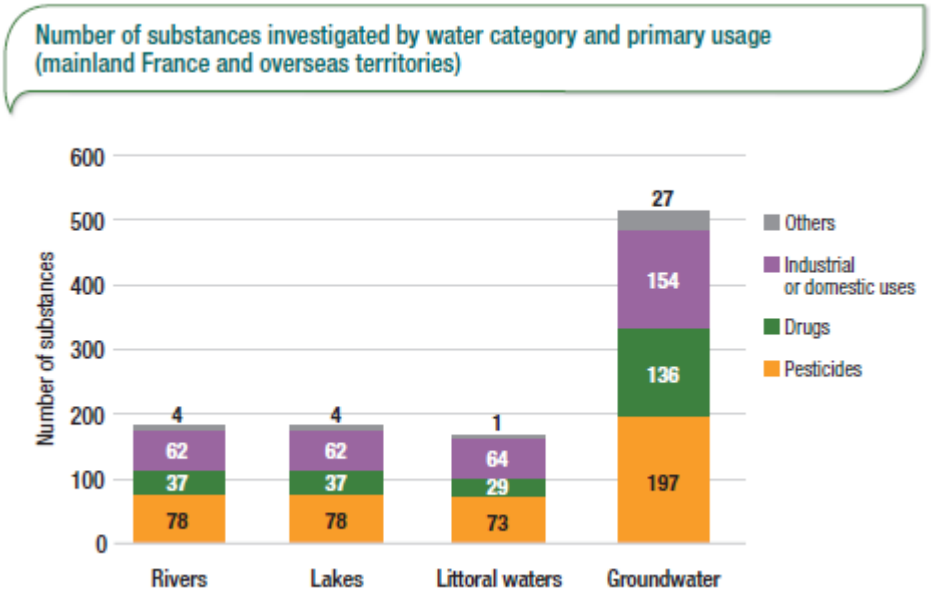
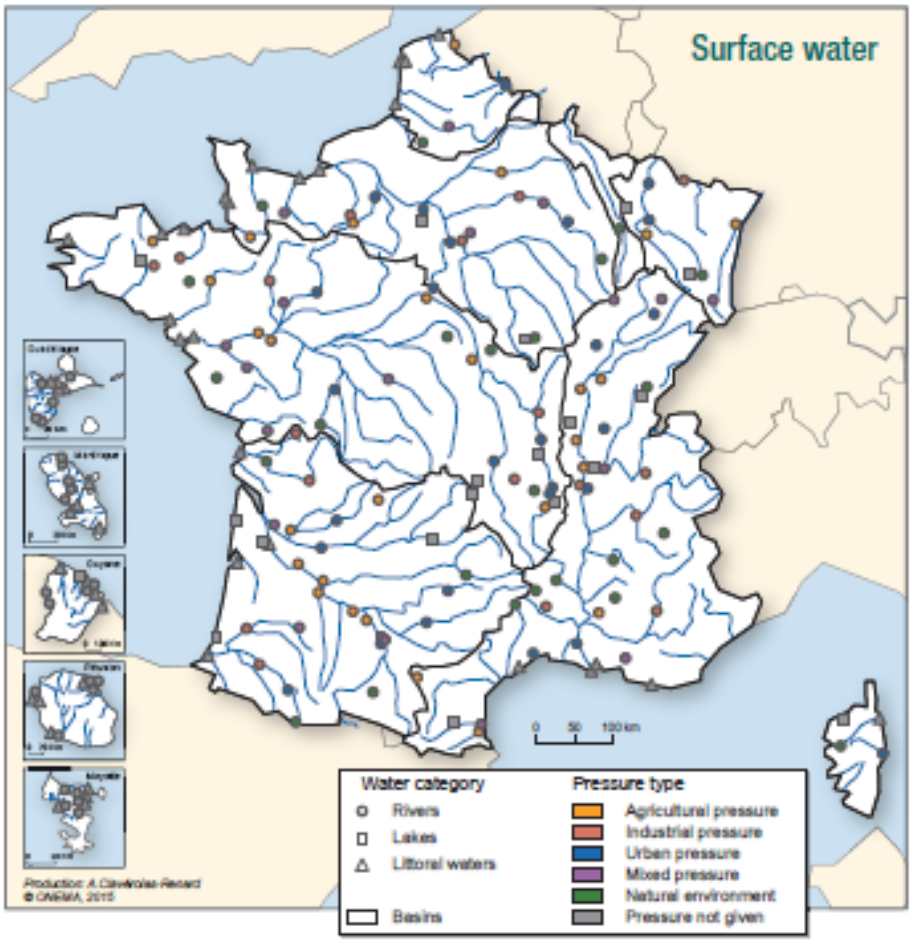


Figure 1 : Schéma NORMAN adapté à la situation française avec six catégories d'action correspondantes aux objectifs identifiés

- The whole rationale was adapted from the NORMAN scheme to the French situation
- It has been applied in various prioritisation exercises in France:
  - 2011: selection list of emerging compounds for a national screening campaign
  - 2012: update of the list of RBSP for 2nd WFD cycle (based on existing data in the 6 main French river districts)
  - 2014: recommendations for list of compounds (national watch list) to be monitored during 2nd WFD cycle, in view of the next review of RBSP (3rd cycle)

2012: FIRST NATIONAL SCREENING CAMPAIGN ON EMERGING SUBSTANCES BASED ON NORMAN APPROACH

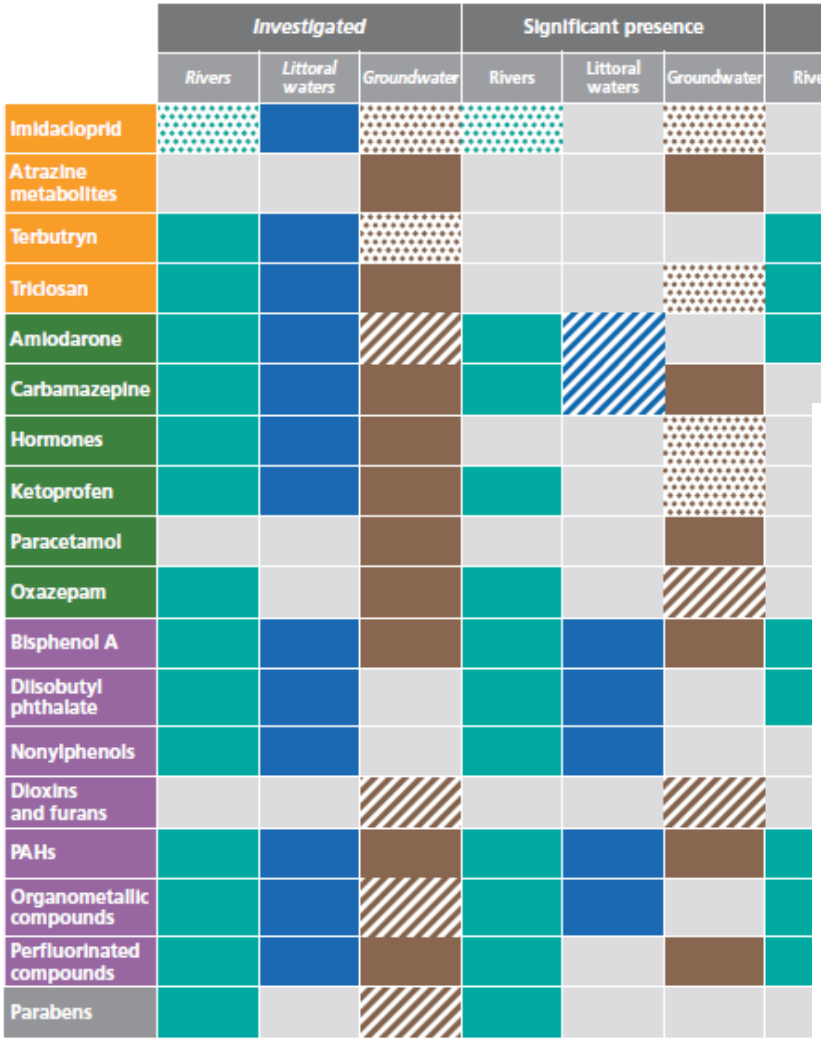




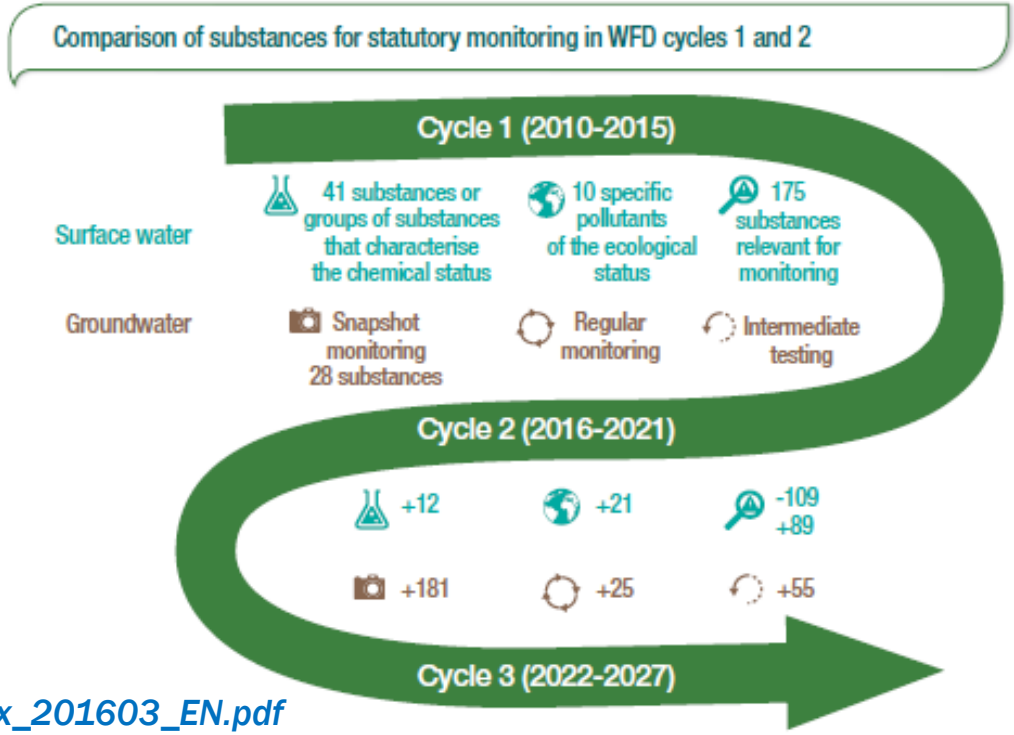
- 2011 & 2012 campaigns: ~600 compounds investigated at 890 surface and groundwater sites in french metropolitan and overseas territories

OUTPUTS & OUTCOMES OF THE 2011-2012 CAMPAIGNS

- Results were used to update the list of compounds to be monitored in French river basins.



- Also forwarded to JRC to contribute to the review of the WFD Priority Substances.



More on *http://www.eaufrance.fr/IMG/pdf/campex_201603_EN.pdf*

A NEW PROSPECTIVE SURVEILLANCE NETWORK IS GOING TO BE LAUNCHED IN FRANCE

- A **dedicated « prospective » national surveillance network** is currently being established:
  - under the coordination of national and river basin authorities
  - based on Watch List sites + other WFD-relevant sites
- **Screening campaigns of emerging compounds** will be run on a regular basis:
  - the first campaign will take place in 2018
  - will be organised in interaction with NORMAN
- **Demonstration studies to verify the applicability of innovative tools**
  - passive sampling, non-target analysis, bioassays…

PASSIVE SAMPLERS

- WFD Chemical Status:
  - given the economical implication of a WFD quality assessment, are 12 monthly « instant bottle samplings » sufficient and acceptable?
  - would the accuracy of the measured mean annual average concentration be improved using alternative sampling strategies, e.g. PS?
- Emerging pollutants screening:
  - looking for solutions to capture as many pollution events as possible on a given site, with limited resources…

- WFD 2013/39/EC, "*Novel monitoring methods such as passive sampling and other tools show promise for future application, and their development should therefore be pursued*"

NORMAN HELPS…

European Commission

JRC TECHNICAL REPORTS

NORMAN interlaboratory study (ILS) on passive sampling of emerging pollutants

A Chemical Monitoring On Site (CM Onsite) organised by NORMAN Association and JRC in support of the Water Framework Directive

Branislav Vrana, Foppe Smedes, Roman Prokeš, Robert Loos, Nicolas Mazzella, Cecile Miege, Hélène Budzinski, Etienne Vermeirssen, Tomáš Ocelka, Anthony Gravell, Sarit Kaserzon

2016

EUR

Workshop on Passive Sampling techniques for monitoring of contaminants in the aquatic environment

Achievements to date and future perspectives

27-28 November 2014, Lyon, France

Organised jointly by

NORMAN Network and AQUAREF

Hosted by IRSTEA, France

Trends in Environmental Analytical Chemistry 8 (2015) 20–26

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journal homepage: www.elsevier.com/locate/teac

ELSEVIER

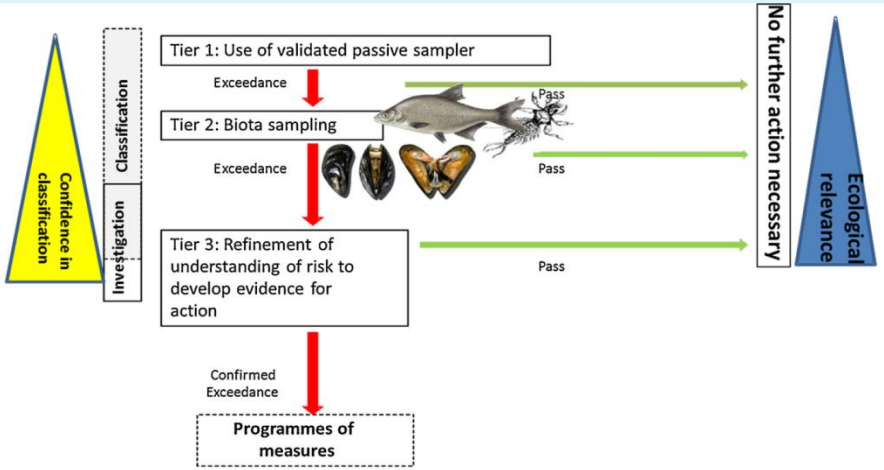
Position paper on passive sampling techniques for the monitoring of contaminants in the aquatic environment – Achievements to date and perspectives

Cécile Miège [a,*], Nicolas Mazzella [b], Ian Allan [c], Valeria Dulio [d], Foppe Smedes [e,f], Céline Tixier [g], Etienne Vermeirssen [h], Jan Brant [i], Simon O'Toole [j], Hélène Budzinski [k], Jean-Philippe Ghestem [l], Pierre-François Staub [m], Sophie Lardy-Fontan [n], Jean-Louis Gonzalez [o], Marina Coquery [a], Branislav Vrana [e]

PLANS FOR IMPLEMENTATION OF PASSIVE SAMPLERS IN FRANCE

- Aquaref is to carry out a demonstration study in 2017-2018, on both WFD priority substances and emerging compounds, including temporal and spatial comparisons with grab sampling
  - To assess Passive Sampling vs. Water EQS compliance

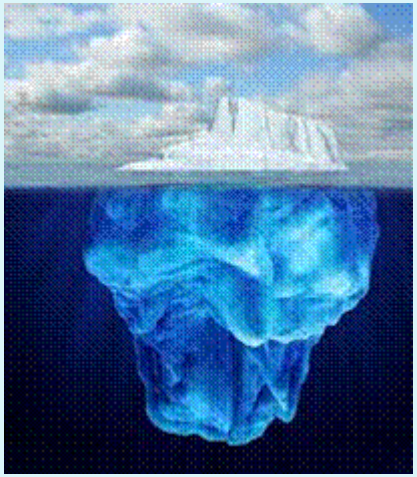
- French institutes (Irstea, Ineris) are preparing in collaboration with Norman experts (Recetox & Niva) the setting-up of a monitoring campaign (French measurement sites) to study the correlation between concentration of hydrophobic compounds measured in passive samplers (silicon rubber) and concentration in fish tissue (WFD PS with EQS-biota)
  - To verify the use of passive sampling as a screening tool for compliance checking of WFD Priority Substances with EQS-biota
  - Data sharing expected through Norman database…

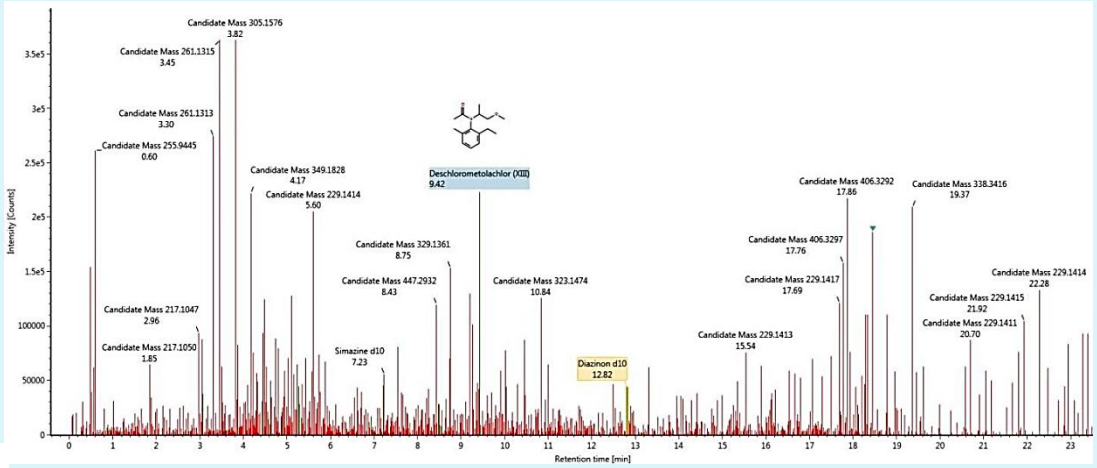


NON-TARGET SCREENING

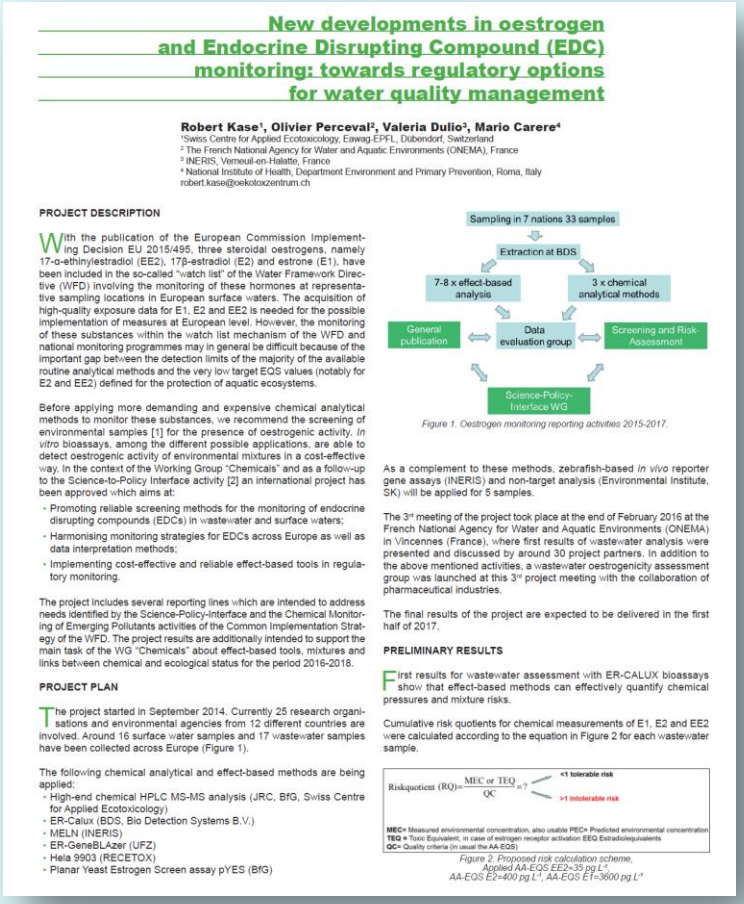
- Aquaref experts participate in the NTS NORMAN Cross-Working activity
  - contribution to the development of harmonised « suspect screening » and « non-target screening » workflows

- Aquaref interlaboratory studies scheduled to assess the impact of various extraction and spectra processing methods, then derive recommendations to share with NORMAN





MEET THE CHALLENGES IN IMPLEMENTING THE WATCH LIST: BIOANALYTICAL APPROACHES FOR THE MONITORING OF EDCS



New developments in oestrogen and Endocrine Disrupting Compound (EDC) monitoring: towards regulatory options for water quality management

Robert Kase[1], Olivier Perceval[2], Valeria Dulio[3], Mario Carere[4]
[1]Swiss Centre for Applied Ecotoxicology, Eawag-EPFL, Dübendorf, Switzerland
[2] The French National Agency for Water and Aquatic Environments (ONEMA), France
[3] INERIS, Verneuil-en-Halatte, France
[4] National Institute of Health, Department Environment and Primary Prevention, Roma, Italy
robert.kase@oekotoxzentrum.ch

PROJECT DESCRIPTION

With the publication of the European Commission Implementing Decision EU 2015/495, three steroidal oestrogens, namely 17-α-ethinylestradiol (EE2), 17β-estradiol (E2) and estrone (E1), have been included in the so-called "watch list" of the Water Framework Directive (WFD) involving the monitoring of these hormones at representative sampling locations in European surface waters. The acquisition of high-quality exposure data for E1, E2 and EE2 is needed for the possible implementation of measures at European level. However, the monitoring of these substances within the watch list mechanism of the WFD and national monitoring programmes may in general be difficult because of the important gap between the detection limits of the majority of the available routine analytical methods and the very low target EQS values (notably for E2 and EE2) defined for the protection of aquatic ecosystems.

Before applying more demanding and expensive chemical analytical methods to monitor these substances, we recommend the screening of environmental samples [1] for the presence of oestrogenic activity. *In vitro* bioassays, among the different possible applications, are able to detect oestrogenic activity of environmental mixtures in a cost-effective way. In the context of the Working Group "Chemicals" and as a follow-up to the Science-to-Policy Interface activity [2] an international project has been approved which aims at:

- Promoting reliable screening methods for the monitoring of endocrine disrupting compounds (EDCs) in wastewater and surface waters;
- Harmonising monitoring strategies for EDCs across Europe as well as data interpretation methods;
- Implementing cost-effective and reliable effect-based tools in regulatory monitoring.

The project includes several reporting lines which are intended to address needs identified by the Science-Policy-Interface and the Chemical Monitoring of Emerging Pollutants activities of the Common Implementation Strategy of the WFD. The project results are additionally intended to support the main task of the WG "Chemicals" about effect-based tools, mixtures and links between chemical and ecological status for the period 2016-2018.

PROJECT PLAN

The project started in September 2014. Currently 25 research organisations and environmental agencies from 12 different countries are involved. Around 16 surface water samples and 17 wastewater samples have been collected across Europe (Figure 1).

The following chemical analytical and effect-based methods are being applied:

- High-end chemical HPLC MS-MS analysis (JRC, BfG, Swiss Centre for Applied Ecotoxicology)
- ER-Calux (BDS, Bio Detection Systems B.V.)
- MELN (INERIS)
- ER-GeneBLAzer (UFZ)
- Hela 9903 (RECETOX)
- Planar Yeast Estrogen Screen assay pYES (BfG)

Figure 1. Oestrogen monitoring reporting activities 2015-2017.

As a complement to these methods, zebrafish-based *in vivo* reporter gene assays (INERIS) and non-target analysis (Environmental Institute, SK) will be applied for 5 samples.

The 3rd meeting of the project took place at the end of February 2016 at the French National Agency for Water and Aquatic Environments (ONEMA) in Vincennes (France), where first results of wastewater analysis were presented and discussed by around 30 project partners. In addition to the above mentioned activities, a wastewater oestrogenicity assessment group was launched at this 3rd project meeting with the collaboration of pharmaceutical industries.

The final results of the project are expected to be delivered in the first half of 2017.

PRELIMINARY RESULTS

First results for wastewater assessment with ER-CALUX bioassays show that effect-based methods can effectively quantify chemical pressures and mixture risks.

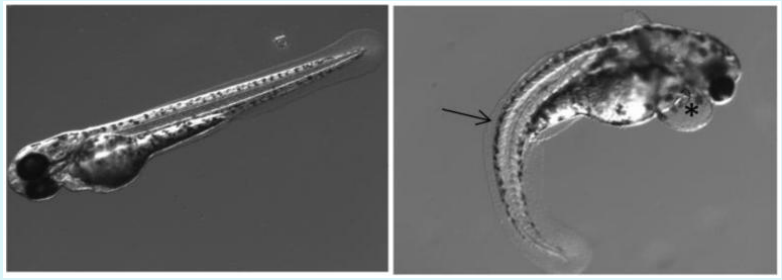
Cumulative risk quotients for chemical measurements of E1, E2 and EE2 were calculated according to the equation in Figure 2 for each wastewater sample.

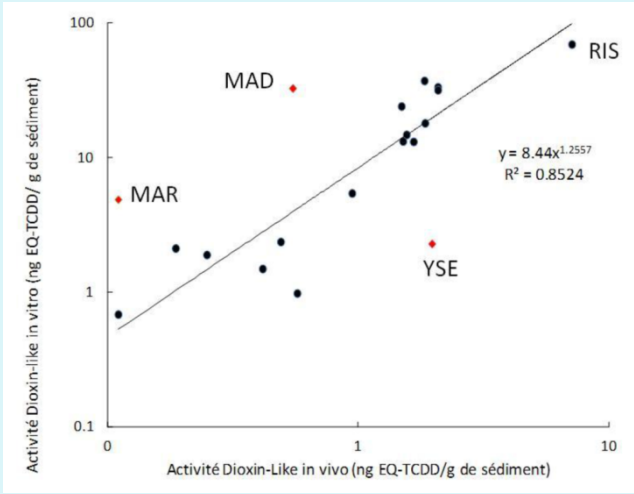
Figure 2. Proposed risk calculation scheme, Applied AA-EQS EE2=35 pg.L-1, AA-EQS E2=400 pg.L-1, AA-EQS E1=3600 pg.L-1

- Science-Policy Interface follow-up activity, endorsed by WG Chemicals
- International project involving more than 20 partners, support and contribution from the NORMAN network
- To provide water managers with valuable tools to monitor EE2, E2 and E1

AQUAREF ON-GOING ACTIVITIES ON BIOASSAYS AND POSSIBLE LINKS WITH NORMAN WG-2

- 2016: Inventory of effect-based tools (*in vitro* and *in vivo* bioassays) for hazard assessment
- 2017: Definition of criteria for appraising the validity/suitability of bioassays for water quality monitoring. **Interactions with Norman WG2 foreseen!**
- 2018: Operational criteria according to final application purpose (water quality, effluent monitoring, etc.)





Source: Aït-Aïssa, Brion *et al.* , 2014. Etude prospective 2012: apport des outils biologiques pour le diagnostic de la contamination des milieux aquatiques / Rapport INERIS

CONCLUSIONS: NORMAN EXPERIENCE IN FRANCE

- NORMAN draws together expertise from across the EU and beyond, and promotes synergies across research teams: this adds significant value to the WFD-CIS process
- NORMAN's strategic focus + data and expertise sharing also stimulate the development of complementary national R&D strategies in support of WFD implementation

Happy Birthday Norman!