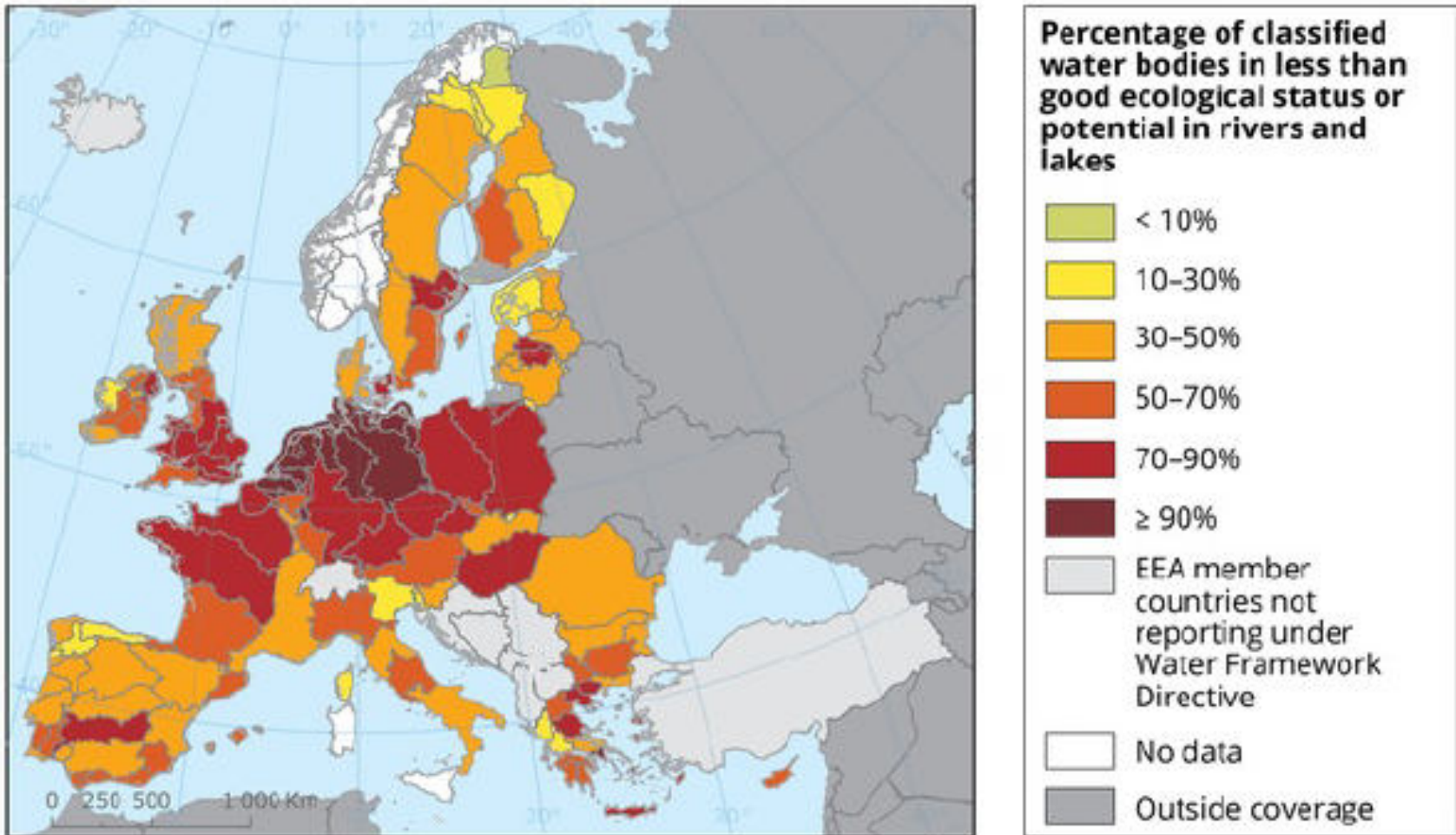


EU COST Action: Woodlands for Water


Tom Nisbet, Forest Research




Around 60% of surface water bodies in Europe are at less than Good Ecological Status




Diffuse pollution is a major problem – 38% of RWBs in EU24 fail due to diffuse pollution; 90% of RBMP's identify agriculture as primary source

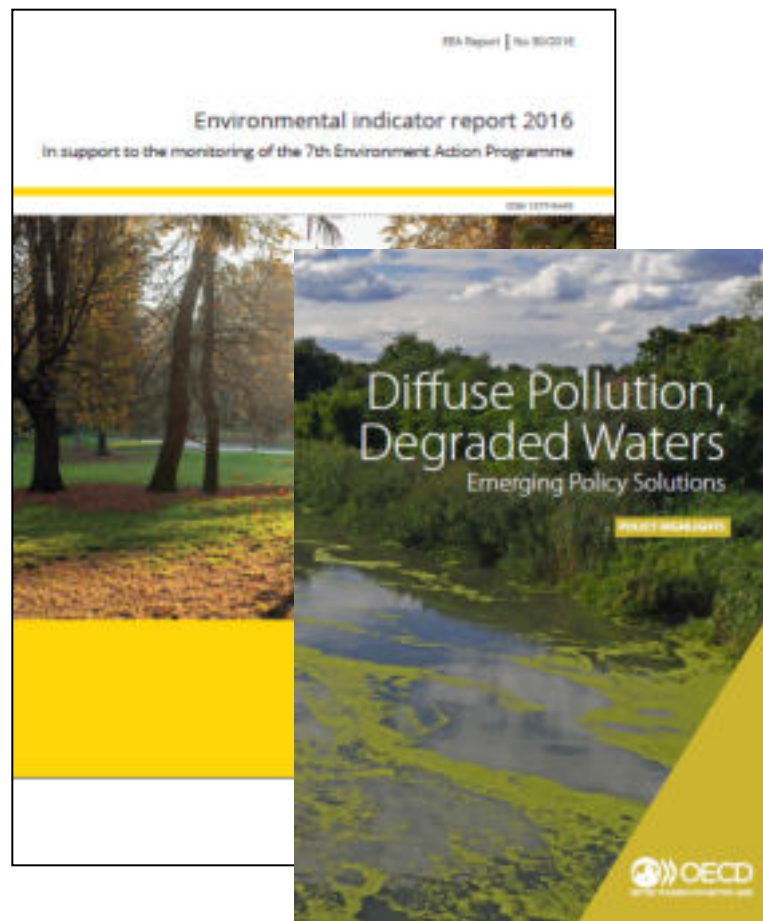
Annual Indicator Report Series (AIRS) European Environment Agency 

Natural capital

Surface waters 

Indicator	EU indicator past trend	Selected objective to be met by 2020	Indicative outlook of the EU meeting the selected objective by 2020
Status in surface waters	NA ⁽¹⁾	Achieve good status of transitional and coastal waters and freshwater — Water Framework Directive	

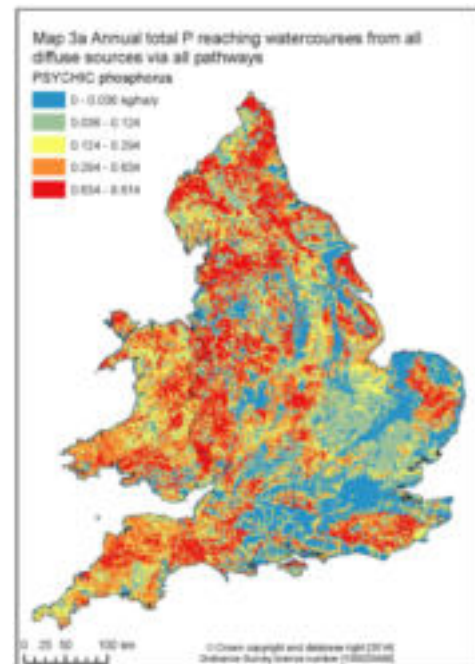
Considering the large proportion of surface waters failing to meet 'good' ecological status, it is unlikely that the objective of achieving good status of waters will be met by 2020



EEA State of Water Assessment Report due June 2018: only 1 to 2% improvement in RWB status

How can tree planting help?

- Increased recognition of need for land use change to meet water quality targets (1.5M ha in England);
- Woodland cover protects the soil, removes/reduces fertiliser and pesticide inputs, intercepts pollutants, protects river banks;
- Woodland creation provides a secure and sustainable measure;
- Careful integration of woodland with farming can reduce land take and increase acceptability;
- Target pollutants sources, pollutant pathways and water receptors.



Payments for Ecosystem Services: Forests for Water

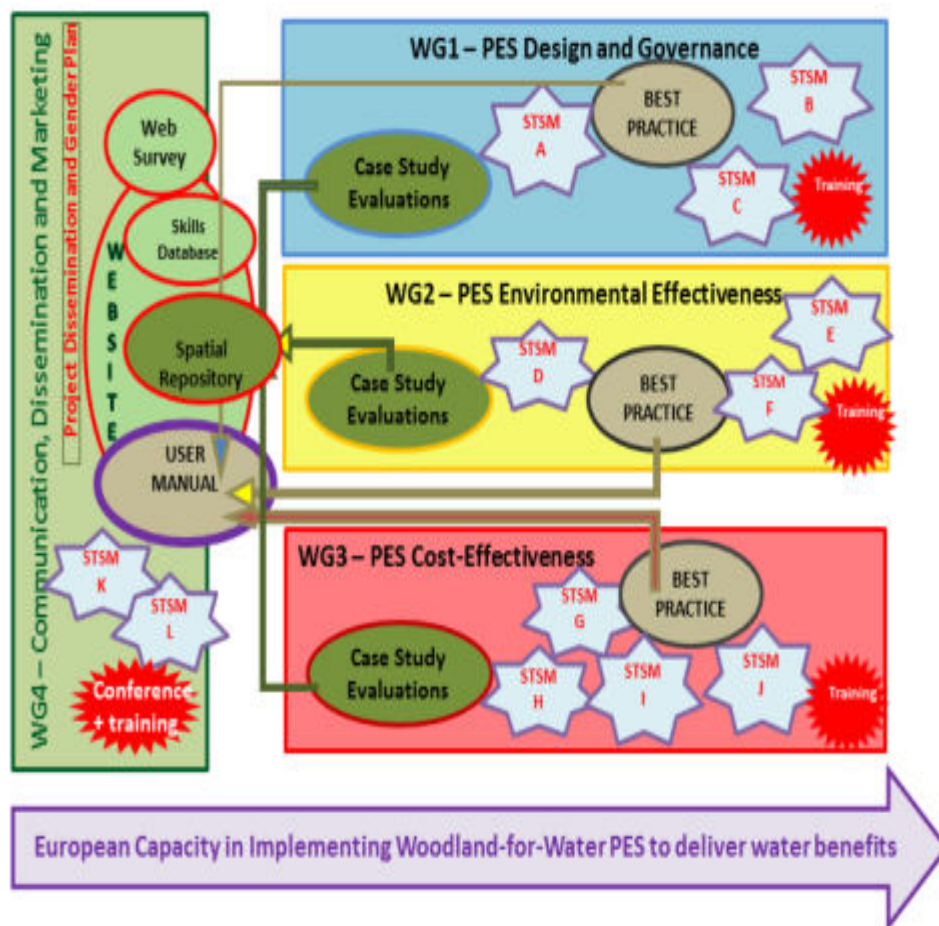
- Four Year Research Network (October 2016-2020);
- Aim to improve Europe's capacity to use Payments for Ecosystem Services (PES) to achieve WFD targets and other policy objectives through incentives for planting woodland to reduce agricultural diffuse pollution (sediment, nitrate, phosphate, pesticides, FIOs);
- 37 countries involved



Country	Name of scheme	Aim/ Description
Denmark	Aalborg	City council converted 450 ha of farmland to forest or permanent grass to improve groundwater quality.
	Vigersted	Copenhagen Energy purchased farmland & paid the municipality to plant woodland to protect groundwater.
	Water Supply Act Reforestation Levy	Consumers pay a levy on their water bills which funds land purchase and afforestation (as well as forest management of public land).
France	Massif de la Nerthe	In partnership with the local municipality, Coca-Cola financed reforestation during 2010-2013 to reduce sediment-laden runoff in local public forests damaged by wildfires and protect mineral water supplies for bottling.
	Rennes	City council financed creation of 70 ha of woodland in a local catchment, successfully lowering nitrate concentrations by 20%.
	Vittel	Vittel paying farmers for groundwater quality protection measures including woodland planting (additional land provided in return).
Germany	Lower Saxony	Oldenburg and East-Frisia Water Association purchased land for afforestation to reduce agricultural nitrate pollution in groundwater (also payments for replacing conifers with broadleaves -mainly planting beech).
	Mangfall Valley (Munich)	Woodland creation historically by Stadtwerke München (and replacement of conifers with broadleaves) to improve public water supply).
Switzerland	Henniz SA	Henniez SA bought 200 hectares of farmland and planted forest to limit nitrate & other pollutants affecting a spring used for mineral water.
	Müsern auf der Baldegg	Müller AG (a local brewery which owns water extraction rights for a spring) provided funds in 1999 for the municipality / Baden water utility to restore nearby forests in the aftermath of hurricane Lothar.

- Characterize & evaluate **governance models & design structures** of W4W PES schemes
- Evaluate **environmental effectiveness** of targeted woodland planting
- Develop **User Guidance** on quantifying the effectiveness of tree planting to reduce diffuse pollution
- Develop a **European PES spatial repository** of Case Studies
- **Build capacity** by facilitating interaction between multidisciplinary specialists, increasing stakeholder understanding and training in technical and economic skills – new ‘PES engineers’

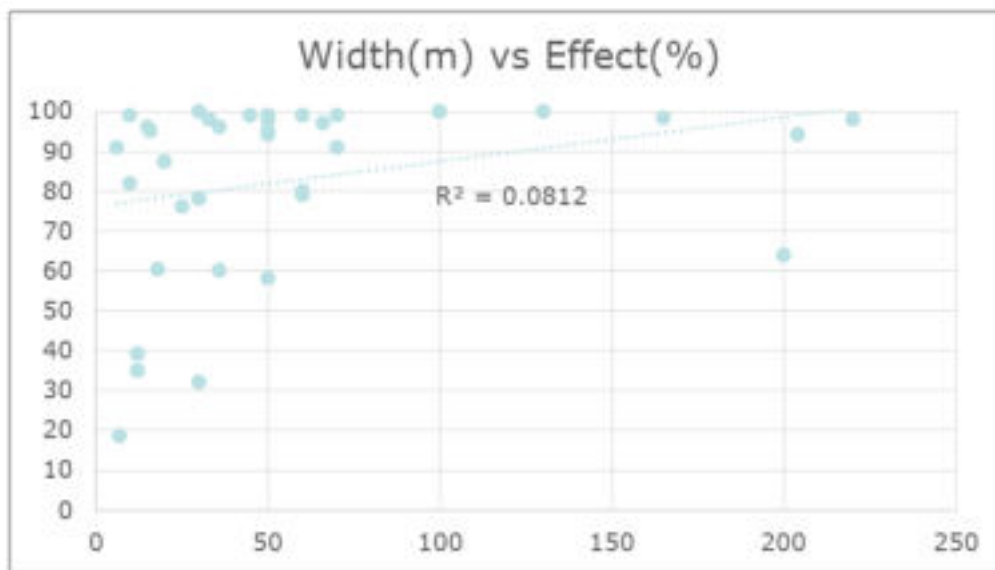
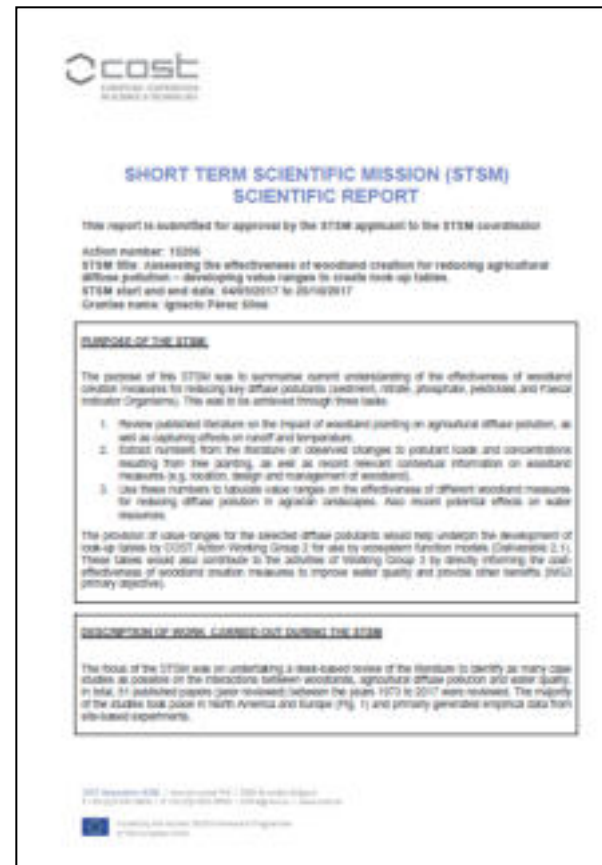
Management Committee and Four Working Groups (WG)



- Meetings, workshops and case study visits;
- Short-term scientific missions;
- Training schools;
- Research network, conferences and publications.

Development of look-up Tables: NO₃-N

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 [94.0 - 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 [12.0 - 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]

cost
COUNCIL FOR SCIENTIFIC AND TECHNICAL RESEARCH

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

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

Action number: 10206
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 26/02/2017
Grantee name: Ignacio Perez Siles

PURPOSE OF THE STSM

The purpose of this STSM was to increase current understanding of the effectiveness of woodland creation measures for reducing key diffuse pollutants (sediment, nitrate, phosphate, pesticides and trace invertebrate organisms). This will be achieved through three tasks:

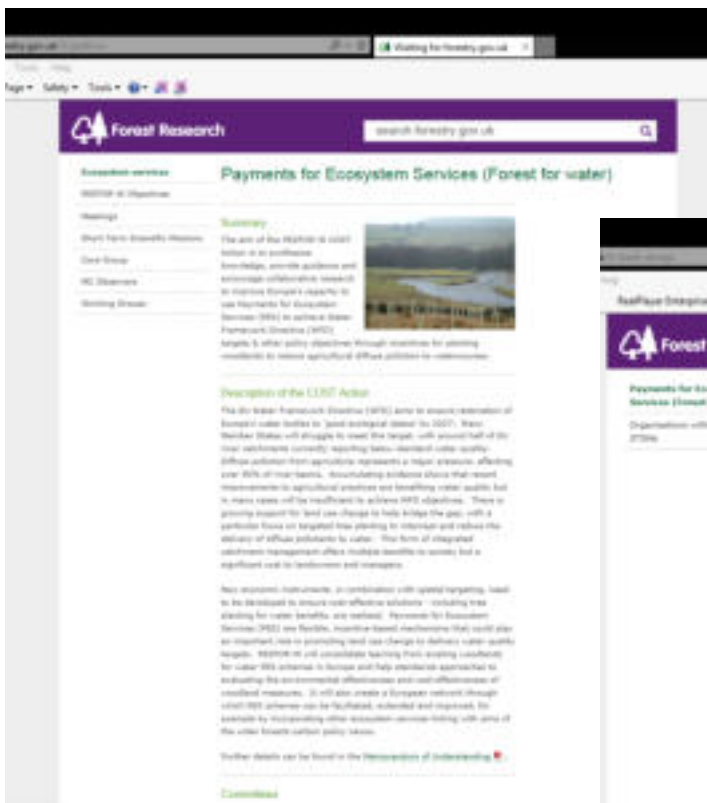
1. Review published literature on the impact of woodland planting on agricultural diffuse pollution, as well as capturing effects on runoff and temperature.
2. Extract numbers from the literature on observed changes to pollutant loads and concentrations resulting from the planting, as well as recent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

The production 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 non-expert farmer groups (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 (SILV primary objective).

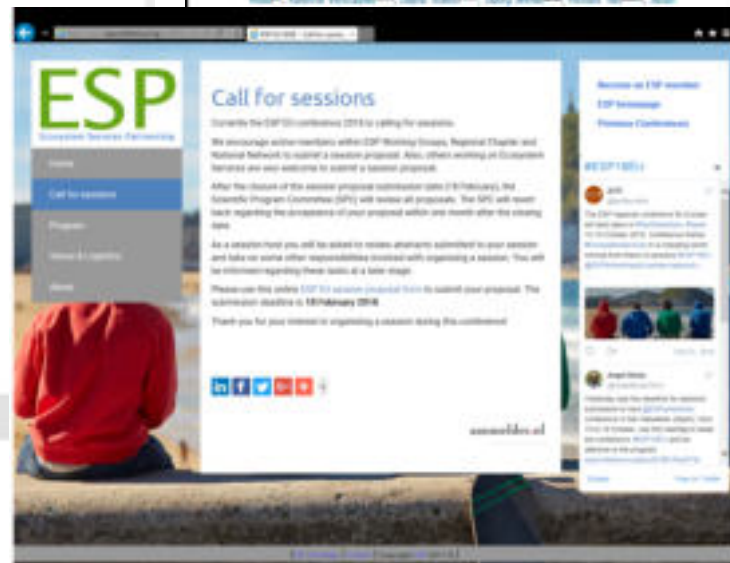
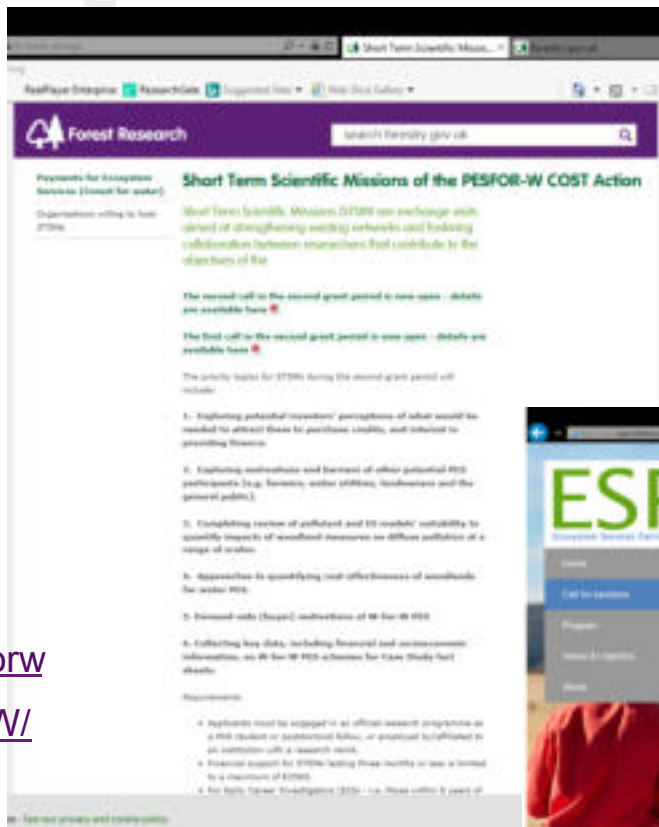
BACKGROUND OF WORK: CURRENT OUT-DATES FOR STSM

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, agriculture diffuse pollution and water quality in total 21 published papers (peer-reviewed) between the years 1970 to 2017 were reviewed. The majority of the STSM task pool in North America and Europe (76%) and primary generated empirical data from site-based experiments.

STSM Reference #10206 | STSM Coordinator: Prof. J. D. W. Jones | STSM Applicant: Ignacio Perez Siles
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