

Working Group 2 – Environmental Effectiveness of Woodlands for Water PES

WG2 Leader - Tom Nisbet, FR

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- Working Group comprised ~15 members from 12 countries;
- Four main tasks: Review evidence and generate value ranges for each diffuse pollutant; Populate look-up tables; Evaluate models and mapping tools; Provide training and guidance;
- Focused on three diffuse pollutants: nitrate, phosphate and sediment;
- Assessed source- and pathway-based measures;
- Progress made via a series of workshops, two STSMs and Training School (Portugal, 2018);
- Look-up tables embedded into User Manual.

First STSM: Review by Pérez-Silos (2017) of 61 empirical studies (1973 – 2015)

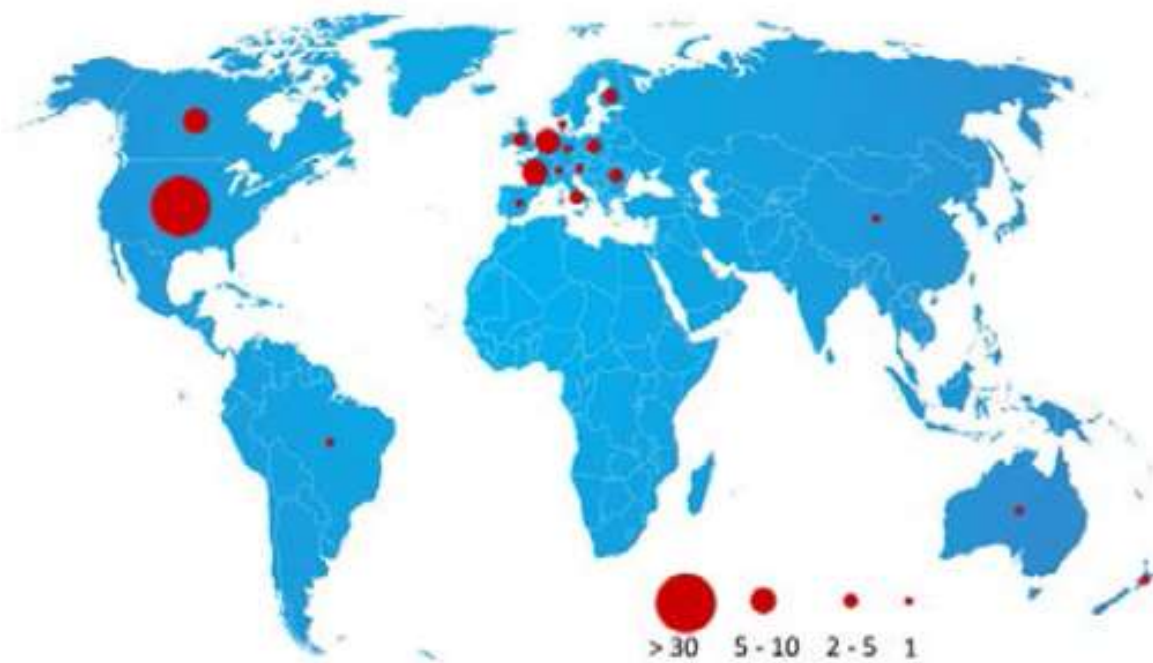



Fig. 1. Map of case studies



**SHORT TERM SCIENTIFIC MISSION (STSM)
SCIENTIFIC REPORT**

This report is submitted for approval by the STSM applicant to the STSM coordinator

Action number: 15206
 STSM title: Assessing the effectiveness of woodland creation for reducing agricultural diffuse pollution – developing value ranges to create look-up tables.
 STSM start and end date: 04/09/2017 to 20/10/2017
 Grantee name: Ignacio Pérez Silos

PURPOSE OF THE STSM

The purpose of this STSM was to summarise current understanding of the effectiveness of woodland creation measures for reducing key diffuse pollutants (sediment, nitrate, phosphate, pesticides and Faecal Indicator Organisms). This was to be achieved through three tasks:


1. Review published literature on the impact of woodland planting on agricultural diffuse pollution, as well as capturing effects on runoff and temperature.
2. Extract numbers from the literature on observed changes to pollutant loads and concentrations resulting from tree planting, as well as record relevant contextual information on woodland measures (e.g. location, design and management of woodland).
3. Use these numbers to tabulate value ranges on the effectiveness of different woodland measures for reducing diffuse pollution in agrarian landscapes. Also record potential effects on water resources.

The provision of value ranges for the selected diffuse pollutants would help underpin the development of look-up tables by COST Action Working Group 2 for use by ecosystem function models (Deliverable 2.1). These tables would also contribute to the activities of Working Group 3 by directly informing the cost-effectiveness of woodland creation measures to improve water quality and provide other benefits (WGS3 primary objective).

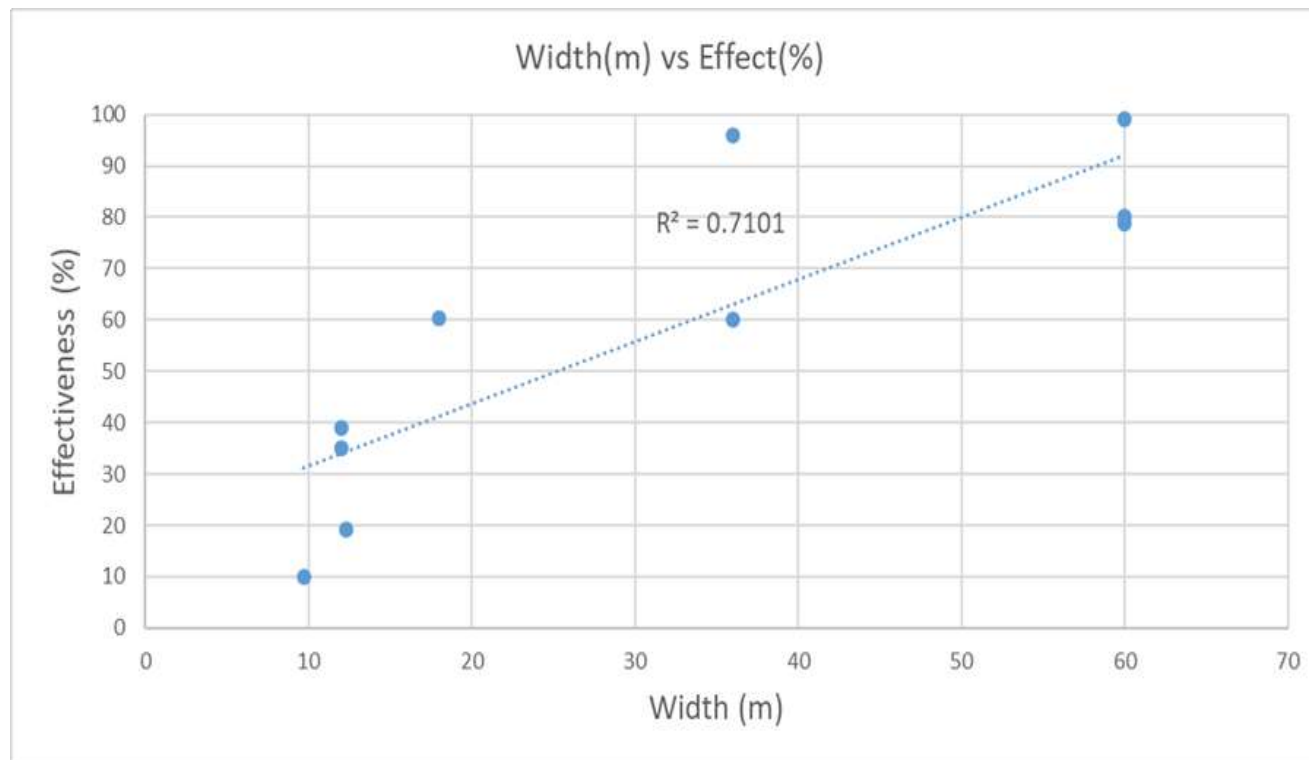
DESCRIPTION OF WORK CARRIED OUT DURING THE STSM

The focus of the STSM was on undertaking a desk-based review of the literature to identify as many case studies as possible on the interactions between woodlands, agricultural diffuse pollution and water quality. In total, 61 published papers (peer reviewed) between the years 1973 to 2017 were reviewed. The majority of the studies took place in North America and Europe (Fig. 1) and primarily generated empirical data from site-based experiments.

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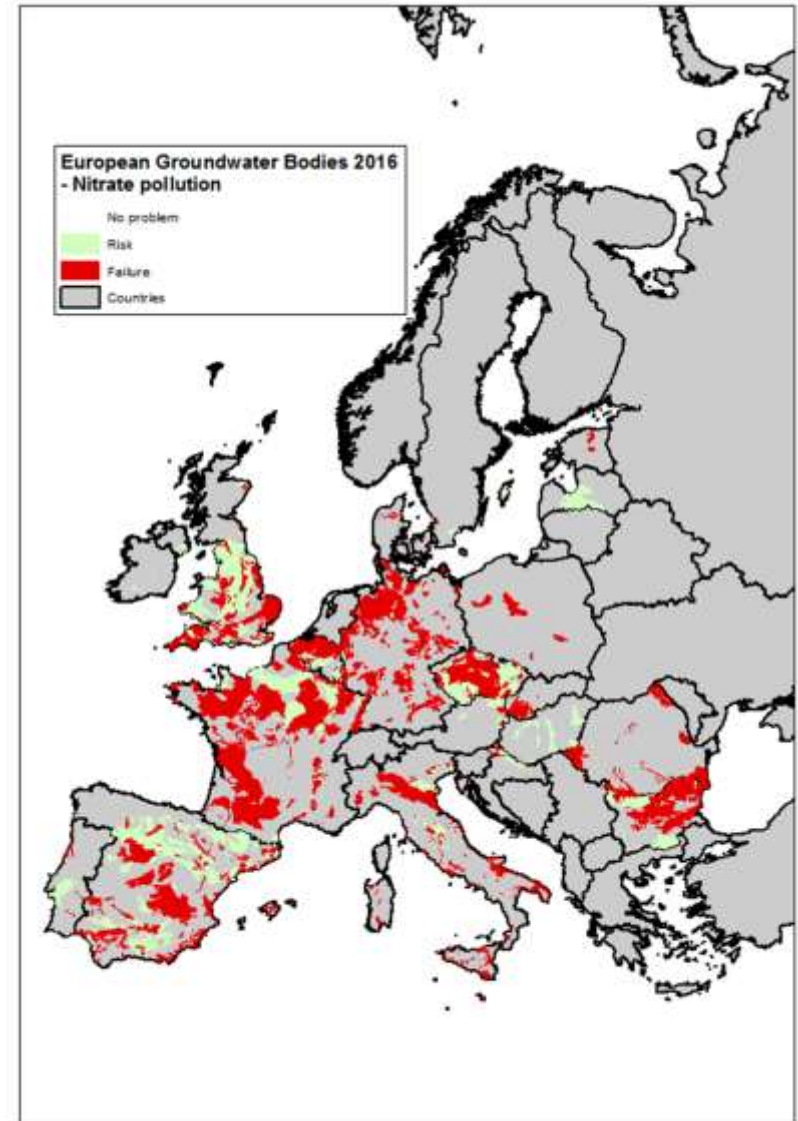
Concentration of NO ₃ -N (mg/l) in surface runoff										
Climate	n	max[Initial]	min[Initial]	Av. Effect.(%)	Q1	Q2	Q3	Type of plantation/forest	n	Av. Effect.(%)
Continental	17	46.8	0.4	84.8 [18.4 - 100.0]	82	98	99	Hillside woodland	6	88.6 [64.0 - 100.0]
								Riparian woodland	9	79.8 [18.4 - 99.9]
								Shrub	2	96.0 [94.0 - 98.0]
Oceanic	8	32.5	0.1	74.2 [32.0 - 98.0]	60	77	95	Riparian woodland	7	73.9 [32.0 - 98.0]
								Shrub	1	76.0
Subtropical humid	13	13.5	1.3	82.5 [35.0 - 99.0]	80	92	96	Riparian woodland	10	89.7 [39.0 - 100.0]
								Shrub	3	58.3 [35.0 - 80.0]



Buffer width	5 m	10 m	20 m	50 m	100 m
Nitrate-N	20%	30%	40%	80%	90+%
Phosphate-P	10%	20%	30%	60%	90+%
Suspended Sediment	80%	90+%	90+%	90+%	90+%



- Developing European target maps for woodland creation to reduce diffuse pollution and thereby the extent of water body failure;
- Based on WFD monitoring and reporting by Member States to EEA.



- Write up review and look-up tables for journal paper;
- Pursue opportunities for new research to quantify the effect of woodland design and management factors across different typologies;
- Model development and testing to increase confidence in model predictions, especially for woodland buffers;
- Explore case for producing separate look-up tables to cover different typologies;
- Develop guidance on how to assess and manage potential negative impacts of forestry on water resources.