



# Combination toxicity: time to act!

*The EU's chemicals strategy for  
sustainability towards  
a toxic-free environment:*

*A Mixture Assessment Factor under REACH*

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↓ **Package Deal** ↑





# 2009 State of the Art Report on Mixture Toxicity

Kortenkamp et al, 2009

*"During the **last ten years**, mixture toxicology has undergone a remarkable and productive development. Whilst earlier experimental studies have focused mainly on combinations of only two chemicals, a significant number of well-designed and decisive studies have been carried out that involve multi-component mixtures.*

*Ecotoxicology has played an important role in advancing mixture toxicology, with human and mammalian toxicology slowly catching up.*

*The planning, conduct and assessment of multi-component mixtures is possible, with clear results.*

[https://ec.europa.eu/environment/chemicals/effects/pdf/report\\_mixture\\_toxicity.pdf](https://ec.europa.eu/environment/chemicals/effects/pdf/report_mixture_toxicity.pdf)







# 2016 Thought starter

The image shows the cover of a report from the National Institute for Public Health and the Environment (RIVM). The cover has an orange background. In the top left corner, there is a dark blue square containing the RIVM logo. To the right of the logo, the text reads: 'National Institute for Public Health and the Environment' and 'Ministry of Health, Welfare and Sport'. In the center, there is a white rectangular box with the title: 'Addressing combined effects of chemicals in environmental safety assessment under REACH - A thought starter'. Below the title, it says 'RIVM Letter report 2016-0162' and 'F.A. van Broekhuizen | L. Posthuma | T.P. Traas'.

- > Proposal to introduce a data-driven Mixture Assessment Factor (MAF) when assessing the environmental risk of a single substance under REACH, given the presence of others
- > Further work needed to identify the chemicals that contribute the most to overall EU-wide combination effects to be able to quantify a MAF

<https://www.rivm.nl/publicaties/addressing-combined-effects-of-chemicals-in-environmental-safety-assessment-under-reach>



2020

# EU Chemicals Strategy for Sustainability

- > Better protect citizens and the environment
- > Boost innovation for safe and sustainable chemicals

#ChemicalsStrategy

#EUGreenDeal



European  
Commission

# 2020 EU-CSS 5 strategic priorities



Vision for a 'toxic-free environment' by 2050

1. Innovating for safe and sustainable EU chemicals
2. Stronger EU legal framework to address pressing environmental and health concerns
  - Endocrine disrupting chemicals and **mixtures**
  - **Protecting people and the environment from the combination effects of chemicals**
  - Towards zero chemical pollution in the environment
3. Simplifying and consolidating the legal framework
4. A comprehensive knowledge base on chemicals
5. Setting the example for a global sound management of chemicals



# 2020 EU-CSS

## Stronger EU legal framework to address pressing environmental and health concerns

- > Protecting people and the environment from the combination effects of chemicals
  - Focus on unintentional mixtures
  - Mixtures needs to be taken into account and integrated more generally into chemical risk assessments
  
- > The Commission will:
  - assess how to best introduce in REACH (a) mixture assessment factor(s) for the chemical safety assessment of substances;
  - introduce or reinforce provisions to take account of the combination effects in other relevant legislation, such as legislation on water, food additives, toys, food contact material, detergents and cosmetics;
  - improve the assessments of the mixtures used in the manufacture of tobacco and related products by using where possible existing EU agencies.





## 2021 RIVM publication in prep

- > Use IPCheM/NORMAN monitoring data for EU surface waters to identify trends in number of chemicals responsible for toxic pressure due to cumulative (environmental) exposures

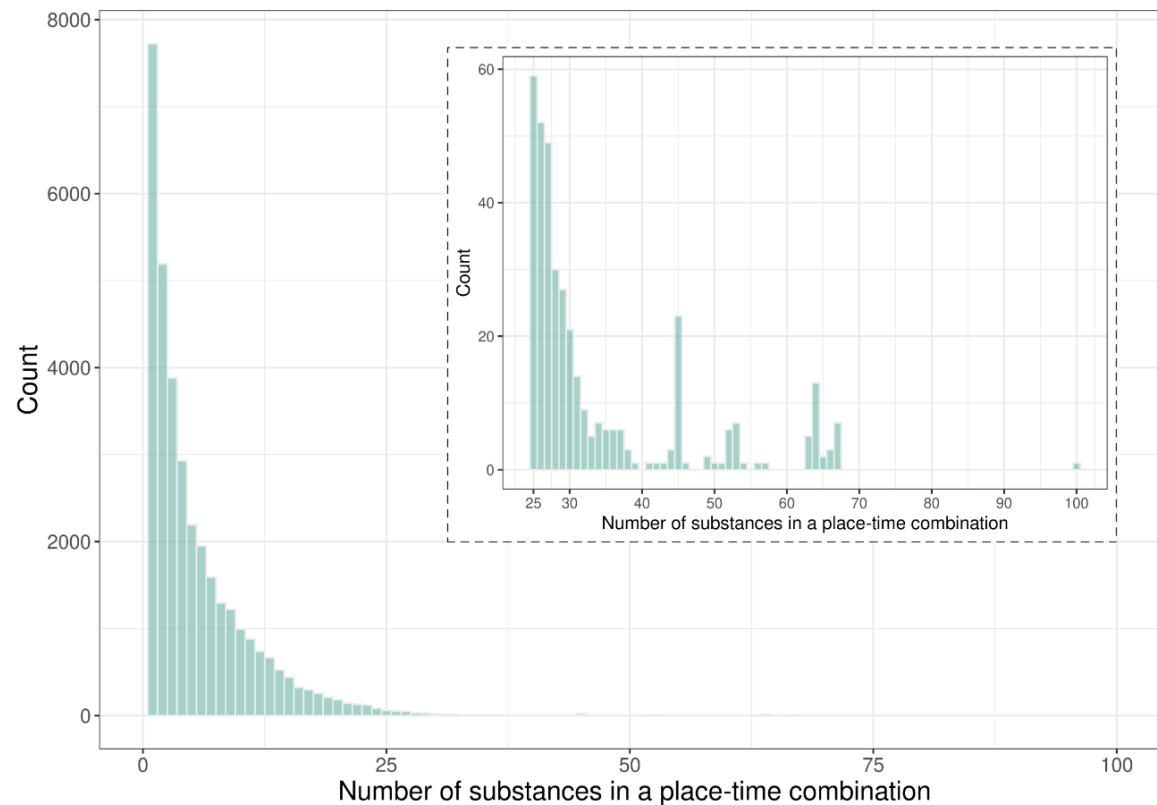
**(not: estimate a generic MAF for European freshwater bodies)**

- Number of 'mixture problem' locations in the EU based on monitoring data
- Relative contribution of individual chemicals to mixture toxic pressure
- Calculation of scenarios (reducing environmental concentrations)
- Uncertainty analyses, evaluating alternative assumptions



# Total number of substances measured in place-time combinations

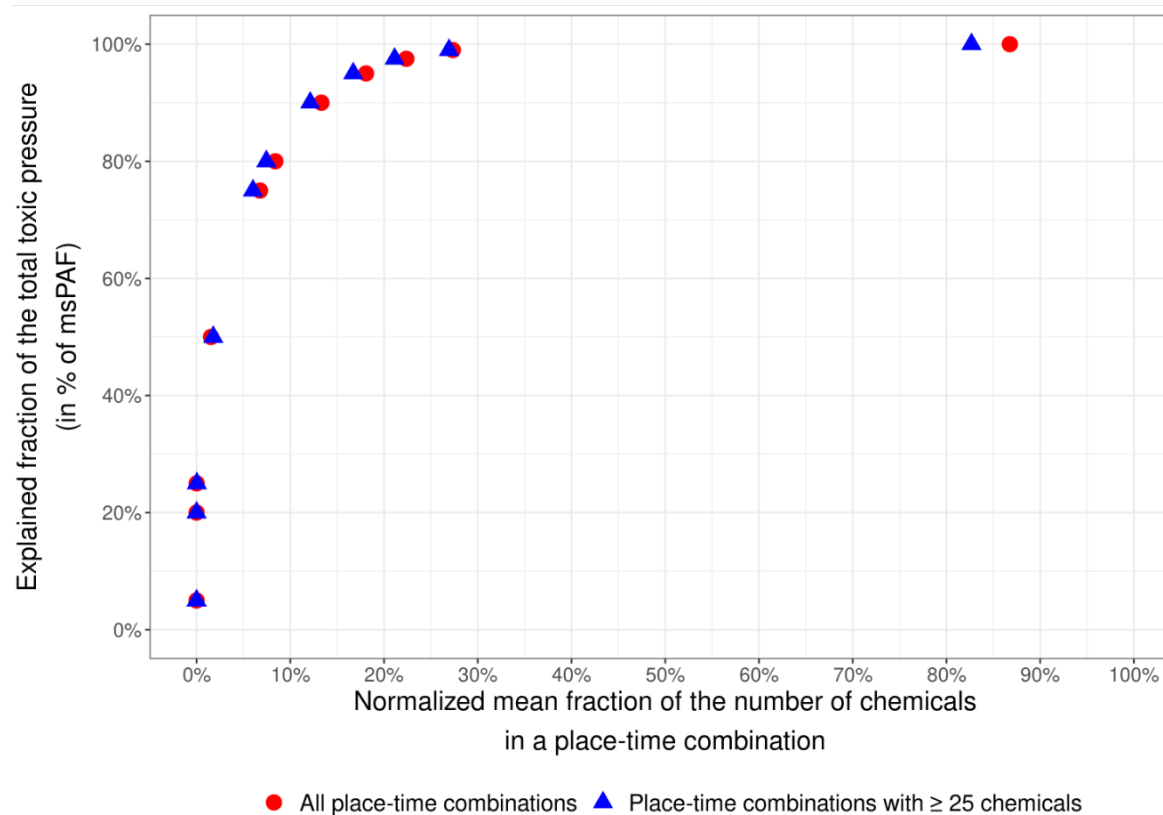
(n = 34,354)



376 place-time combinations with more than 25 substances



# Fraction of total toxic pressure caused by the normalized mean fraction of the number of substances present

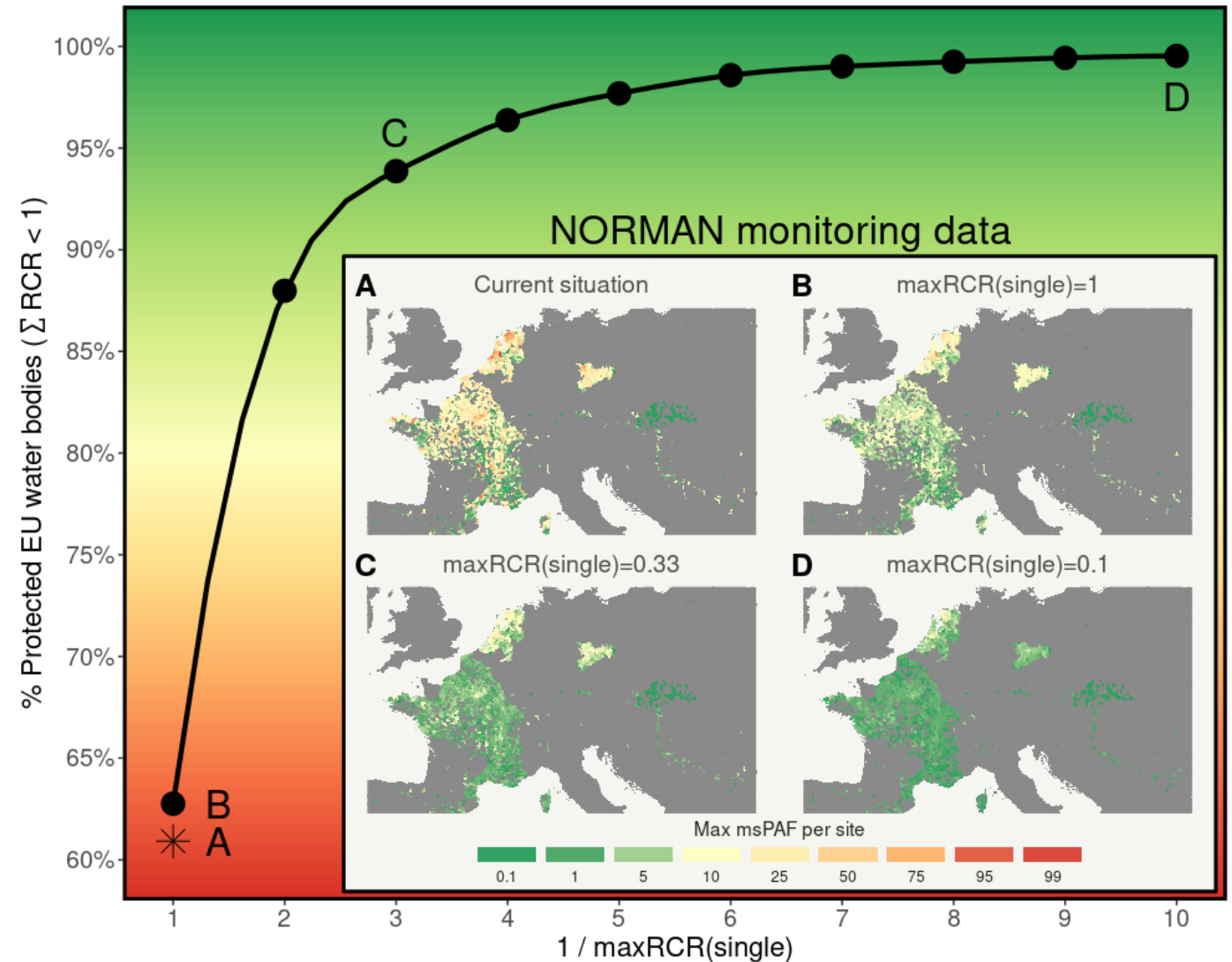




Pattern robust – no change with other assumptions

**X** = now  
**●** = Mixture Factor

Can be understood as:  
Higher Y =  
Higher # water bodies protected



Can be understood as: X = Fractional reduction of freshwater concentrations

# 2021 Project by Wood

## Support for the proposal to introduce a MAF in REACH



### > **Objective:**

#### **Help the Commission:**

- Address unintentional chemical mixtures by integrating one or more MAFs into the main piece of EU chemicals legislation (REACH), and thereby manage risks from chemical mixtures to humans and the environment.
- Understand the impacts of introducing one or more such MAFs into REACH.

### > **Project timeline**

- Project started in June 2021, to be finalised by end of May 2022

### > **The project team will:**

- Propose one or more science-based values for MAFs.
- Suggest ways to incorporate those into REACH.
- Assess how MAFs in REACH would interact with other legislation.
- Propose policy options for introducing MAFs and assess their environmental, economic and social impacts.
- Engage with key stakeholders, in an open public consultation, in targeted consultation as well as at CARACAL.







2022

- > RIVM: Ongoing work on EU-wide modelled data (SOLUTIONS)
  - Much more data (spatially, compounds)
- > Discussions on outcomes 2021 work
  - What effects are expected from a generic MAF
  - What effects are expected from a differentiated MAF
  - Other options?





2025

- > Introduction of a Mixture Assessment factor under REACH?





2050

> Toxic-free environment



Statement:

***Time to act!***

***In order to achieve a toxic-free environment by 2050, we need a MAF under REACH by 2025***

Thank you for your attention!

