Diffuse phosphorus input to surface waters
- new concepts in removal, recycling and management -

D6.1 – Public engagement strategy

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1. Executive Summary

An important goal of P-TRAP is to ensure far-reaching communication, dissemination and exploitation of the project's scientific results and outcomes, and by this increase the long-term impact of the project. The activities include public engagement, and P-TRAP will follow the definition of the National Co-ordinating Centre for Public Engagement (http://www.publicengagement.ac.uk):

> *"Public engagement describes the myriad of ways in which the activity and benefits of higher education and research can be shared with the public. Engagement is by definition a two-way process, involving interaction and listening, with the goal of generating mutual benefit."*

The public engagement strategy describes, which stakeholders have been identified, and how the P-TRAP consortium will organise the engagement with them, including a detailed communication, dissemination and exploitation management strategy. This deliverable is a living document, and information and results will be evaluated and - if necessary - updated on a yearly basis.

2. Introduction

2.1 Background

Public engagement is an indispensable tool for projects aiming on long-term impact beyond the project lifetime, which includes the visibility of the project and the use of its outcomes. Public engagement involves interaction and participation of the broader public with science, and is offering insights and knowledge for both, researchers and non-academics. Benefits for the public are an increased understanding and the chance of participating in science; the researchers can develop new ideas and challenges tailored to society.

P-TRAP is of high societal impact for several reasons: The data and methods gathered and developed within P-TRAP will provide important information on a more sustainable phosphorus (P) cycle, e.g. avoiding wasting phosphorus as a resource from agricultural areas to surface waters or to revoke it from them to reduce eutrophication and by this meet the objectives of the EU Water Framework Directive (http://ec.europa.eu/environment/water/water-framework/index_en.html).

P-TRAP will develop new methods and approaches to trap P in drained agricultural areas and in the sediments of eutrophic lakes, and establish a framework of 16 international collaborating partners from multiple science and engineering disciplines. By close integration of various stakeholders P-TRAP aims on direct implementation of the acquired knowledge.

Developing a project-tailored public engagement strategy requires several questions to be answered, e.g.

- Why does the project want to engage the public?
- Who are the interested stakeholders, why are they interested, and what expectations and perceptions do they have?
- Which information can the project deliver?
- How to distribute information with respect to language, information density, or used channels to ensure reaching the identified stakeholders?
- How to communicate with the stakeholders and involve them in an appropriate way?
- What does the project expect from the stakeholders?

2.2 General dissemination and exploitation management

The Regulation (EU) No 1290/2013 of the European Parliament and the Grant Agreement (Article 29) as the binding contractual basis of EU-funded projects state, that projects have the obligation to disseminate and exploit their knowledge and results.

"The EU funding programmes support research and development activities resulting in new knowledge, new products and services, and also in non-technological and social innovation. EU projects are aiming on innovation and increasing benefits to the EU economy and citizens by converting the public investment. Participants are obliged to exploit and disseminate the outcome of their projects, which means to use and communicate results and multiply the benefit of investments."

REGULATION (EU) No 1290/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

Beside others P-TRAP aims on valorisation, i.e. to maximise not only the visibility but also the impact of the project by adequate communication, dissemination and exploitation. Based on the reference terms of the EC Research & Innovation is

- **Communication** a strategically planned process that starts at the outset of the action and continues throughout its entire lifetime, aimed at promoting the action and its results. It requires strategic and targeted measures for communicating about (I) the action and (II) its results to a multitude of audiences, including the media and the public and possibly engaging in a two-way exchange.
- **Dissemination** the public disclosure of the results by any appropriate means (other than resulting from protecting or exploiting the results), including by scientific publications in any medium.
- **Exploitation** the use of results in further research activities other than those covered by the action concerned, or in developing, creating and marketing a product or process, or in creating and providing a service, or in standardisation activities.

The obligations of the consortium regarding dissemination and exploitation is part of the GA, Section 3. The consortium has not only the obligation to disclose and use the results, but also the responsibility to ensure visibility of EU funding for the project. Thus, any dissemination of results, including electronic dissemination must display the EU emblem and the following text:

"This project has received funding from the European Union´s Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 813438."

The P-TRAP Public Engagement Strategy comprise the necessary and likely key points in the communication, dissemination and exploitation of the project to ensure that institutions, companies, authorities and people with potential interest in the project are continuously informed about P-TRAP, its content, goals and consortium partners. P-TRAP aims to extend its data dissemination and exploitation beyond the project-funding period, i.e. the project's results and products are further used and marketed, the Public Engagement Strategy will be conforming the Data Management Strategy (submitted as deliverable D5.5), providing the frame conditions, and adjusted and updated over the lifetime of the project.

The dissemination and exploitation management is imbedded in the project management in Work Package (WP) 5. WP5 is led by the Project Coordinator, compulsory supported by input from all beneficiaries and non-academic partners. The dissemination and exploitation activities of all project participants will be monitored on a regular basis, and will be reported within in the consortium and towards the EU. The general rights and obligations of the consortium related to background and results are described and agreed on in the Terms and Conditions, Section 3 of the Grant Agreement as well as in Section 9 / Attachment 1 of the Consortium Agreement.

Beside a close collaboration between the beneficiaries, partner organisations and the project management, each project participant is responsible for individual dissemination and exploitation activities coordinated by their own public relation offices and to inform the coordinator about those activities.

Table 1: Contact information for public relations

Participant	Press office contact
UU	Press officers GeoSciences: T.deKievith@uu.nl, S.H.J.vanMeulebrouck@uu.nl, A.C.vandeVijsel@uu.nl, Press office secretary: +31 30 253 9300, news@uu.nl
UNIVIE	Mag. Cornelia Blum, cornelia.blum@univie.ac.at +43-1-4277-10012
UBT	Press & PR Manager: anja.meister@uni-bayreuth.de, +49 (0)921 / 55-5300
EAWAG	Andri Bryner, andri.bryner@eawag.ch, +41 58 765 5104
UNIMAN	Jordan Kenny (News and Media Relations Manager), +44 (0)161 275 8257, jordan.kenny@manchester.ac.uk
US	Scientific dissemination office
KULEUVEN	The Newsroom: +32 16 32 40 08, news@kuleuven.be
GEOS	+49 3731 369 281
DELTARES	Astrid van Bragt, Communication dept. afdeling-com@deltares.nl
FERTIBERIA	
AQUAMINERALS	Press office secretary, +31 6 11 603 754
WATERNET	
GEOTEAM	
ARCADIS	
BAYFOR	
ETH ZÜRICH	

Regarding the communication to stakeholders and local governments, a Strategic Advisory Board (SAB) will be convened during the 1st Annual Meeting, consisting of key stakeholders and project partners to facilitate knowledge exchange with the non-academic sector beyond the consortium partners, and with local governments. The SAB will identify the most suitable communication channels to interact with such stakeholders. The culmination of this activity will be the production of a policy brief at the end of the project, facilitated by partner organizations.

2.3 Scope of the deliverable

As mentioned, P-TRAP aims on high visibility, use of the outcomes and by this a long-term impact of the project. Deliverable D6.1 describes the public engagement strategy of the consortium including a dedicated dissemination and exploitation strategy to ensure reaching this goal. D6.1 is a living document, and information and results will be evaluated and - if necessary - updated on a yearly basis.

3. Content

The main focus of this document is the implementation of the P-TRAP public engagement and dissemination & exploitation strategy. This includes a wide range of activities to reach a broad audience. Several activities already started before the project was officially launched or shortly afterwards, e.g. the setup of the website and its maintenance, presentation of the project at conferences and trade shows, and introducing the P-TRAP project via social media.

Exploitation activities include the re-use of data as well as of methodologies and methods. As P-TRAP aims to develop and implement strategies dealing with the reduction of P pollution and P recycling, the project has also a high commercial potential which impacts intellectual property rights (IPRs). This needs to be considered when planning and implementing not only data management strategies but also a public engagement strategy. IPRs have impact on ownerships of scientific data to be published in scientific journals and/or potentially patentable results. As the different participants have different scopes within the project, the public engagement strategy needs to be tailored not only to P-TRAP as a whole but also to the individual participants. The legal framework for the data management is given in the Grant Agreement and the Consortium Agreement.

Several partners within the consortium already have collaborated in other projects, so P-TRAP is imbedded in an established network of academic and non-academic partners, which is advantageous for dissemination and exploitation activities.

3.1 Engagement

Flux of P from agricultural areas to surface waters is wasting a resource which is becoming scarce and is in conflict with the principles of a circular economy. Enhanced loading of surface water with P is the main cause for the eutrophication of lakes and presents a key challenge in meeting the objectives of the EU Water Framework Directive. P-TRAP can help recover high volume waste products as new materials, transformed by low cost biotechnological approaches, that have a new market value.

So, by targeting these environmental problems P-TRAP has a high societal relevance on several levels such as e.g. lake restoration, improve drinking water treatment or developing new fertilizers for the agricultural sector. Those problem-solving approaches should be visible to the broader public as P-TRAP is financed by public funding. By disseminating the results, the consortium will create an awareness for the general issues of fertilisation and water and waste management, aiming on a better understanding of problems and implementation of possible solutions.

3.2 Target groups

As P-TRAP aims to develop and implement strategies dealing with the reduction of P pollution and P recycling, and also have a high commercial potential for the development of e.g. new fertilizers, the spectrum of potential stakeholders is broad.

The main target group are scientific communities of related disciplines, but P-TRAP also aims on different stakeholder groups for communication and public engagement such as regional and national authorities and policy makers, EU authorities, and the general public including media, schools, businesses and local governments. Table 2 gives an overview of them, including a brief profile and possible perceptions, benefits and contact platforms.

Various activities and channels (see also Chapter 3.3, 3.4) target different user groups with different benefits. Dissemination during project meetings, data repositories or network schools will e.g. target project partners, stakeholders and the EU, as well as international collaborators of the project and representatives of other networks. These activities will provide the most direct and detailed access to the project results for users with immediate interest. Dissemination during national and international conferences will target scientific communities related to the objectives of the project, but also stakeholders. Together with dissemination by peer-reviewed publications and reports to the EU, this is the traditional pathway providing the most rigorous dissemination. Dissemination via the media will reach regional, national and international stakeholders and EU authorities, as well as the general public. All avenues of social, news and science media, popular science press, and peer-reviewed publications will be used to disseminate the project results to a wider audience and provide the major highlights of the project results. The project website will play a central role for wide dissemination of all the activities and to reach all target groups. Measurement data generated by P-TRAP will be archived e.g. in the BAYCEER IT data repository to reach users, following the data management plan (submitted as deliverable D5.5).

Table 2: overview of potential stakeholders, their profile and possible perceptions

Stakeholder	Profile	Perceptions	Benefits	Contact platforms
Scientists inside the consortium	Scientific audience, interested in scientific outcome of the project	Scientific results to use	Knowledge transfer, collaborations, new projects with national and international partners	Project events, scientific events such as conference / workshops, website, social and press media, personal contact
Scientists outside the consortium	Scientific audience, interested in scientific outcome of the project	Scientific results to use	Knowledge transfer, collaborations, new projects with national and international partners	Scientific events such as conferences / workshops, website, social and press media, personal contact
Management of stakeholders inside and outside the consortium	Non-scientific audience	General results and overviews, usable for decision making processes	Being updated about the project in general, can use information for implementation strategies and building up collaborations	Newsletters, website, social and press media, personal contact

Ministries, State Authorities	Non-scientific and scientific audience	General information about the project and its results, usable for applied aspects	Being updated about the project in general, can use information for recommendations, for guidelines future monitoring and remediation programmes	Newsletter, website, press media, stakeholder workshops, personal contact,
Policy makers and lobbyists (local, national, international)	Non-scientific audience	General results and overviews, usable for decision making processes	Knowledge of (possible new) material processing, material routes and applications. Be informed to determine if policy/legislation is up-to-date and fit and, if not, what should be changed and how.	Newsletters, website, social and press media, personal contact
Broader public	Non-scientific audience	general information about the project and its results with direct impact on them and their environment	Understanding of the (future) availability of resources (quality/quantity) and the (possible) demand for the processing of these materials	Newsletters, website, social and press media, personal contact
Pupils and higher education	Non-scientific audience	General information about the project and its results, usable for educational aspects	Understanding of the (future) availability of resources (quality/quantity) and the (possible) demand for the processing of these materials	Newsletters, website, social and press media, personal contact
Industry	Non-scientific and scientific audience	General information about the project and its results, usable for applied aspects	New collaborations and development of new business fields	Newsletters, website, social and press media, personal contact
Funding bodies	Non-scientific and scientific audience	General information about the project and its results, usable for applied aspects	Use information to prepare future funding programmes	Newsletters, website, social and press media, personal contact, deliverables
Environmental / Agricultural Sector	Non-scientific and scientific audience	General information about the project and its results, usable for applied aspects	Availability of new products, possibility to engage in sustainable agricultural Understanding of chemical-biological interaction and the use in agriculture.	Newsletters, website, social and press media, personal contact
Drinking water companies and water authorities	Non-scientific and scientific audience	General information about the project and its results, usable for applied aspects	Knowledge transfer on chemical-biological behaviour of P and Fe in water and soil. Application for water-treatment processes.	Personal contacts and cooperation during the project, newsletters, website, social and press media, deliverables
Water managers	Non-scientific and scientific audience	Technical application of scientific results	demonstrations sites/projects to show methods that can reduce P-concentrations in surface waters	Personal contacts and cooperation during the project, newsletters, website, social and press media, deliverables
Bioeconomy clusters	Association of industry-stakeholders-researchers	General information about the project and its results, usable for applied aspects	Availability of new products, possibility to engage in sustainable agricultural knowledge transfer	Personal contacts and cooperation during the project, newsletters, website, social and press media, deliverables
Industrial biotechnology and waste management sectors	Non-scientific and scientific audience	High value products especially from wastes	Availability of new products, possibility to engage in sustainable knowledge transfer	Personal contacts and cooperation during the project, newsletters, website, social and press media, deliverables

3.3 Project information

P-TRAP aims to deliver information about the project tailored to the needs and interests of the identified stakeholders. Several are defined in the Grant Agreement and Table 3 gives an overview of the type of information delivered to different stakeholders, the frequency, and the respective lead authors.

Given information has to tailor the volume, frequency and the content to the needs and expectations of the envisaged audience to avoid an information overflow as this could jeopardize the intention of dissemination activities.

Table 3: overview of the type of information, the frequency and the respective lead authors

Type of information	Level of information	Lead author	Main addressed audience	Frequency of publication	Distribution channel (see also chapter 3.4)
Summaries of the project, the highlights and major findings	General overviews	All	interested public and media	quarterly	Newsletter, mail, P-TRAP website, FIMIN network, SCOPE newsletter (European Sustainable Phosphorus platform), Expertanswer, Informationsdienst Wissenschaft, press releases
Scientific summaries, proceedings	Scientific overviews	All	Scientific networks, industrial stakeholders	Irregular during the project	Journals of scientific organizations, e.g. ELEMENTS, international Journal of Innovation
Scientific guidelines, procedures, and models	Scientific documents and software, e.g. D1.2 (GEOS), D1.3 (DELTARES), D1.4 (UNIMAN), D1.5 (US), D2.4 (UU), D2.5 (UBT), D3.1 (EAWAG), D3.2 (UNIVIE), D6.6 (UBT), D6.7 (UU),	Lead authors of respective deliverables	Scientific networks, industrial stakeholders	After submission to and approval by the EC	P-TRAP website
E-learning module	General educational level	UU, all ESRs	Schools and higher education	End of project	Dedicated platform for the module, advertisement trough general channels
Conference contributions	Scientific level	All	Scientific networks, industrial / agricultural / water-company stakeholders	Irregular during the project	Poster, oral presentations, organised sessions at project relevant conferences
Public open days	General information	All	interested public and media	Irregular during the project	Poster, presentations, demonstrations
Policy feedback	General summaries and overview		Policy stakeholders	End of project	Policy letter
Peer-reviewed publications	Scientific results	All	Scientific networks	Irregular during the project, mainly at the end	Scientific journals
Project related workshops	Scientific level	all	Scientific networks, industrial stakeholders	Irregular during the project	Workshops (e.g. Stakeholder workshop associated to TSTC3)
Public parts of project meeting	General information	All	Public and other interested stakeholders	Irregular during the meeting	Poster, presentations, demonstrations
Press release	Public	All	Interested local population and media	Irregular during the project and individual by partners	Local Press

3.4 Distribution channels

P-TRAP actively utilizes different channels to communicate the project and it results to the public, addressing different audiences. This will be further developed in the run of the project and together with the ESRs. ESRs will be specifically encouraged to disseminate their individual projects and results, in collaboration with the project management.

3.4.1 Website

The development of the project website (https://h2020-p-trap.eu) started in November 2018 and was launched beginning of February 2019, approximately one month before the project officially started. It represents the main interface for the dissemination of P-TRAP objectives, progress and results. The website will provide access for the wider public and experts in the field, key information on the project aims, including project summary, project components, and a detailed description of every work package. Several of the P-TRAP school lectures will be recorded and made available via the website. The website will thus provide the most comprehensive access to the project results and to all other dissemination activities of the project. The website is mostly public available, but few password-protected parts of the website will be used to facilitate internal communication among the consortium partners. It will provide a platform for internal exchange of information, documents and data files and for documentation of the P-TRAP meeting and project progress. The management of the P-TRAP website is provided by the University of Utrecht.

3.4.2 Social media

Twitter, Facebook, ReseachGate and LinkedIn accounts will be used for dissemination purposes and external communication.

The Twitter account was set up at the beginning of the project (@h2020_PTRAP), and together with LinkedIn and ResearchGate used to promote the open positions within the project and support the recruitment for P-TRAP.

A more dedicated and result-orientated set-up will be implemented in the second half of the first year when the ESRs have been appointed. Social media are an excellent platform to spread information and visual documentation of scientific work performed during measurement campaigns. Depending on the content, different audiences will be addressed by using specific references and hashtags (Table 4, 5).

Blogs will be maintained by the ESRs, e.g. about their secondments, used methodologies, or daily work. The blogs will be published on the website. To reach a wider audience articles to other blog networks and websites will be provided as soon as first results have been achieved (Table 6).

Table 4: Social media accounts of P-TRAP participants

Participant	Social media accounts
P-TRAP general	Twitter: @h2020_PTRAP, ResearchGate: https://www.researchgate.net/project/P-TRAP, LinkedIn: #h2020_PTRAP
UU	Facebook: @UtrechtUniversity, Twitter: @UniUtrecht, YouTube: Utrecht University, LinkedIn: Utrecht University, Instagram: #utrechtuniversity, Vlogs: bit.ly/UU-vlogs
UNIVIE	@UniVienna, https://www.facebook.com/univienna, https://twitter.com/univienna, https://blog.univie.ac.at/, https://www.youtube.com/user/univienna, https://www.instagram.com/univienna/?hl=de, https://socialmedia.univie.ac.at/
UBT	https://www.facebook.com/UniBayreuth, https://twitter.com/unibt, @unibt, https://www.youtube.com/user/unibayreuth, https://www.instagram.com/uni.bayreuth/, https://unibloggt.hypotheses.org/
EAWAG	@EawagResearch
UNIMAN	@OfficialUoM, https://twitter.com/GeoMicroMan, https://twitter.com/MESWRC
US	Facebook: @UniversidaddeSevillaoficial, Twitter: @UniSevilla, Youtube: UniversidaddeSevilla
KULEUVEN	Facebook: @KULeuven, Twitter: @LeuvenU, Instagram: @kuleuven, #kuleuven, Blog: kuleuvenblogt.be, Youtube: KU Leuven, LinkedIn: KU Leuven
GEOS	none
DELTARES	Facebook: @Deltares, Twitter: @Deltares, LinkedIn: Deltares, Instagram: Deltares
FERTIBERIA	
AQUAMINERALS	https://www.youtube.com/channel/UC-LkdcnFVIT-ZnzkRLOmiYQ, https://www.linkedin.com/company/aquaminerals-b.v./about/, https://twitter.com/AquaMineralsNL, @AquaMineralsNL

WATERNET	@WaterNet
GEOTEAM	
ARCADIS	@Arcadisnl
BAYFOR	@BayFOR_UEB
ETH ZÜRICH	

Table 5: General social media accounts interesting to be informed about P-TRAP activities

Reference, hashtag	Description
@NutrientP	Phosphor industry in the Netherlands for circular economy
@phosphorusfacts	European Sustainable Phosphorus Platform ESPP
@dpp_ev	German phosphorus platform
@BSAG_	Baltic Sea Action Group
@Phosphorus_ie	Irish Nutrient Sustainability Platform
@CFPlatforma	Czech Phosphorus Platform
@ETNReflow	H2020 MSCA-ITN-ETN on P fertilizers
@AgroCycle_EU	H2020 project addressing recycling waste from agri-food sector
@systemic_eu	H2020 project implementing circular solutions for biowaste ect.
@eureau	lobby of water sector in Europe, drinking and waste water service providers
@eip_water	European Innovation Partnership on water - initiative within the EU2020 Innovation Union
@EIPAGRI_SP	EIP project on agricultural productivity and sustainability
@lex4bio	H2020 project on bio-based fertilisers
@sustainP	US member organisation and sustainable P alliance
@CEJA	European council of young farmers
@COPACOGECA	Lobby of farmers and agri-cooperatives in the EU, pressing for a strong agriculture sector
@IFOAMEU	Advocates for the development and integrity of organic food and farming in Europe
@FertilizersEuro	Representing the European fertilizers industry
@UNEnvironment	United Nations Environment Programme
@EnvDefenseFund	NGO, Environmental Defense Fund, US
@MSCActions, #MSCA, #ITN	European Commission for MSCActions
@EU_H2020, #H2020	Official EU H2020 account managed by DG Research & Innovation
@UNFCCC	UNFCCC secretariat (UN Framework Convention on Climate Change)
@EUClimateAction	Directorate-General for Climate Action (DG Climate)
@ENVRIcom	community of the Environmental research infrastructures, projects and networks

Table 6: External blogs, groups and websites as possible dissemination platform for P-TRAP

Owner	blog
European Sustainable Phosphorus Platform (ESPP)	https://phosphorusplatform.eu/home2
German phosphorus platform	https://www.deutsche-phosphor-plattform.de/english/
NextGen	https://nextgenwater.eu/
WaterNet	https://www.waternet.nl/blog/
Biorefine Cluster Europe	https://www.biorefine.eu
European freshwater platform	https://freshwaterblog.net/, https://freshwaterplatform.eu
Soil Science Society Belgium	http://www.bbv-sbss.be/
Global coalition for sustainable agricultural development	https://farmingfirst.org/
Community of farmers and researchers	https://www.agricology.co.uk/
Water JPI researcher forum group on LinkedIn	http://www.waterjpi.eu/

3.4.3 Materials

Many aspects of P-TRAP are of interest to the public and wider press, as e.g. sustainable use of fertilizers or its contribution to reduce eutrophication and by this increasing the water quality of e.g. recreation areas.

Media coverage of P-TRAP will be actively promoted by using existing press and outreach offices of the academic and non-academic partner organizations (Table 1), which will issue press releases and raise awareness of the P-TRAP project (ESR together with supervisors and local press offices). Articles will be written for popular science media both printed (e.g. Expertanswer (https://expertsvar.se/en/),

Informationsdienst Wissenschaft (https://idw-online.de/en/), New Scientist) and web based (e.g. Science Daily, Wired:Science) to distribute summaries of research activities and achievements mainly to journalists and research professionals. This will also foster the communication to the broader public. The authors of articles and press releases will inform the management and provide it with copies and links, which will be placed on the website.

The ESRs will be trained in presentation and media skills through a "Science and the Media" workshop given at one of the P-TRAP schools (TSTC4: Communicating science out of the ivory tower). In the run of the project, the management will publish regular newsletters, which will target the wider public and in collaboration with the partner also fact sheets about the project and its results. Both will be available in digital form on the website but also distributed as hand-outs by the consortium during suitable public events, e.g. open days, conferences, workshops or tradeshows. A logo was developed by the coordinator before the project started and is available on the website. This will be used for P-TRAP dissemination activities to ensure corporate identity. Templates for presentations and poster will also be provided, but are not compulsory.

Next to the traditional material the project will offer E-learning modules for experts and non-experts. ESRs will be educated in translating scientific findings into e-learning modules. In the Transferable Skills Training Course "E-learning modules as dissemination channels" (TSTC2) ESRs will be introduced to various e-learning elements with the aim to produce modules of the following content: i) the two faces of P: a resource under threat and a substance with deteriorating properties for aquatic ecosystems, ii) the need to think interdisciplinary to cope with pollution of aquatic ecosystems iii) the application of P-TRAP systems for P-removal from non-point sources. The target audience for such releases will be schools, the scientific community, and popular science media (journals, local or regional newspapers, broadcast channels).

3.4.4 Scientific conferences and tradeshows

Scientific conferences, symposia, and tradeshows are a traditional dissemination channel for presenting project results to a broad scientific and / applied audience. This channel is planned to be extensively used, and is also compulsory for the ESRs, as each of them has to visit at least two conferences and present her/his project results.

Several scientific conferences and tradeshows are planned for dissemination activities, as well as for exploitation activities, e.g. by ESR training. This includes general assemblies with more than 10000 participants such as the EGU or AGU, but also smaller symposia or trade shows.

Table 7: overview of envisaged conferences, symposia, and tradeshows suitable for P-TRAP activities

Name event	Location	Time	Website
American Geophysical Union Fall Meeting (AGU)	2020 San Francisco, USA	Annual, December	https://www.agu.org/Plan-for-a-Meeting/AGUMeetings
European Geosciences Union General Assembly (EGU)	2020 Vienna, Austria	Annual, April / May	https://www.egu.eu/meetings/
Goldschmidt	2020 Honolulu, US 2021 Lyon, France 2022 Chicago, US	Annual summer	https://goldschmidt.info/conferencesView
International phosphorus workshop (ETH Zürich)	n.d.	Tri-annual -next planned in 2022	https://plantnutrition.ethz.ch/ipw9.html
Eurosoil	2020 Geneva, Switzerland	Annual	https://eurosoil2020.com/
Swiss Geoscience Meeting	2020 Zürich, Switzerland 2021 Geneva, Switzerland	Annual	https://geoscience-meeting.ch
XVI Congress of ESA (organization)	2020 Seville, Spain 2022 Berlin, Germany	Bi-Annual	https://esa-congress-sevilla2020.es/
Symposium Phosphorus in Soils and Plants	2022 Uruguay	Four-annual, next planned in 2022	
International Mine Water Association	2020 Christchurch, New Zeeland 2021 Cardiff, UK	Annual	http://imwa.info/imwaconferencesandcongresses.html

Conference on Land Use and Water Quality	n.d.	Bi-annual	http://bios.au.dk/en/currently/show/artikel/land-use-and-water-quality-2019/
AIWW Amsterdam International Water Week	n.d.	Bi-annual, next 2021	https://www.amsterdamiww.com
IWA Resource Recovery Conference	n.d.		https://iwa-network.org/events/3rd-iwa-resource-recovery-conference/
European Sustainable Phosphorus Conferences	2020 Vienna, Austria	Bi-annual, next 2020	https://www.phosphorusplatform.eu/espc4
Geomicrobiology network meetings in UK			
Other industry/biotechnology meetings as appropriate			

3.4.5 Public events

Public events such as open days, workshops for children or science festivals are opportunities to demonstrate and present a project, its ideas and outcomes to the general public. Several P-TRAP beneficiaries have such public events on a yearly basis and the consortium, particularly the ESRs, are encouraged to participate and show what P-TRAP is about. Also, several cities, libraries or museums organise public science related events which might be an appropriate platform to present P-TRAP.

Table 8: Public events as an opportunity to present P-TRAP to the broader public

Country	Participant	Public events
The Netherlands	Betweterfestival	**https://www.betweterfestival.nl**
	NEMO kennislink	https://www.nemokennislink.nl/activiteiten
Germany	Night of science	(https://www.nacht-der-wissenschaften.de)
Spain		https://investigacion.us.es/promocion
Belgium	Sound of Science	https://soundofscience.be/
Belgium	Wow wetenschapsfestival	http://www.wooowfestival.be/
Belgium	Pint of science festival	https://www.pintofscience.be/

3.4.6 Scientific journals

As several disciplines are involved in the project, the results of P-TRAP will be published in a broad scientific range of different journals and thematic fields. As P-TRAP is a H2020 project, the consortium has the obligation to ensure open access (free of charge online access for any user) to all peer reviewed scientific publications directly or at latest 6 months after publication (GA, Article 29.2). Suitable journals are e.g.

- Environmental science and technology (https://pubs.acs.org/journal/esthag)
- Geochemica Cosmochemica Acta (https://www.sciencedirect.com/journal/geochimica-et-cosmochimica-acta)
- European Journal of Soil Science (https://onlinelibrary.wiley.com/journal/13652389)
- Plant and soil (https://link.springer.com/journal/11104)

As all dissemination activities, also peer-reviewed publications have to include the following text to ensure the visibility of EU funding:

> *"This project has received funding from the European Union´s Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 813438."*

3.4.7 Data repositories

To ensure a long-term impact, data will be treated **FAIR**, i.e. **F**indable – **A**ccessible – **I**nteroperable – **R**e-usable. Details on the data policy will be defined in the Data Management Plan.

Based on the Grant Agreement, data management and storage will be operated through the BayCEER IT and database group, organised by UBT. Backbone for data storage will be a central file server with a cloud service (ownCloud). All project members are committed to use this cloud for all project related

activities producing documented datasets, models, dissemination activities etc. The storage system will allow to define the accessibility of the data on three levels: i) only for data creator, ii) shared internally within P-TRAP, iii) public access. Backup of the file server will be done by the IT service center of the University of Bayreuth (ITS) via Tivoli Storage Manager on an always incremental basis. In regular intervals (two times a year) project members will meet face to face or remotely with employees of the BayCEER IT group, to unify the directory and data structures on the file server and to build up a metadata catalogue using the Dublin Core standard. Following this practice, it will be easy to make project-data publicity available during and after the project runtime. On request, embargo of making data public after the end of the project can be granted for a period of up to 12 months in order not to interfere with publication in peer-reviewed journal.

3.4.8 Project deliverables and milestones

Projects aim to create knowledge and to share it. Elaborated and prepositioned deliverables can help to maximize the impact of a project in an effective and efficient way. Deliverables as contractual obligations are often time consuming and more often seen as a waste of "research" time, administrative tasks without any use. However, deliverables are needed to verify the progress of a project and to demonstrate to the funder that I) the project is going in the right direction and II) the money is well–invested.

Deliverables in general are a distinct output of the project, which should be meaningful in terms of the project's overall objectives, and constituted by e.g. reports, methodologies, publications, software etc. They are often corresponding to specific milestones, which are control points in the project that help to e.g. chart progress, start the next project phase, take corrective measures or critical decisions. Both could be important measures to ensure knowledge transfer, the process through which one group is affected by the experience of another.

P-TRAP - as a Horizon 2020 project - has to demonstrate progress and impact by submission of in total 44 deliverables. The deliverables defined in the Grant Agreement are as well public and confidential. They will be used to communicate and disseminate information, data and results not only towards the EU but also to the broader public and scientific community. For each deliverable a report will be submitted, general templates will be available. The templates can be modified regarding to the content of a deliverable, e.g. reporting a methodology requires different information than reporting results of measurement campaigns. To ensure high quality of the deliverables and usability for general dissemination activities, a timeline and review procedure has been agreed on by the consortium during the Kickoff Meeting, which will be described in more detail in the Data Management Plan (submitted as deliverable D5.5).

3.4.9 Collaborations

Due to the international and interdisciplinary character of P-TRAP, the project offers excellent opportunities for collaborations. These collaborations will be established and developed during the lifetime of the project. Promising collaborations might lead to adding new partner organisations in case it is beneficial for the ESRs. Table 9 gives a first collection of organisations and projects as interesting targets for collaborations and joint activities.

Table 9: collaboration opportunities between P-TRAP and other societies, organisations, and projects

	Name	Joint activities	Link
Societies / Organisations	European Sustainable Phosphorus Platform (ESPP)	Knowledge transfer, joint workshops, dissemination activities	https://phosphorusplatform.eu/home2
	Praxisplattform für Boden- und Gewässerschutz	Knowledge transfer, dissemination activities	https://www.boden-staendig.eu/
	Deutscher Verband für Wasser und Abwasser)	Knowledge transfer, joint workshops, dissemination activities	https://en.dwa.de/en/

Projects	Wetsus	Joint experiments, e.g. recovery of P from wastewater in the form of vivianite, knowledge transfer, dissemination activities	https://www.wetsus.nl
	BBSRC Metals in Biology NIBB	Using waste metals for industrial biotech application, Multiple network meetings in this area (linking academia and industrial partners)	https://sites.durham.ac.uk/mib-nibb/
	Regional government of Andalucia		
	Flemish Environmental Agency, Flemish Land Agency	exchange information regarding research to combat nutrient losses from agricultural soils towards the environment. Outcomes of P-TRAP can boost new investments by the Flemish Government to decrease P concentrations in surface waters.	https://en.vmm.be, https://www.vlm.be/en
	Organisation of water Dutch authorities	Joint projects on eutrophic sediments in brooks, measures to reduce leaching of nutrients	https://dutchwaterauthorities.com
	Water authority of Rijnland	Lake restoration projects, other water manager using iron treatment	https://www.rijnland.net/overig/english
	NuReDrain	Knowledge transfer, joint workshops, dissemination activities	https://northseare-gion.eu/nuredrain/
	ICT-Biochain	Interest in bioeconomy and use of wastes as source of nutrients (particular interest in sewage sludge)	https://ictbiochain.eu
	Power4Bio	Interest in bioeconomy and use of wastes as source of nutrients (particular interest in sewage sludge)	https://power4bio.eu
	REINWASTE	Interest in bioeconomy and use of wastes as source of nutrients (particular interest in sewage sludge)	https://reinwaste.interreg-med.eu
	ERA-NET AgriAs: Evaluation and management of arsenic contamination in agricultural soil and water	Dissemination through GTK (project coordinator)	http://projects.gtk.fi/AgriAs/
	Monitoring / Restauration projects at Lake Baldegg	Diffuse P trapping, field test	e.g. https://www.biogeosciences.net/16/2131/2019/bg-16-2131-2019.pdf

3.4.10 P-TRAP schools, workshops, courses

P-TRAP scheduled several educational events for the ESRs such as dedicated schools, workshops and courses. Where possible, they will be either accessible for interested students of the host organisation, or the relevant material will be published on the website.

3.5 Timelines

Dissemination is an ongoing process during and beyond the project. All channels will follow their own timelines, but as the scientific outcomes are the main dissemination material, the timeline of all activities mostly depend on the progress of ESR projects. A preliminary planning is given in the following table:

Table 10: timeline of dissemination activities

Dissemination channel	Nature of dissemination / main goal	Responsibilities	Main audience	General timeline
Website	Digital, general public information, internal exchange	Coordinator	Public, scientific community, stakeholders	Project lifetime and beyond
Online media	Digital, general public information	Coordinator	Public, scientific community, stakeholders	Project lifetime and beyond
Articles / press releases	Print/digital, general publication	All	Public, scientific community, stakeholders	Project lifetime and beyond
Newsletters	Print/digital, general publication	Coordinator	Public, scientific community, stakeholders	Project lifetime, approximately twice a year
Fact sheets	Print/digital, general publication	Coordinator	Public, scientific community, stakeholders, policy makers	Project lifetime, depending on the audience (e.g. for policy makers end of the project, for scientific community as soon

				as the first results are available)
Conferences / tradeshows	Presentation of the project and results	All	scientific community, stakeholders	Project lifetime and beyond
Scientific journals	Publication of results	All	scientific community	Project lifetime and beyond, increasing output expected towards the end of the project
Data repositories	Data sharing	All	scientific community	Project lifetime and beyond, start with generating first data, availability of data at least 3 months after generating them
Deliverables / milestones	Publication of project results	All	scientific community, EU, policy makers	Project lifetime and beyond
Collaborations	Networking	All	Public, scientific community, stakeholders, policy makers	Project lifetime and beyond
schools / workshops / courses	Education	All	scientific community, stakeholders	Project lifetime, as soon as all ESRs are recruited

3.6 Monitoring

A Communication and Dissemination Board (CDB) will be implemented to monitor and optimise internal and external communication, dissemination, and exploitation. The CDB will be instituted at the 1st Annual meeting. Until than the coordinator will organise the respective activities in collaboration with the consortium. Afterwards, regular meetings will occur concurrently to Supervisory Board (SB) meetings or, if required, at any time remotely. In the meetings, the performance of past dissemination and communication activities will be evaluated and future dissemination and communication activities will be discussed and suggestions for potential improvements will be proposed to the MB. CDB will be chaired by the leader of WP6 and will consist of all Work Package leaders and one delegate from Partner Organisations. Once all ESRs are recruited, 3 ESRs delegates (representing WPs 1,2 and 3, respectively) will be elected in the ESR assembly to join the CDB.

4. P-TRAP exploitation plan

In general exploitation is the use of results, aiming on maximization of impact and valorisation of results. The obligations of exploitation are given in the Grant Agreement (Article 28 and related) and include that each beneficiary must take measures aiming to ensure exploitation of its results – up to four years after the project.

The exploitation of data and results - in- and outside the consortium - requires agreements and procedures on Intellectual Property Rights, licenses, and exploitation strategies.

4.1 Intellectual Property Rights

The frame conditions are defined in the Grant Agreement (Terms and Conditions, Section 3 and related; Part B, Section 3.2.4) and the Consortium Agreement (Section 8-10 and related), regulating I) confidentiality of any data, documents or other material, II) ownership of the foreground of the project considering contribution of several partners and establishing the allocation and terms of exercising joint owner-ship, III) protection: if the foreground of the project is capable of industrial or commercial application, each owner shall provide for its adequate and effective protection. More details are given in the Data Management Plan (submitted as deliverable D5.5).

The consortium will follow the Commission Recommendation C(2008)1329 on the management of intellectual property (http://ec.europa.eu/invest-in-research/pdf/ip_recommendation_en.pdf). The recommendations will be available on the website. Most beneficiaries have already established and publicised policies and procedures for the management of IPs in line with the code of practice (Annex I of the recommendations).

Table 11: Intellectual property right management

Participant	Established yes / no	Link	comments
UU	yes	https://www.uu.nl/en/research/research-data-management/guides/policies-codes-of-conduct-and-laws	Further support and information via Utrecht Holdings (https://utrechtholdings.nl/about/team/) and CIER (http://www.cier.nl/?lang=en)
UNIVIE	yes	https://transfer.univie.ac.at/tech-transfer/	
UBT	yes	https://www.fdm.uni-bayreuth.de/en/index.php https://www.forschungsfoerderung.uni-bayreuth.de/pool/dokumente/IP-Strategie-UBT-final_en.pdf	UBT Strategy for data management UBT Strategy for Handling Intellectual Property (IP)in Knowledge and Technology Transfer
EAWAG	yes	https://opendata.eawag.ch/	
UNIMAN	Yes	https://umip.com	UMIP is a division of UMI^3 Limited, the UNIMAN´s agent for IP commercialisation and technology transfer. UMI^3 is wholly owned by UNIMAN and has more than 30 years of experience of IP commercialisation.
US		https://investigacion.us.es/docs/apoyo/C%C3%93DIGO%20DE%20BUENAS%20PR%C3%81CTICAS%20EN%20INVESTIGACI%C3%93N%20DE%20LA%20UNIV%20DE%20SEVILLA.pdf	Recommendation for good research practices; data management considered as recommendation
KULEUVEN	yes	https://www.kuleuven.be/english/research/scholcomm/rdm/policy-plan-rdm-ku-leuven-2014	More info available on the intranet of KU Leuven
GEOS	yes		Certified acc. to DIN EN ISO 9001-2015
DELTARES			
FERTIBERIA			
AQUAMINERALS			
WATERNET			
GEOTEAM			
ARCADIS			
BAYFOR			
ETH ZÜRICH			

4.2 Exploitation strategy

The exploitation strategy is based on user requirements and objectives of the project, and determined by the Grant Agreement and the Consortium Agreement (GA article 28 and related, CA section 9 and related).

Non-point P pollution produces significant external costs in several business sectors, i.e. tourism, property values, mitigation, and ecosystem restoration (see GA chapter 2.3.2). Results from P-TRAP provide direct opportunities for commercialisation mainly I) the application of developed sorbent materials to remove P from non-point sources (P-TRAP Systems, GEOS, AQUAMIN, ESR 1,3,4), II) the development of P fertilizers on a vivianite (Fe(II)-phosphate) base to overcome Fe-deficiency chlorosis, which is a relevant agronomic problem in calcareous soils (FERTIBER, ESR2,8,10), and III) development of lake restoration techniques based on by-products from water treatment (AQUAMIN, ESR9,11).

Exploitation of results in regard to their commercial application will be supported by patent consultants at the participating universities that assist the scientists in identifying and evaluating inventions as well as in the financing, application and maintenance of patents.

ARCADIS, WATNET and GEOTEAM aim at enhancing their portfolio of expertise in water management with a focus on nonpoint pollution. Potential activity fields are lake and river restoration, management of P loads, reactive transport modules to simulate groundwater surface water interaction in regard to P input from groundwater. The exploitation pathways are subject to Intellectual Property Rights (IPR) which are I) ownerships of scientific data to be published in scientific journals and/or potentially

patentable results, II) attainment of knowledge by ESR about sensible data or other research activities through secondments with the private sector.

Given the high relevance for future activities of ESR, exploitation of knowledge and management of Intellectual Property Rights (IPR) will be part of the research training as part of the Transferable Skills Training Course on "Entrepreneurship: from innovative idea to business plan" (TSTC5). Here, ESRs will learn about the different steps on the way from an innovative idea to starting an enterprise.

4.3 Market analysis

Waste materials from water and other industries containing iron and phosphorus are an untapped resource for a wide range of industries, including agriculture and catalysis. P-TRAP can help recover high volume waste products as new materials, transformed by low cost biotechnological approaches, that have a new market value. Beside this, P-TRAP will deliver and develop new insights and understanding of methods, which could be used e.g. in improving technologies or general quality management. In the run of the project the consortium will monitor the expected outcomes and their market potential, and possibly develop a tailored market strategy. Several universities offer support and guidance to researchers to create impact, e.g. the KU Leuven Research and Development service https://lrd.kuleuven.be/en or the Utrecht Holdings (https://utrechtholdings.nl) at Utrecht University.

Table 12: overview expected outcomes and their market potential

Expected outcomes	Market potential	Market potential analysis
Mechanistic insights into Fe-ppt formation and transformation and impacts on P	no direct market potential	No
Optimal biotechnological methods for conversion of waste Fe to high value products	Potential use in agriculture and also catalysis	No
P/Fe fertilizer products; new management strategies for recycled fertilizers	Fertilizer industry (source or part of commercial fertilizers)	No
P and Fe fertilizers	Valuable inorganic fertilizer	No
Adsorption technology based on developed filterstable Schwertmannite adsorbents for phosphate removal from water	Not yet estimated	No
Development or better understanding of methods to reduce phosphorous in surface waters in agricultural catchments	Farmers and water managers can adopt these techniques in their water quality managements	No
P-removal using residual from drinking water treatment (ironhydroxide)	Potentially very large and international: P-removal from wastewater and surface water.	Yes
Applications for FeP or finding ways to 'split' this saturated material into P and Fe	Applications for FeP: largely unknown Applications for Fe and P separately: potentially large	No No
Application for sludges containing substantial % of iron (5-12%), but also clay, organic matter and other materials	In Netherlands +/- 15 kton/a	Yes

7. History of the document

Version	Author(s)	Date	Changes
1	Sylvia Walter	2 May 2019	Set-up
	Sylvia Walter	18 June 2019	1st version sent to Thilo
	Sylvia Walter	4 November 2019	Final version sent to consortium
	Sylvia Walter	9 December 2019	Submission to EU