



Effectiveness for Drought of Nature-based Flood Measures in Headwater Streams: Evidence-Based Practise in NW-Europe

Angelique Lansu¹, Charlotte Wieles-Rietveld¹, Nico Ruysseveldt¹, Borjana Bogatinoska¹, Jikke van Wijnen¹, Frank van Lamoen², and Jetse Stoorvogel^{1,3}

¹Open University of the Netherlands, Faculty of Science, Environmental Sciences, Heerlen, Netherlands
(angelique.lansu@ou.nl)

²Provincie Noord-Brabant, 's Hertogenbosch, Netherlands (FvLamoen@brabant.nl)

³Wageningen University and Research, Wageningen, Netherlands (jetse.stoorvogel@ou.nl)

Drought is a topical issue, given extreme drought records in NW Europe, the establishment of water coordination bodies and the perceived impact of drought on society. Climate change is driving disruptions in the hydrological cycle. In North-West Europe, in recent years, solutions to counter the effects of floods and flooding have been co-designed in a participatory manner in society. The question in this study is whether these Nature-based Solutions (NbS) to adapt to flooding are also effective to mitigate the effects of drought. We studied this research question based on field expertise from some 40 water professionals involved in the co-creation and implementation of NbS in 8 headwater catchments in NW Europe (southern England, northern France, Flanders, southern Netherlands; project Interreg 2 Seas Co-Adapt (2019-2023).

Based on the concept of evidence-based practice (EBP), we combined the field expertise of these water professionals with scientific knowledge to arrive at best practices. The NbS studied were predefined by process function (geomorphological, hydrological, soil-land). To collect and evaluate the field expertise (practical knowledge), we conducted a Consensus Decision Process. This process consisted of a brainstorming phase (collecting) and a consensus phase (evaluating). This process at two time-intervals was conducted online, in the form of synchronous, online sessions in an online collaboration tool (Mural). The scientific knowledge from a Systematic literature review on NbS as flood measures were compared in the EBP with the collected practical knowledge from the Consensus Decision Process, and evaluated based on the criteria 'effect on drought' and 'synergy/trade-off with NbS'. Obtained results have been tested on outcomes from modelling NbS and drought in catchment Aa/Weerijns (NL; H2020 EIFFEL4Climate; 2021-2024) and expertise of the water professionals of this catchment. The result is that the most effective drought mitigation measures are: storage solutions, slow the flow measures and soil processes. If the underlying steering processes (geomorphology, hydrology, soil-land) are included in the design of flood measures, it is expected that after implementation of NbS in head waters, the water storage capacity will increase and ecological drought will decrease.