



# NO MICROPLASTICS, JUST WAVES.

## LIFE Blue Lakes. Project Impact Ex post Report



BENEFICIARI ASSOCIATI



Autorità di Bacino  
Distrettuale  
dell'Appennino Centrale



ENEA  
AGENZIA NAZIONALE PER LE NUOVE TECNOLOGIE,  
L'ENERGIA E LO SVILUPPO ECONOMICO SOSTENIBILE



UNIVERSITÀ  
POLITECNICA  
DELLE MARCHE

PROGETTO COFINANZIATO DA

PlasticsEurope  
Associazione di Promozione e Sviluppo dell'Industria del Plastico

# Summary

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## SUMMARY

Action C.1 - **Monitoring of project impact** aims to measure the effectiveness of **LIFE Blue Lakes** project in mitigating the environmental threats posed by microplastic in lakes and inner waters and assessing the effective achievement of the objectives and expected results.

Being this a Governance project, its impact was assessed from the beginning and during its whole implementation mostly by means indirect indicators, that is measuring the effects of the project actions among the key target groups.

The monitoring and evaluation strategy was defined and carried out by the **Project Impact Working Group (PIWG)** that was set up at the beginning of the project. The PIWG included one technical referent for each partner and was supervised by the Project Coordinator.

The monitoring strategy was defined by assessing the main project impacts on the key project target groups that were targeted by the core project actions:

- Action B.1 **local authorities** and **stakeholders** in the targeted areas;
- Action B.2: **staff of the Italian Regional/Provincial Agencies for the Protection of the Environment (ARPAs/APPAs)**;
- Action B.3: **managers and operators of Wastewater Treatment Plants**;
- Actions B.5 and B.7: representatives of **companies** from sectors using microplastics;
- Action B.6: **decision-making operators** at local, national and regional level; **citizens** of the 5 lakes involved.

For each target group, relevant indicators were defined based on what was foreseen in the project proposal in terms of main expected results. The impact of the project on the main key stakeholders will be discussed in separate chapters of this report.

## Chapter 1: Impact on Local authorities and stakeholders

One of the main outputs of the Life Blue Lakes project is the **Lake Paper** that has developed and promoted within the context of the project action B.1 - Campaign for local authorities and stakeholders. This document, specific for each lake, has been developed through separated **participatory processes** (PP) where local authorities and stakeholders of the **5 targeted lake areas** (Garda, Trasimeno and Bracciano lakes in Italy and Chiemsee lakes and Lake Constance in Germany) were involved to set their voluntary commitments to fight the release of microplastics in lakes.

The PPs (B1.1 and B1.2) led to 5 different Lake Papers that included suggestions on plastic waste treatment, discharge limits, wastewater treatment process improvement, provisions for reducing companies and households' impact, etc. In addition, the Lake papers included the commitments of the target groups of each lake to undertake concrete actions for reducing their input of plastic (and microplastics) in lakes. Thus, the impact of action B.1 was measured through the number of formal adoptions of the Lake Papers by the main stakeholders, starting from the municipality's representatives located close to the targeted lakes.

Furthermore, with the aim to promote the Lake paper approach to the communities of additional lakes (B1.3) (not the 5 ones initially targeted by the project), a simplified and synthetic version of this document was developed. This has named Lake Manifesto and was presented to numerous lakes communities during the summer itinerant campaign *Goletta dei Laghi* carried out every year by Legambiente to monitor the ecological status of the main Italian lakes, identifying the major threats as well as promoting a better management of lake ecosystems. In Germany the Lake Manifesto was presented through different live and online workshops in close collaboration with the partners of the Network Living Lakes Germany.

In the table 1, the main results achieved by action B.1 are described, compared to those expected in the project proposal.

Tab 1. Summary of the main results achieved by Action B.1 compared to the ones foreseen by the Proposal

Action B.1 expected results	Results actually achieved by Action B.1	✓/✗
Delivering of <b>5 Lake Papers</b> (3 in Italy and 2 in Germany)	<b>5 Lake Papers</b> (3 in Italy and 2 in Germany) delivered	✓
Organizing and carrying out of <b>5 participatory processes</b>	<b>5 participatory processes</b> organized and carried out	✓
<b>12 Italian</b> formally adopt the Lake Paper	<b>13 Italian municipalities</b> formally adopted the Lake Paper. <ul style="list-style-type: none"><li>• <u>Garda Lake</u>: Municipality of Lazise; Municipality of Toscolano Maderno; Municipality of Desenzano Del Garda; Municipality of Sirmione, Municipality of San Felice Del Benaco; Municipality of Lonato Del Garda; Municipality of Gardone Riviera.</li><li>• <u>Bracciano Lake</u>: Municipality of Trevignano; Municipality of Bracciano; Municipality of Anguillara.</li></ul>	✓

	<ul style="list-style-type: none"> <li>• <u>Trasimeno Lake</u>: Municipality of Tuoro Sul Trasimeno; Municipality of Di Magione; Municipality of Castiglione Del Lago</li> </ul>	
<b>8 German municipalities</b> formally adopt the Lake Paper	<b>3 (+ 7)</b> German municipalities formally adopted the Lake Paper: <ul style="list-style-type: none"> <li>• <u>Lake Constance</u>: Municipality of Mammern, Municipality of Romanshorn, Municipality of Radolfzell,</li> <li>• <u>At Lake Chiemsee</u> we are still in the finalisation process of the adoption between the Chiemsee Naturführer und the umbrella organisation (AUV) representing all 7 riparian communities at the Chiemsee.</li> </ul>	✓
Not foreseen	<b>65 additional stakeholders</b> of the 3 Italian targeted lakes the adopted the Lake Paper	✓
Not specified	<b>250 stakeholders</b> involved in the participatory process in Italy  <b>106 stakeholders</b> at Lake Constance, <b>8</b> at Chiemsee involved in the participatory process in Germany	✓
Additional <b>50 Italian and German municipalities</b> get informed of the Lake Paper	Additional <b>54 Italian municipalities</b> informed of the Lake Paper/Manifesto through the itinerant campaign <i>Goletta dei Laghi</i>  Additional <b>14 German municipalities</b> around various German Lakes informed of the Lake Paper/Manifesto through the German Living Lakes Network (NLSD).	✓
Not Foreseen	<b>Lake Manifesto</b> delivered in 2 versions (Italian and German)	✓
25% of the additional municipalities (a total of <b>12 municipalities in Italy and Germany</b> ) signing the document (Lake Manifesto)	<b>17 Italian municipalities</b> signed the Lake Manifesto  <b>1 German municipality</b> signed the Lake Manifesto  In Germany, <b>7</b> institutions signed the Lake Manifesto (Bavarian Academy for Nature Conservation and Landscape Management, Chiemgau Tourism Organization, Association of Nature Guides Salzach, Water Authority Rosenheim, Water Authority Traunstein, Chiemsee Tourism Association, District Administration Rosenheim.)	✓

Table 2 lists the Italian lake municipalities reached by the itinerant campaign *Goletta dei Laghi* during the 2022 and 2023 editions. All the municipalities reached by the campaign were informed about the Lake Paper approach and the opportunity of starting their own Participatory Process. 18 municipalities signed the Lake Manifesto (17 in Italy, 1 in Germany).

**Table 2. Additional Italian Lake municipalities informed of the Lake Paper/Manifesto**

Region	2022 Campaign	2023 Campaign
VENETO	Sospirolo	Sospirolo
	Alpago	Alpago
FRIULI	-	Ronchi dei Legionari
LOMBARDIA	Desenzano	Desenzano
	Iseo	Cutro
	Como	Como
	Lecco	Lecco
	Porto Ceresio	Lavena Ponte Tresa
	Varese	Varese
PIEMONTE	Sada (TO)	Avigliana
	Pella (NO)	Pella
	Verbania	Verbania
UMBRIA	Piediluco	Piediluco
	Perugia	Perugia
	Castiglione del Lago	Castiglione del Lago
LAZIO	Caprarola	Caprarola
	Castel Gandolfo	Castel Gandolfo
	Fumone (FR)	Bracciano
	Sabaudia	Ferentino (FR)
	Ascrea (RI)	Monte San Biagio (LT)
	-	Fiumata (RI)
ABRUZZO	Scanno	Scanno
MARCHE	Fiastra	Fiastra
CAMPANIA	Napoli	Napoli
MOLISE	Chiauci	Chiauci
PUGLIA	Bari	Bari
SICILIA	Palermo	Palermo
CALABRIA	Cosenza	Cosenza
<b>TOT</b>	<b>26</b>	<b>28</b>

### Conclusion

We can confirm that by the end of the project implementation, all action the expected results of action B.1 listed in the approved project proposal were fully achieved.

Indeed, the Participatory Process was carried out both in Italy and Germany with open-door events, focus groups), itinerant campaign, and final presentation of the Lake Paper in each Lake.

According to the approved project proposal, this action should have also led to the delivery of 5 different versions of the Lake Paper, that were presented by the end of September 2021. Moreover, it was expected that at least 12 Italian and 8 German municipalities of the 5 targeted lakes involved

in the PP would have formally adopted the Lakes Paper for a total of 20 municipalities. The actual number of adoptions is indeed of **13 municipalities in Italy and 10 in Germany** (we are still in the finalisation process of the adoption between the Chiemsee Naturführer und the umbrella organisation (AUV) representing all 7 riparian communities at the Chiemsee), for a total of **23 municipalities**.

According to approved project proposal, 50 Italian and German municipalities should have been informed of the Lake Paper and 25% (12 municipalities) of them would have signed the document. Thanks to the intensive campaign carried out in Italy (*Goletta dei Laghi*) and in Germany (Living Lakes Network), we reached **54 municipalities in Italy and 14 in Germany** for a total of **68 additional municipalities**, around 25% more than expected. Of these, **18 municipalities** (17 in Italy and 1 in Germany) and **7 institutions** in Germany signed the Manifesto.

## Chapter 2: Impact on Staff of the Regional /Provincial Environmental Protection Agencies (ARPAs/APPAs)

This chapter presents the results of the final survey conducted by ENEA, Legambiente, and Arpa Umbria to assess the extent to which the Blue Lakes MP Monitoring Protocol (action B.2) has been applied and/or is about to be applied by relevant authorities responsible for water quality management as a consequence of the training courses. The main objective of the survey was to examine any experiences and collaborations developed resulting from the sharing activity of the MP monitoring protocol in inland, river and lake waters.

The results of this second survey are discussed in this separate chapter of the Ex-post Report on the Impact of the Life Blue Lakes Project.

### Data collection

The survey started by resending the Blue Lakes questionnaire (Appendix 2 Excel file Report ex-ante) to the contact persons previously indicated by the relevant ARPA Directorates in the manner described in the Report ex-ante.

The persons contacted (table 3) filled in the questionnaire. In addition, the name of technicians that participated to the training course held in September/October 2022 are listed on table 4. Some of them were directly involved in the sharing and implementation phase of the Blue Lakes protocol.

Tab 3 – List of contact persons ARPA/APPAs for the Blue Lakes project

ARPA/APPAs	Referente	E-mail
ABRUZZO	Giovannella VESPA	g.vespa@artaabruzzo.it
BASILICATA	Teresa TRABACE	teresa.trabace@arpab.it
CAMPANIA	Lucio DE MAIO	ldemaio@arpacampania.it
EMILIA-ROMAGNA	Veronica MENNA	vmenna@arpae.it
FRIULI-VENEZIA GIULIA	Francesco CUMANI	francesco.cumani@arpa.fvg.it
	Cristina SGUBIN	cristina.sgubin@arpa.fvg.it
LAZIO	Laura AGUZZI	laura.aguzzi@arpalazio.gov.it
LIGURIA	Sonia ALBANESE; ALESSANDRO DAGNINO	sonia.albanese@arpal.liguria.it; alessandro.dagnino@arpal.liguria.it
LOMBARDIA	Fabio BUZZI	f.buzzi@arpalombardia.it
MARCHE	Debora Mancaniello*	debora.mancaniello@ambiente.marche
MOLISE	Antonietta CIOFFI	antonietta.cioffi@arpamolise.it
PIEMONTE	Francesca VIETTI	francesca.vietti@arpa.piemonte.it
PUGLIA	Nicola UNGARO	n.ungaro@arpa.puglia.it
SARDEGNA	Felicina TREBINI	ftrebini@arpa.sardegna.it
SICILIA	Giovanni VACANTE	gvacante@arpa.sicilia.it
TOSCANA	Michela RIA	m.ria@arpat.toscana.it
	Francesco LAVISTA	f.lavista@arpat.toscana.it
TRENTINO-ALTO ADIGE BOLZANO	Maddalena CASERA	maddalena.casera@provincia.bz.it
TRENTINO-ALTO ADIGE TRENTO	Giovanna PELLEGRINI	giovanna.pellegrini@provincia.tn.it
VALLE D'AOSTA	Alessandra ROMANI	al.romani@arpa.vda.it
VENETO	Giorgio FRANZINI	giorgio.franzini@arpa.veneto.it
	* nuova referente sostituisce Stefania Sarcina	

Tab 4 – list of participants to the Blue Lakes training activities

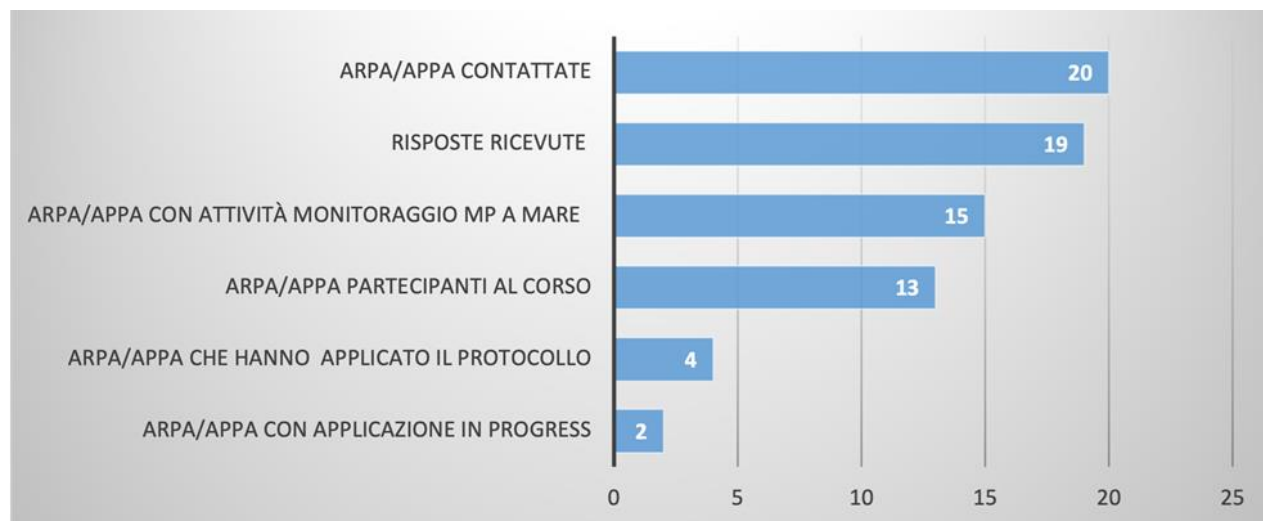


<b>Partecipanti al corso</b>
Pamela Perez <p.perez@artaabruzzo.it>; a.iannarelli@artaabruzzo.it
Teresa Trabace <teresa.trabace@arpab.it>; Salvatore Longo <salvatore.longo@arpab.it>;
Laezza, Ilaria Santina <ilaezza@arpae.it>; Menna, Veronica <vmenna@arpae.it>; Baio, Katia <kbaio@arpae.it>; Marta Bacchi <mbacchi@arpae.it>; Emanulea Peroncini <eperoncini@arpae.it>; Alberto
Francesco Cumani <francesco.cumani@arpafvg.it>; Damiano Virgilio <damiano.virgilio@arpa.fvg.it>; federico.pittaluga@arpa.fvg.it
Antonella Giorgio <antonella.giorgio@arpalazio.it>; Marco Angeluzzi <marco.angeluzzi@arpalazio.it>; Tatiana Notargiacomo <tatiana.notargiacomo@arpalazio.it>
CARAFFINI KETTY <K.CARAFFINI@arpalombardia.it>; Filippo Galimberti <f.galimberti@arpalombardia.it>
Daniela Corradetti <daniela.corradetti@ambiente.marche.it>; Silvia Giorgetti <silvia.giorgetti@ambiente.marche.it>
Sergio Caccamo <sergio.caccamo@arpamolise.it>
Enrico Gastaldi <enrigast@arpa.piemonte.it>; Arianna Nicola <arianico@arpa.piemonte.it>; paola emma botta; caviglia
Daniela Battista <d.battista@arpa.puglia.it>;
Paola Aiello <paiello@arpa.sicilia.it>; Annamaria Mauro <amauro@arpa.sicilia.it>
Casera, Maddalena <Maddalena.Casera@provincia.bz.it>; Lazzeri, Francesca <Francesca.Lazzeri@provincia.bz.it>
Gianandrea Sighel <gianandrea.sighel@provincia.tn.it>; Giovanna Pellegrini <giovanna.pellegrini@provincia.tn.it>; Laura Fravezzi <laura.fravezzi@provincia.tn.it>
Giorgio Franzini <giorgio.franzini@arpa.veneto.it>; Manuela Cason <manuela.cason@arpa.veneto.it>; Francesca Ragusa <francesca.ragusa@arpa.veneto.it>; Federica Giacomazzi <federica.giacomazzi@arpa.veneto.it>; Chiara Zampieri <chiara.zampieri@arpa.veneto.it>;

Collected data confirmed and consolidated what had already emerged from the previous survey: a specific monitoring activity of MPs in the coastal strip is carried out by the ARPAs/APPAs of the 15 Regions bordering the sea, according to the Marine Strategy Monitoring Program which, in compliance with the Framework Directive 2008/56/EC, foresees a complex framework of measures and controls aimed at defining the state of sea quality. Among the many activities implemented by the Marine Strategy, a specific program is dedicated to micro-litter and to MPs present in seawater that are monitored according to standardized procedures under a defined protocol identified as Module 2bis.

The methodology used is common and shared by all ARPAs/APPAs, likewise the choice of sites. For each area, sampling is carried out at 3 stations located at different distances from the coast (0.5; 1.5; 6 meters), along transects orthogonal to the coastline. The procedure involves, for each monitoring station: at-sea measurements and at-sea sampling with a manta net; identification and counting of fragments.

Concerning the implementation of the Blue Lakes Monitoring Protocol, the information processed through the questionnaires revealed possible problems due to internal organizations of the ARPAs in starting a freshwater microplastics monitoring activity with respect to the type of activity already present (priority, institutional, etc.) and the possibility of investing resources on it, and to more general critical issues of lack of resources to devote to an activity not yet institutional.



**Figure 1. Summary of data on ARPA/APPAs collected during the impact survey of the LIFE Blue Lakes project.**

Figure 1 shows a summary of the information collected through the questionnaires highlighting an adherence to the survey by the ARPAs/APPAs in providing the requested information of 95%.

The comparison with data collected in the initial phase of the project shows a participation of ARPAs/APPAs in sharing the Protocol through the Blue Lakes training course of 65%, of which 31% have already carried out monitoring campaigns in the 2022-23 biennium in pilot areas of interest to the ARPAs/APPAs. A 15% of ARPAs/APPAs have initiated the request to share field and laboratory activities in collaboration with ENEA for 2024.

In detail, the ARPAs/APPAs, in addition to partner ARPA Umbria, that have adopted the MP Monitoring Protocol are listed below:

**ARPA Piemonte:** During the *Goletta dei Laghi- Blue Lakes 2021 campaign*, ARPA Piemonte participated in the sampling activities of transects on Lakes Maggiore, Orta, Avigliana Grande and Viverone and then undertook sorting activities on these samples: sample filtration, digestion with hydrogen peroxide (for organic matter removal) and microscopic examination. With respect to these determinations, the activities were framed in the year 2022 of the ARPA Piemonte's project "P2022-02 Microplastics" and included a consolidation of skills with respect to the sorting activity and the definition of sampling strategies in the lake environment. Moreover, these activities increased the ARPA's staff skill in the subsequent execution of the independent sampling. The application of the MP Monitoring Protocol and related data collection involved the Lake Orta pilot area on which two seasonal campaigns were carried out in 2022 and then repeated in 2023 with the purpose of assessing annual trends.

**ARPA Emilia-Romagna:** During 2022, ARPA ER began collaboration with ENEA through the realization of an initial seminar to present microplastics monitoring activities in the Ridracoli artificial reservoir on which two seasonal (winter and summer) monitoring campaigns were carried out. At the moment, laboratory analysis and characterization are underway.

**ARPA Lazio:** during 2023 ARPAL began collecting samples of microplastics taken in Bolsena Lake where sampling was performed in the summer season and repeated the activity in the fall. ARPAL

will soon expand the activity to Vico Lake as well. Samples on which sorting and classification by shape and colour has already been performed in ARPAL's laboratories, in the same manner initiated with other ARPAs, will be sent to ENEA for chemical characterization by FT-IR analysis. The results obtained may be useful in order to deepen and improve the monitoring that ARPAL plans to carry out in the two lakes.

**ARPA Friuli-Venezia Giulia:** by the end of 2022, ENEA started a dialogue with ARPAFVG to define in detail and schedule the MP Monitoring Protocol sharing activities as part of the sampling and analysis campaigns of microplastics in the karst lake of Cavazzo, planned in March and July 2023, later postponed to 2024:

- the sampling of surface and column water in the two indicated seasons will be carried out with Enea instrumentation and personnel together with ARPA FVG technical staff who took part in the training course on the Monitoring Protocol in September 2022;
- the vessel used for sampling is made available by ARPA FVG as part of already scheduled routine monitoring activities;
- the analysis related to sorting, counting and chemical characterization of the samples from the first campaign will be started and completed in the ENEA BES C.R. Casaccia laboratory;
- the analysis related to sorting and counting of the samples collected in the second campaign will be carried out by ARPA FVG colleagues and then sent to complete the chemical characterization at the BES laboratory in Casaccia.

**ARTA Abruzzo:** by the end of 2022, ENEA started a dialogue with ARTA Abruzzo to define in detail and schedule the MP Monitoring Protocol sharing activities as part of the sampling and analysis campaigns of microplastics in the mountain lake of Scanno, planned in April and July 2023, later postponed to 2024:

- the sampling of surface and column water in the two indicated seasons will be carried out with Enea instrumentation and personnel together with ARTA Abruzzo technical staff who took part in the training course on the Monitoring Protocol in September 2022;
- the vessel used for sampling is made available by ARTA Abruzzo as part of already scheduled routine monitoring activities;
- the analysis related to sorting, counting and chemical characterization of the samples from the first campaign will be started and completed in the ENEA BES C.R. Casaccia laboratory;
- the analysis related to sorting and counting of the samples collected in the second campaign will be carried out by ARTA Abruzzo colleagues and then sent to complete the chemical characterization at the BES laboratory in Casaccia.

## Conclusions

The process of information exchange about monitoring microplastics in the aquatic environment with all the Italian ARPAs/APPAs started with the ex-ante survey. Although not immediate in its bureaucratic steps, it got a greater and more timely interaction in the ex-post survey thanks to the personal knowledge of the ARPAs/APPAs technicians that participated to the training course as well as the dialogue started with them during the training course.

In general, the information collected during this second survey still shows a reduced presence of regular MP monitoring activity in freshwaters carried out by ARPAs/APPAs. However, all ARPAs/APPAs clearly showed a strong interest to develop this type of monitoring as evidenced by the feedback received during the LIFE Blue Lakes project (activities initiated and still ongoing with ARPA Piemonte, ARPA Emilia-Romagna and ARPA Lazio) and in the subsequent collaborations initiated through several sampling campaigns within already identified sites (ARPA Friuli-Venezia Giulia, ARTA Abruzzo).

The survey showed that to date the water resources monitoring service personnel of each ARPA/APPAs are engaged in monitoring all types of water bodies, in implementation of Legislative Decree 152/06, for both chemical-physical parameters and biological elements. In recent years, the set of biological elements was expanded by initiating monitoring of fish fauna, benthos and macrophytes for transitional waters, benthos, *Posidonia* and macroalgae for marine-coastal waters,

and macrophytes in volcanic lakes. In addition to these activities, Marine Strategy activities have been added over the years, with new modules being integrated over time.

In addition, regarding the equipment indicated for monitoring lake microplastics, ARPAs/APPAs have larger Manta nets used for microplastics in the sea and not all are equipped with instrumentation for analytical determination of microplastics.

The training course and following monitoring campaigns that were performed with the project staff, helped to resolve doubts and critical issues of ARPAs/APPAs on sampling and sample processing methodologies. Thanks to effective networking among ARPAs/APPAs, ENEA and Legambiente, it was possible to integrate the sampling methodology, sample preparation and observation in a manner suitable for the different types of lakes and reservoirs examined.

## Chapter 3: Impact on Managers and operators of Wastewater Treatment Plant

This chapter presents the results of investigations conducted by UNIVPM as part of the Blu Lakes project, which aims to promote the reduction of microplastics in Italian and German lakes, through governance, training, **information** and awareness-raising activities. In particular, at the end of the training courses carried out in the context of Action B4, surveys were conducted to evaluate to what extent the **Technical Protocol and Guidelines** developed within Action B.3 are applied by Italian and German Treatment Plants as a result of the training activities for managers and technical operators of waste water treatment (WWTP), drinking water treatment plants (DWTP, also called DWTP drinking water treatment plants) and combined overflow systems (CSO) also in view of creating possible future collaborations for the strengthening of existing structures.

The surveys are mainly aimed to acquire the evaluations of managers and/or technical referents of water services and wastewater treatment plants. The results of these investigations are collected and harmonized in this separate chapter of the Ex-post Project Impact Report.

### Stakeholder selection

The experience of UNIVPM in water and wastewater sector also related to the participation into several national and international projects and support for water companies, was extremely useful and allowed to collect a wide number of contacts from different water utilities, operating both in potabilization and in wastewater treatment sector.

Italian water utilities were selected with particular attention to the ones operating in the surroundings of Garda and Castreccioni Lakes, where the field activities of UNIVPM take place in Blue Lakes. German water utilities were selected from contacts of UNIVPM and from GNF from previous collaborations and partnership in European projects. The GNF and the LCF added further regional stakeholders in the lake areas. The contacts of the WWTPs and DWTPs were involved and informed about the training activities of Blue Lakes project and in some cases, they were already participated in other Actions of the project. The stakeholders were invited mainly by email or phone call.

The lists of contacted stakeholders from the Italian and German water services who participated in the editions of training courses are shown in Table 6, Table 7, Table 8 and Table 9, respectively.

**Table 5. No of Managed Plants by involved Companies**

Managers/Technicians trained during the Bluelakes Courses	Companies	No. of managed plants
x	ACEA	865
x	ACEGAS APS AMGA	11
x	AQP	184
x	VIVASERVIZI	42
x	ACQUAMBIENTE	4
x	ACQUEVERONESI	134
x	MARCHE MULTISERVIZI	114

x	GORI ACQUE	193
x	A2A	87
x	VERITAS	71
x	AQA	76
x	PUBLIACQUE	8
x	AZIENDA GARDESANA SERVIZI	29
x	ACQUE BRESCIANE	107
x	DEPURAZIONE BENACENSI	1

**Table 6. List of participants of the first edition of the training courses**

Companies-Summary		Role of the participant in the Company
Acquedotto Pugliese	UTILITY	Chemist in the Laboratory and Hygiene Control Department
Laboratorio    Eco Control Srl	ANALYSIS LAB.	Technical direction
Laboratorio    Eco Control Srl	ANALYSIS LAB.	Laboratory chemist
Acque        Veronesi Scarl	UTILITY	Laboratory and Monitoring Manager
ACQUAMBIENTE MARCHE srl	UTILITY	Coordinator of the Drinking water department
AqA srl - gestore del SII della prov.di Mantova	UTILITY	Environmental Engineer
ACQUAMBIENTE MARCHE srl	UTILITY	Technical office
Marche Multiservizi Spa	UTILITY	Chemical analyst
ARPA UMBRIA	PROTECTION AGENCY	Project service manager
ACEA SpA	UTILITY	Technical operator
Acea Elabiori S.p.A	UTILITY	coordinator of research projects
INNOVEN	PRIVATE COMPANY	Technician
INNOVEN	PRIVATE COMPANY	Technical operator

ASL di Viterbo – Lab. di Igiene Ind.- Centro di Riferimento Regionale Amianto	PROTECTION AGENCY	Industrial Hygienist
PASA LABS srl	ANALYSIS LAB.	Laboratory technician
ARPA Marche	PROTECTION AGENCY	Biologist, professional technical collaborator
ARPA Umbria	PROTECTION AGENCY	Biologist, professional technical collaborator
ARPA Marche	PROTECTION AGENCY	Technical operator
ARPA Marche	PROTECTION AGENCY	Technical operator
GORI Acque	UTILITY	Laboratory technician
Publiacqua S.p.a.	UTILITY	Laboratory technician
VERITAS	ANALYSIS LAB.	Laboratory technician
A2A	UTILITY	Technical operator
A2A	UTILITY	Technical operator
GORI Acque	PRIVATE COMPANY	Technician
VIVA SERVIZI	UTILITY	Coordinator of the Drinking water department
<b>TOTALE</b>	<b>30*</b>	

\*Organizers excluded

**Table 7. List of participants of the Second Edition of the training courses**

Companies-Summary		Role of the participant in the Company
GNF	INTERNATIONAL FOUNDATION	Executive Director
ÜB Abt. Tiefbau	PROVINCIAL CIVIL ENGINEERING DEPARTMENT	Technical direction



Regional Resource Center, Croatia, ReRec	INTERNATIONAL ORGANIZATION	Researcher
GNF	INTERNATIONAL FOUNDATION	Programme manager
Hochschule Rottenburg	UNIVERSITY	Student
Chiemsee Naturführer	INTERNATIONAL FOUNDATION	Employee
Stadt Veszprém, Ungarn	PROVINCIAL DEPARTMENT	Technical office
Chiemsee Naturführer	INTERNATIONAL FOUNDATION	Employee
LCF	INTERNATIONAL FOUNDATION	Employee
Chiemsee Naturführer	INTERNATIONAL FOUNDATION	Employee
GNF	INTERNATIONAL FOUNDATION	Communications and Marketing Manager
WWA Rosenheim,	UTILITY	Technical operator
ÜB: Abteilung Tiefbau/Zweckverband Abwasserbeseitigung Überlinger See	PROVINCIAL CIVIL ENGINEERING DEPARTMENT	Technician
WWA Traunstein,	UTILITY	Technical operator
LCF	INTERNATIONAL FOUNDATION	Employee
Hochschule Rottenburg	UNIVERSITY	Student/Technical scientist
Technische Leitung Abwasserzweckverband Region Kesswil	UTILITY	Technician
ARA Romanshorn	UTILITY	Technical operator
ARA Steckborn	UTILITY	Technical operator

Abwasserzweckverband Münsterlingen; Scherzingen	8596	UTILITY	Technical operator
ARA Untersee, 8267 Berlingen		UTILITY	Technical operator
Università degli studi di Firenze		UNIVERSITY	PhD Student/Technical scientist
Università degli studi di Firenze		UNIVERSITY	PhD Student/Technical scientist
<b>TOTALE</b>	<b>23*</b>		

\*Organizers excluded

**Table 8. Summary of the participants of the Third Edition of the training courses- online session**

Summary	Info
Course Title	Microplastics in the Integrated Water System
Participants	<b>166*</b>
Provenience	Technical engineers mainly from water and environmental sector
Start time	6/12/23, 7:51:31 AM
End time	6/12/23, 4:10:11 PM
Duration	8h 18m 39s
Mean participation time	4h 30m 43s

\*organizers excluded

**Table 9. List of participants of the Fourth Edition of the training courses**

Companies-Summary	Role of reference
<b>Ingegneria Ambiente</b> <b>s.r.l.</b>	PRIVATE COMPANY Civil Engineer

<b>Laboratorio Control Srl</b>	<b>Eco</b>	LAB. ANALISI	Civil Engineer
<b>Beccaceci S.r.l.</b>		PRIVATE COMPANY	Project & Innovation Director
<b>Consul System SpA</b>		ENERGY SERVICE COMPANY	Energy referent in private company
<b>Ingegneria Ambiente s.r.l.</b>		PRIVATE COMPANY	Civil Engineer
<b>Consorzio ARETUSA</b>		WATER CONSORTIUM	Civil Engineer
<b>TOTALE</b>	<b>6*</b>		

\*organizers excluded

## Technical Protocol for Urban Water Service Infrastructure

In line with the objectives of the LIFE Blue Lakes project, the Polytechnic University of Marche contributed to investigating the presence of MP in DWTPs and WWTPs applying sampling and analytical optimized methods and analytical procedures developed during the project. Therefore, in the "*Analytical protocol for process control: microplastics (MPs) in drinking and wastewater treatment plants*" were detected concentrations, typologies and fate of microplastics in water treatment plants to better understand the production mechanism and to increase the mitigation of the release into the environment.

The resulted procedures used for the pilot study carried out in full-scale water infrastructures were described in the "*Technical report and operative manual regarding the improvement of the treatment process*", previously produced within the same Action B.3.

The "Analytical Protocol" together with the "Technical Report" represent the first harmonized guidelines for the monitoring and processing the microplastics samples in real scale water treatment plants highlighting possible technological solutions to reduce these contaminants in treated water and sludge.

### Training for operators of Water Service

In the context of Action B.4, UNIVPM realized teaching material and e-lessons thanks to the literature research collected and to the experimental work carried out from the beginning to the end of the project to increase knowledge on drinking water and wastewater treatment together with the technologies developed to improve the removal of microplastics (MPs). The courses were mainly delivered for operators and managers of the treatment plants of Water service and students and professionals in the environmental sector.

All editions of the training courses firstly introduced the theoretical concepts relating to the problems of the microplastics in the Integrated Water Service and showed the possible solutions tested within the project. In particular, the analytical protocol and the technical-operational protocol of the process were well detailed and explained.

The practical session in the UNIVPM laboratories and in real WWTPs allowed to practically show the processing and characterization phases of the samples, the application of the developed protocol and the difference between different sampling methods also using the prototype developed by UNIVPM during the project.

The **first edition** of the training course was organised in Ancona from 05-07.12.2022, reaching **30 participants** including employees of private labs, health and environmental agencies, environmental companies/associations and managers and operators of Water Utilities.

The **second edition** took place at Ancona, Italy, from 20-21.04.2023, reaching **23 participants** mainly employees from local authorities, managers of wastewater treatment plants and nature conservation centres around Lake Constance and Lake Chiemsee but also water experts and scientists from Bosnia-Herzegovina, Croatia and Hungary.

The **third edition** of the training courses consisted in an online session for the theoretical part on 12.06.2023 and the fourth edition in a practical part carried out in person on 23.06.2023. Both sessions were awarded credits from the engineer's association reaching in total **166 participants**.

### Post-survey results

The survey was structured in a way to get information from all the sectors related to the Integrated Water Service and environmental companies (analysis laboratories, water (multi)utilities, private companies).

Wherever possible, the questions included multiple choices from predefined options in order to make the answer process faster and simpler.

The content of the survey is reported in Annex B.

The first part of the questionnaire was focused on the expectations of participants from the training courses and on the importance of each covered topics to investigate the more critical aspects for the

technicians and managers but also for the scientific community. In the second part, the opinions on the teaching method and didactic aspects were requested.

### Data collection

The surveys were distributed to the utility contacts using a format from Google Modules, since it is a simple and open-source tool that allows users to answer and send back questionnaires in a fast and easy-to-use way. Using this online tool, the participants were able to fill in the questionnaire and directly send back their answers in an automatic way. Moreover, the online format facilitates the collection and the elaboration of the data. The number of answers collected was periodically checked and a reminder was sent to the interested contacts to enhance the participation and the number of replies.

The online tool automatically makes some elaborations from the answers collected such as the percentage of answers selected from multiple choice options together with graphs for a quick visual check.

The survey was distributed via email and 29 surveys were collected mainly from the water utilities.

### Results

As can be seen in Figure 2, 96% of the participants rated the courses up to their expectations and only 4% declared themselves fully satisfied only for the theoretical part. This feedback is more than positive showing the attention and the interest on the discussed topics and the possible knowledge increase for managers, technicians and operators of the Integrated Water Service, representatives of environmental associations and researchers.

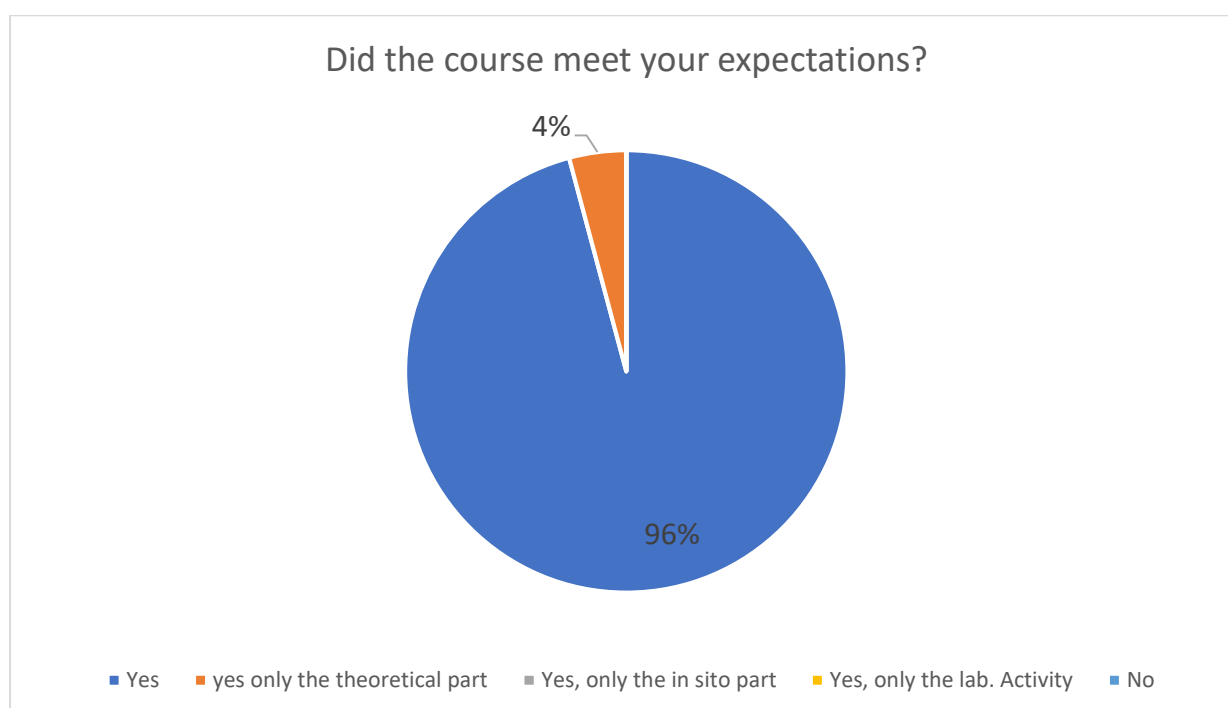
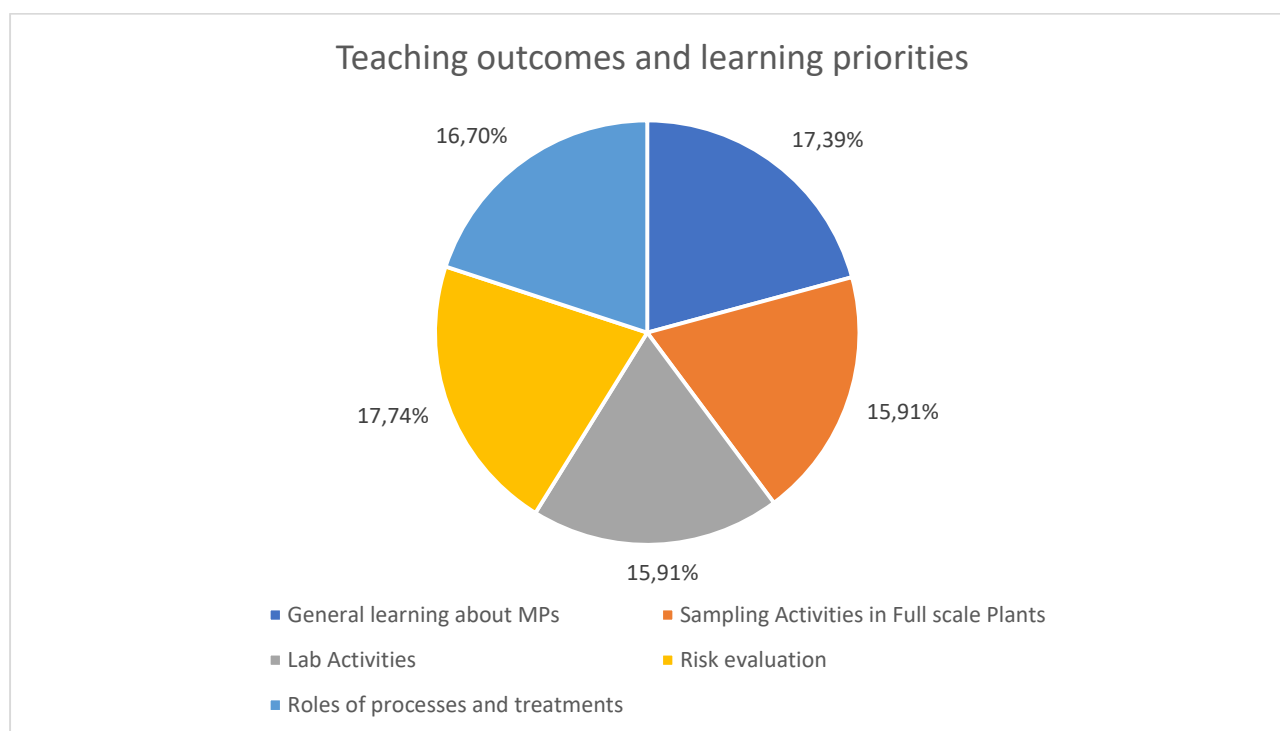


Figure 2. Participants expectations

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Furthermore, participants gave about possible future in-depth analysis. The main indications were: 1) Quick reminder of the instrumental techniques with explanation of the principle of the method, for non-analytical chemists and 2) Chemical characterization in the laboratory.

As it is possible to note in Figure 3, variables learning priorities were detected between the participants with main indications for General Learning, Sampling activities, Laboratory activities, Risk Evaluations and Roles of treatment.



**Figure 3. Teaching outcomes and learning priorities**

Finally, the feedback from the participants to the teaching aspects was positive recommending the course to other technical operators and managers and to specialized laboratory or technicians of plants.

## Conclusions

Over the next 5 years, the overall applications of the new drinking water directive (EC 2020/2184 ) and of the regulation on minimum requirements for water reuse (EU 2020/741) with the approval of the new Urban Wastewater and Wastewater Directive are expected. In this context, the public protocols developed by UNIVPM as part of the Blue Lakes project represent an important normalised approach for the sampling and monitoring approach and for technical removal strategies.

After the conclusion of the activities foreseen in action B4, an ex-post survey was carried out to assess the impact of the training courses on the managers and technicians of the Integrated Water System involved. In particular, a total number of 219 participants joined the 3 editions of the training course, more than what was expected in the approved project proposal (90 Managers and technical operators of Sewage Treatment Plants in Italy and 20 in Germany). The results of the surveys also highlighted a more active participation of the scientific and technical/managerial referents mainly to the session dedicated to Microplastic topic, confirming the opportunity to continue these activities in the future.

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In fact, as a follow-up of the LIFE Blue Lakes Project, UNIVPM started two MPs sampling and monitoring campaigns in two wastewater treatment plants (190000 PE and 197000 PE) by using the sampling and analytical Protocols developed within the project.

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## Annex B – Survey

# Feedback for the course "Microplastics in the Integrated Water Service"

Second edition of training courses dedicated to water service professionals, as part of the European project LIFE BLUE LAKES.

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For more info: <https://lifebluelakes.eu>



1. Did the course meet your expectations? \*

- ☐ Yes
- ☐ Partly
- ☐ Only the theretical part
- ☐ On site activities only
- ☐ Laboratory activities only
- ☐ No
- ☐ Other

2. Would you have preferred to see some of the topic in more details? If yes, which ones? \*

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3. In your opinion, is there a topic that hasn't been considered? If yes, which one?

4. Which importance level would you assign to the individual topics covered?

	very important	Important	Optional	Not important
Demonstration activities of in situ sampling	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Demonstration activities of laboratory analysis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
General training on the presence of microplastics in the Integrated Water Service	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Critical analysis of the field measurements obtained from the survey	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Framework of the microplastics topic in legislation and risk analysis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sampling methodologies and equipment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
General tools for analytical characterization	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
General analysis of the role of processes and operating units of treatment plants	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5. How would you assess the course content?

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	Very good	Good	Sufficient	Not sufficient
Topics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Useful for work	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How the topics were developed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

6. How would you assess the course development methodology?

	Very good	Good	Sufficient	Not sufficient
Course set up	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Didactic material delivered	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. How would you assess the teaching?

	Very good	Good	Sufficient	Not sufficient
Explanation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Degree of involvement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8. Would you recommend your colleagues to participate in the next editions?

- ☐ Yes
- ☐ Yes, especially to those in charge of the treatment service
- ☐ Yes, especially plant operators
- ☐ Yes, especially to lab technicians
- ☐ No
- ☐ Other

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## 9. Comments and suggestions

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## Chapter 4: Impact on Representatives of Companies from sectors using microplastics for production

On action B.5, national and international companies have been sensitized on microplastics. In the table 10, the main results achieved by action B.5 are described compared to those expected in the project proposal.

**Tab 10. Summary of the main results achieved by Action B.5 compared to the ones foreseen by the Proposal**

Action B.5 expected results	Results actually achieved by Action B.1	✓ / ✗
Informing <b>50 business</b> representatives of companies	<b>252 business representatives</b> of companies informed. Around 50 business representatives of companies have been informed repeatedly	✓
<b>20 businesses</b> in Germany and additional ones in other European countries demonstrating their interest.	<b>20 businesses</b> in Germany and additional ones in other European countries have demonstrated their interest:  <ol style="list-style-type: none"> <li>1. Continental AG</li> <li>2. Schwalbe/Ralf Bohle GmbH</li> <li>3. bleed clothing GmbH</li> <li>4. Lanificio Becagli</li> <li>5. Langbrett GmbH</li> <li>6. Polartec (Senel Celik, Sales Marketing DACH, Island, Türkei, NL)</li> <li>7. Salewa (gehört zur Ober AlpGroup); OBERALP AG-SPAVIA (ITALY), Oberalp Deutschland GmbH</li> <li>8. Sportsella</li> <li>9. Sympatex Technology</li> <li>10. VAUDE Sport GmbH &amp; Co. KG</li> <li>11. A. Moras &amp; Comp.</li> <li>12. Alviana Naturkosmetik</li> <li>13. Primavera Life GmbH</li> <li>14. Jungglück</li> <li>15. Weleda AG</li> <li>16. dm</li> <li>17. Schöffel</li> <li>18. Autarcon GmbH</li> <li>19. INTEWA GmbH</li> <li>20. SEBA Hydrometrie GmbH &amp; Co. KG</li> </ol>	✓
<b>3 Companies</b> from relevant industry sector (Tyre, Cosmetic and Outdoor) signing the <b>MoU</b>	<b>4 Companies</b> from relevant industry sector (Tyre, Cosmetic and Outdoor) signing the <b>MoU</b> :	✓

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	<ol style="list-style-type: none"> <li>1. Selbstverpflichtung Textil BLEED</li> <li>2. VAUDE</li> <li>3. Zero Below</li> <li>4. Primavera Life GmbH</li> </ol>	
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### Adhesion of national and international companies to battle against micro plastic

This chapter summarizes and describes the LIFE Blue Lake project impacts regarding activities addressed to companies from three defined focus business sectors using or creating microplastics (B.5). The aim of Action B.5 was to involve national and international companies in Blue Lakes and sensitize them better on the topic of microplastics and how companies can contribute to reduce **microplastic** in the first place. The three sectors identified as the most relevant ones are the cosmetics and personal care industry, the outdoor garment or textile industry and the tyre sector. In the LIFE Blue Lakes project, companies from the tyre, cosmetics and outdoor textile and garment sectors, but also to a certain extent from the water industry and agricultural sector were targeted. The aim of action B.5 was to raise awareness of this issue and to discuss possible solutions for companies to avoid plastic in the manufacturing process or the use of the products in order to reduce the impact on the environment and especially on water bodies.

### Identification of the relevant industry sectors

Despite there is also no globally uniform definition of microplastics, in a study by the Fraunhofer Institute for Environmental, Safety and Energy Technology (UMSICHT) "Plastics in the Environment: Micro and Macro plastics", abrasion of tyres ranks first among the sources of microplastics input. Therefore, this industry had to be addressed in the project. The industry is very large but is dominated by only a few companies. Fibre abrasion in textile washing is in tenth place and the presence of micro plastics in cosmetics at 17th place. The products from the selected industries affect more or less every single citizen living in Europe. They are products of daily use and are therefore particularly suitable for raising awareness of the issue among the population.

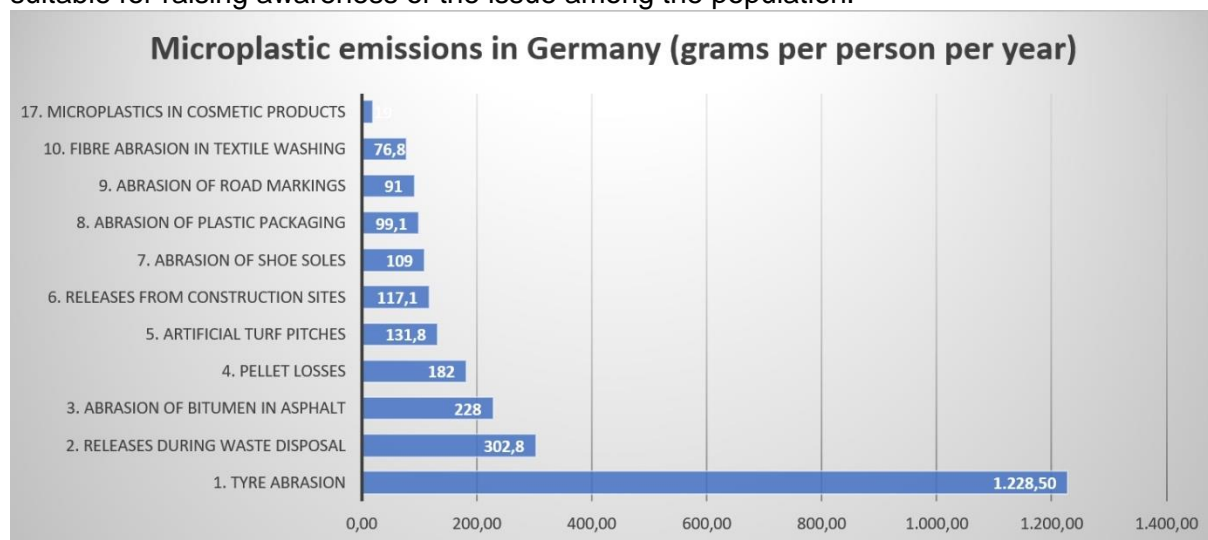


Figure 4. Data Source: Microplastics Consortium Study (2018) of the Fraunhofer Institute for Environmental, Safety, and Energy Technology UMSICHT, Germany.

Against this background, GNF and LCF have involved three business sectors that are highly responsible for microplastics contamination. Various companies from the cosmetics, outdoor and

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tyre industries were approached and engaged in a participatory process. National and international companies have been approached, consulted and sensitized (i.e. via round tables). Sector specific Round Tables have been conducted involving various experts from the selected business sectors. The Round Tables have been organized online due to COVID. However, this had the advantage that more different actors from different regions and departments, such as the sustainability department, participated in the events. Furthermore, sector-specific Fact Sheets have been publicized summarizing the problems of microplastics. They have been used on different events and meetings, as they introduce the topic in a short and understandable way.

Finally, we tried to motivate companies to sign a Memorandum of Understanding aiming at a more sustainable production and use. The European Living Lakes Association (ELLA) picked up this topic and approached companies in other EU countries, too. All in all, the most responsive industry has been the outdoor clothes sector. The cosmetics industry has been rather inactive and reluctant as they seem to wait for a final legal framework to be developed by the ECHA, the EU Chemical Agency. And the tyre industry is also very reluctant to address this topic.

### Fact Sheets for three business sectors

As a basis for identifying the microplastics problem in the respective sectors, three fact sheets were compiled. The pollution and impact on the environment and water bodies was documented, but also the current legal and regulatory situation. With the help of these fact sheets, the current problems were identified and created the basis for a dialogue with the industry. Likewise, the fact sheets serve as knowledge transfer in general. The fact sheets have been sent to a total of around **300 relevant companies, business associations and institutions** and are available online for download ([GNF - Entry of microplastic in German and Italian lakes \(globalnature.org\)](https://www.globalnature.org/)).

## Tyre industry

Tyre wear particles (TWP) or tyre road and wear particles" (TRWP), the abrasion of car tyres and bitumen, are by far the largest source of microplastics input into the environment. The billions of tyres that are worn out world wide every year form the largest single source of microplastic particles into the environment. Although there is no standardized method to analyse TWP yet, estimates show that they are responsible for 30-50% of all microplastic emissions in the EU. Even for microplastic fractions that can be caught by the filters of sewage treatment plants, it is not always guaranteed that they will not be released back into the environment. This is because only a certain proportion of the sewage sludge from the plants is incinerated. Of the total of 1.7 million tonnes of sewage sludge (dry matter) from municipal wastewater treatment plants in Germany in 2017, for example, more than 28 % was used as fertiliser in agriculture or landscaping measures (BMU 2017). A study published in 2018, for example, shows 150,000 microplastic particles per hectare on German fields (Piehl 2018). What proportion of these ultimately end up in surface waters and groundwater – and thus in our food chain – is still completely unclear at present.

### The approach of GNF in the framework of Blue Lakes: identify the relevant actors

In the beginning of the project, a list of relevant stakeholders and multipliers on regional and national level, relevant tyre manufacturers and Umbrella organisations has been compiled (B.5.1) as well as a list of relevant trade fairs and events (deliverable B.5.4) and sector specific media contacts (B.5.5). After that, all companies identified have been contacted individually in March 2021 in order to inform about the Blue Lakes project and to establish direct contacts to the relevant experts within the companies. Generally speaking, companies have been rather reluctant to agree to a dialogue or show a certain position or commitment in view on the topic of microplastics and tyres.

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In June 2021, GNF published a 17 pages “Fact Sheet on microplastic emissions from car tyres” in German and English language. In the fact sheet, GNF has also identified the positions and policies of larger companies from the tyre industry about microplastics, i.e. from the four tyre manufacturers with the highest turnover that are part of the Tire Industry Project (TIP). From our experience, the tyre industry does not see high significant hazards from tyre abrasion for the environment and humans. And we believe that the tyre industry will stay rather inactive and “quiet” in order to avoid that a certain (financial) responsibility will be imposed on them. The fact sheet has been shared with all project partners and relevant stakeholders and can be found for free download on GNF’s project website.

Despite rather few positive feedback in the direct bilateral conversations, contacts, meetings and exchanges, GNF aimed at involving the tyre industry in an open dialogue through a Round Table Event. This event has been finally conducted on 14.07.2023 as an Online Event. Among the invited speakers have been experts such as Dino Silvestro from the German automobile club ADAC introducing a study on tyre abrasion, alternative materials and security and Daniel Venghaus from the TU Berlin talking about the project „Out of the Gully – Development of a microplastic filter for road gulleys”. The participants at the Round Table, including the few from tyre companies, showed a very open attitude and we had a very lively discussion. There was an interest expressed to continue the exchange, i.e. in the framework of the Fair Rubber Association that is coordinated by GNF.

### Conclusion

By far the largest quantities of microplastics are produced by tyre abrasion and abrasion of road surfaces or road markings. Many of these abrasions are currently hardly avoidable technologically. However, the quantities could be reduced, e.g. by optimizing the production processes of the tires, e.g. removal of production residues, lower vehicle weights, speed limits, or collection of the microplastic abrasion at particularly neuralgic points, e.g. intersections and traffic lights. Sufficiently substantiated information on this is available from passenger car associations (such as ADAC in Germany). However, many of these measures are considered rather unpopular, so that also here in regulatory approach of the EU with clear regulations and polluter pays principle to cover the costs is necessary.

### Results and finding: What can be done to reduce the problem and possible solutions to reduce microplastic emissions associated with tyres

There are different ways for tyre manufacturers to approach the issue of microplastics. Tyre abrasion is particularly prevalent on curves and at traffic lights. Road sweepers and decentralized filter systems could be used to specifically reduce it there. In addition, driving regulations and speed (driving behaviour) have a high influence on the abrasion rates.

The German automobile club ADAC defined the following recommendations for drivers and manufacturers<sup>1</sup>:

- Frequent drivers in particular should buy tyres with low wear - this not only saves money, but also protects the environment.
- Summer/winter tyres should be changed seasonally so that they do not fall out of the appropriate temperature window, thereby unnecessarily increasing wear.
- The tyre pressure must be checked regularly. Too low a pressure can increase wear just as much as too high one.
- The axle settings should be checked at regular intervals at a specialist workshop - at the latest when an uneven wear pattern is noticed on the tyre.

<sup>1</sup> [Umweltproblem Mikroplastik: Fakten zum Reifenabrieb \(adac.de\)](https://www.adac.de/umwelt/mikroplastik/fakten-zum-reifenabrieb)



- An even and anticipatory driving style not only ensures low fuel consumption, but also ensures less tyre wear.
- Modern tyres can be low-wear and safe at the same time. Tyre manufacturers must make better use of this technological leap in future developments to reduce the environmental impact of tyre wear.
- Today, a premium tyre is no longer defined only by safe and driveable tyres. The so-called premium manufacturers in particular should be aware of their responsibility and attach much greater importance to the issue of tyre wear, especially in public perception and advertising statements.
- Ultra-high performance tyres hardly improve driving safety in normal road traffic, but belong on the race track. Tyre manufacturers should therefore focus more strongly in the future on tyres that are both safe and environmentally friendly.

In addition, GNF has identified and prioritised the following approaches.

### **Research and generate knowledge**

It should be important for companies to generate knowledge, i.e. to ensure that the causes of microplastic emissions are identified in more detail. The participation of companies in such research is still insufficient. This includes, for example, understanding which production processes, materials, processing steps or usage behaviour cause particularly high levels of tyre wear.

### **Finding solutions together**

A good way is to act together with actors who have similar goals. One approach is a closer collaboration of the European TRWP platform initiated by ETRMA (European Tyre and Rubber Manufacturers' Association) with environmental organisations. The tyre industry so far has shown little interest in such exchange and dialogue, particularly against the risk of more “internalisation of externalities” or polluter pays principle.

### **Rethinking product development**

In product development, the findings of technology for more sustainability are not always realised quickly, i.e. even ADAC underlined that removing production residues, so called rubber bristles, on the tyres before they go on sale will lead to valuable improvements. Long-term product development, such as researching new materials and their properties, requires perseverance and long-term strategies.

### **Capture the entire life cycle**

For the tyre industry, there are currently few motivations and incentives to influence and minimise tyre wear during the whole life cycle, i.e. taking influence on driving behaviour, i.e. through automobile clubs and driving schools or reduced vehicle weight or the appropriate road surface.

### **Material selection**

Tyres consist of a complex, extensive mix of different components. For each of these materials, it is important to continuously research possible alternatives, also taking into account microplastic emissions. Alternative materials (i.e. wood, straw) are currently being researched for their suitability for tyre production, but so far there are no clear solutions visible.

### **Political and legal requirements on microplastics in the tyre industry**

In connection with the European Green Deal, a ban on microplastics has been discussed for many years. Specifically, this refers to the seventh annex of the REACH Regulation. The REACH Regulation regulates the handling and introduction of chemical substances into and within the European market. The European Chemicals Agency (ECHA), in consultation with the Risk Assessment Committee (RAC) and the Socio-Economic Analysis Committee (SEAC), has developed a proposal between 2017 and 2020 on how to restrict the intentional use of microplastics

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in the future. This microplastic ban from the European Green Deal, if adopted, will thus ban intentionally introduced microplastics (primary microplastics). Unfortunately, this draft law regulates only a minimal proportion of the microplastic emissions generated, at around 0.2 per cent, and only under certain boundary conditions (EEB 2020). For the tyre industry, the current draft law is therefore of little significance. The focus of the discussion on the adaptation of the EU regulation is thus the definition of microplastics, as this determines whether individual sectors will be affected by the ban or not. It can be assumed that new regulation with the current adjustments will come into force from around 2023 or 2024, but the legislation will not define any restrictions for the tyre industry.

### **Excursus: Natural Rubber**

Due to a growing tyre market but also caused by the discussion about microplastics, the demand for natural rubber for tyres is increasing. What sometimes is overlooked is that this can have massive negative consequences for the countries where rubber trees are cultivated. i.e. land theft, deforestation and poor wages. Existing tyres are therefore not sustainable, not even when made with more natural rubber. Against this background, Global Nature Fund became a member of the Fair Rubber Association, a multi-stakeholder initiative founded in 2012. Very recently, GNF took over the secretariat role for the Fair Rubber Association. The Fair Rubber Association directly certifies rubber using an own standard and also supports its partners in achieving FSC® certification. GNF aims at involving more tyre companies in the Fair Rubber Association. The bike tyre manufacturer Schwalbe already became a member in the Association.

Further information: [www.fairrubber.org](http://www.fairrubber.org)

### **Textile industry**

The relevance of microplastics in the environment has grown for the textile industry as the proportion of synthetic fibres is steadily increasing (CIRFS 2021). Outdoor industries and sports textiles are particularly involved in this trend, as they use a high proportion of synthetic fibres to achieve certain functions such as quick drying or low weight. For these properties, the fibres are appropriately finished by various processes or with chemicals. Fibres from textiles made from renewable raw materials (e.g. wool, cotton) can also become non-degradable due to treatments such as dyeing or impregnation. In order to include these types of fibres and to avoid confusion with the widely used term "microfibre" in textile products, the term "fibre fragment" is increasingly gaining acceptance in the industry as a designation for textile microplastics. Fibre fragments are produced on the one hand during the manufacture of garments, but also during their use. Among other things, fibres are released through mechanical abrasion during washing processes in the washing machine. The number of spinners, the load quantity and the time play a significant role (Textile Mission 2021). However, it has been proven that a proportion that should not be underestimated is also released during wear, especially into the air (CIA 2020).

Investigations for the example of Germany have shown that on average about 76.8 g of fibre fragments are produced per person and year by textile washing (e.g. clothing) and about 66 g by household laundry, i.e. towels, etc. (Bertling 2018). Studies show that conventional washing machines are not (yet) able to retain these fibre fragments and they thus enter the wastewater treatment plants via the wastewater. The so-called fourth and fifth treatment stages in sewage treatment facilities can remove a large portion (but not all) of such contaminants (BUND 2018). However, they are only installed in few wastewater treatment plants in the EU so far, due to high investment costs. However, if microplastics is being collected by filters in sewage treatment plants, it must be made sure that the sewage sludge from the plants is not used as fertiliser in agriculture.

### **The approach of GNF in the framework of Blue Lakes: identify the relevant actors**

In the beginning of the project, a list of relevant stakeholders and multipliers on regional and national level and in particular relevant outdoor companies and manufacturers has been compiled (deliverable B.5.1) as well as a list of relevant trade fairs and events (deliverable B.5.4) and sector

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specific media contacts (deliverable B.5.5). After that, all companies identified have been contacted individually in 2020, and again in 2022 and in particular and intensively in 2023.

A number of companies (i.e. Bergans, Didrikson, Oberalp Group, Patagonia, Polartec, Sympatec, Vaude) showed a high interest in an exchange and GNF involved a textile expert from the GNF team in the expert conversations. GNF has been able to establish a very lively dialogue with a larger number of key companies from the outdoor industry and we have experienced a very high willingness to cooperate and reveal internal policies and commitment in view on how the companies handle the topic of microplastics and tyres.

Ultimately, this helped to motivate several off the contacted companies to sign a “**Blue-Lakes-MoU**”.

### **Understand and define the topic**

In March 2021, GNF published a “Fact sheet on microplastics in clothing and textile products” in German and English language. In the fact sheet, GNF has also identified the positions and policies of larger companies from the outdoor and textile industry on the subject of microplastics, comprising not only outdoor companies but also larger fashion companies, such as Nike, H&M, Adidas and Fenix Outdoor. The fact sheet has been shared with all project partners and relevant stakeholders and can be found for download on GNF’s project website.

### **Approach and involve the industry**

After very positive feedback in the direct bilateral conversations and meetings in 2020 and 2022, GNF organised a Round Table on 21. October 2022 as an Online Event. Among the invited speakers have been experts from Salewa Germany (Oberalp Group), Vaude GmbH & Co. KG, Sportsella, Sympatex Technology GmbH, Langbrett GmbH and bleed clothing GmbH. The participants at the Round Table showed very high interest in exchange and further and intensified collaboration. After the event, GNF continued with the intensive bilateral contact and exchange and managed to motivate four of the contacted companies to sign a MoU. After the end of the Blue Lakes project, GNF will continue the exchange with the active companies and stakeholders, primarily in the framework of the “Fair Wear Works” activities (see Fair Wear Works – Sustainable textile purchasing (globalnature.org) that are coordinated by GNF.

### **Conclusion**

The outdoor industry considered shows a great interest in dialog and has already undertaken a wide variety of measures to reduce or avoid microplastic waste from clothing with synthetic fiber content. In this industry, the willingness to engage in dialogue and the interest in cooperation was also by far the greatest of all company sectors. All companies that were willing to sign a MoU derived from this industry. In addition to the various measures to reduce the quantities, such as pre-washing of the products before sale, catching the microplastic particles during the washing process through special filters in washing machines could also be a sensible measure. Here, too, EU-wide regulation (level playing field) would have to motivate or force washing machine manufacturers to install suitable filters.

### **Possible solutions to reduce emissions from microfibres in connection with textiles**

Some companies from the textile industry are already aware of the risks posed by microfibre emissions to water and living organisms. There is increasing interest in finding measures and solutions to this problem. The ways in which companies are addressing this challenge can be described in the following four categories:

### **Research and generate knowledge and find solutions together**

Particularly in the areas of production processes, materials, processing steps or usage behaviour, questions arise that are difficult to research without corporate participation. Alternative materials and their acceptance by the target groups, as well as the development and testing of new business models in which textiles can be used for longer, also require a close exchange between research and practice. Researchers at the University of Leeds in the UK have developed a measurement

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method that can reliably determine the amount of small fibre fragments released from textiles during household washing (Leeds UK 2021). A good example of close cooperation between associations and research institutions is the Cross-Industry Agreement (CIA 2020). The CIA published a brochure with new findings on preventing the release of microfibrils when washing synthetic textiles. Relevant umbrella organisations such as the European Outdoor Group (EOG) also have the topic of microfibre emissions from textiles on their agenda. Another good example is "The Microfibre Consortium", which promotes the development of practical solutions for the textile industry, e.g. fibre fragmentation in textile production and product life cycle. Cooperation between textile companies and washing machine manufacturers is important and needs to be intensified, i.e. washing machine filter of Planet (Planet Care 2022).

### **Rethinking product development and improve production processes**

Large environmental problems can be avoided or solved in the product development phase before the product life cycle. Which part of the production process is particularly relevant for the generation of fibre fragments varies from company to company, but there is clear evidence that after production a pre-drying process will remove production residues from the product. Otherwise, large portions of fibre fragments are produced by the customer during the first three washing cycles (TextileMission 2020).

### **Material selection, circular economy and longevity**

Fibre fragments are not only produced by synthetic materials but also from raw materials such as wool or cotton, if treatments such as dyeing, or impregnation make those fibres difficult to biodegrade. Various desired functions, such as low weight or quick drying are often not fulfilled by natural materials. In a study conducted by the TextileMission project, cellulose regenerated fibres in particular proved to be the most efficient, as they are both sustainable in production and biodegradable and can therefore reduce microplastic emissions in the environment (TextileMission 2021). A recent trend towards "fast fashion" has created problems of clothing disposal. So far, less than 1% of textiles are recycled, more than 80% of textiles end up in landfills (GIZ 2019). Companies that want to reduce emissions from fibre fragments must focus on durable, high-quality textiles. There are also approaches to offering a repair service for high-quality textiles, which can significantly extend their durability and lifespan.

### **Thinking holistically about sustainable issues and communication**

Even ambitious companies have experienced that solving one sustainability problem creates another. For example, the cultivation of cotton and viscose is linked to high chemical and water use. Land requirements also play a role. In some cases, cultivation leads to the deforestation of tropical rainforests (Lifechange 2017). Customers also have an influence on the formation of microplastics. Choosing the right washing programme, for example, can reduce microfibre emissions. The choice of detergent, temperature and load also influence the formation of fibre fragments during the washing process. New scientific research confirms that, for example, shorter wash cycles at lower water temperatures can drastically reduce the emission of microfibrils from textiles (Leeds UK 2020). This information should be communicated to customers, for example on labels, websites or enclosed information.

### **Political and legal requirements on microplastics in the textile industry**

The "REACH Regulation" regulates the handling and import of chemical substances into and within the European market. The European Chemicals Agency (ECHA) is an authority of the EU and, in consultation with the Committee for Risk Assessment (RAC) and the Committee for Socio-Economic Analysis (SEAC), has developed a proposal between 2017 and 2020 on how the intentional use of microplastics can be restricted in the future. This microplastic ban from the European Green Deal bans (if passed) intentionally used and introduced microplastics (primary microplastics) – but only from a size of 300 nm. Thus, the draft law only regulates a minimal share (about 0.2%) of microplastic

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emissions and only under certain conditions (EEB 2020). For the textile industry, the current draft law is therefore hardly relevant. ECHA has adapted the microplastic definition in 2020 so that nanoplastics are no longer part of the definition (ECHA 2020). Environmental organisations criticise this adjustment, as nanoparticles are considered particularly toxic and can even penetrate human cells (EEB 2020). It was announced that a new regulation with adjustments shall come into force in 2022. It took until April 2023, when representatives of the EU member countries in the REACH committee voted to restrict intentional added microplastics in various products. After a three months scrutiny period by the European Parliament this proposal shall be adopted by the Commission. To our knowledge, this has not happened by now (Sept. 2023). Finally, it is expected that the Committee will allow various industry sectors transitional periods to implement the ban, i.e. for sports fields, detergents and pesticides, but also for cosmetic products.

## Cosmetics industry

The cosmetics and personal care industry uses synthetic polymers (plastics) in a variety of products. Synthetic polymers serve, among other things, as exfoliating particles, binders, film formers and fillers in shower gels, shampoos, creams and decorative cosmetics. Ingredients, such as polypropylene, polyacrylate or nylon-12, must be indicated on the packaging. However, consumers are usually unaware that these are microplastics. In cosmetic products microplastics are either avoidable or can be substituted or replaced by natural products, i.e. beeswax, minerals or nutshells. One central reason that manufacturers in the cosmetics industry do not use natural substances instead of synthetic polymers is that microplastics are cheap to produce and can be given special properties. GNF has identified two dialogue oriented approaches to involve the sector into solutions. One would be a change of demand by consumers, a second approach would be a change of legislation, concrete a ban of certain chemical ingredients in cosmetics and alternatives to them. We have contacted institutes such as the Fraunhofer Institute for Environmental, Safety and Energy Technology (UMSICHT). There are countries such as Sweden that have already banned microplastics in cosmetics by law. In Germany, the Industrial Association for Personal Hygiene and Detergents (IKW) has only presented a voluntary commitment by the cosmetics manufacturers remove microplastics from cosmetics in 2016. Most cosmetics manufacturers do not sufficiently comply with the voluntary commitment to no longer use microplastics. GNF has contacted the German Federal Environment Agency (UBA) and the European Chemicals Agency (ECHA) in view on ECHA's plans to legally restrict or ban the use of microplastics in ban microplastics cosmetic products, personal care products, cleaning products and detergents in 2022. In its shopping guide on microplastics in cosmetics, the German environmental organisation BUND lists on 35 pages which products still contain microplastics (as of August 2019) (source 10). Through various consumer apps, the customer can also check precisely in the shop whether or not a product contains microplastics or also other substances that are harmful to health or the environment. The German website of the "Consumer Window Hessen" provides an overview of various apps on its homepage (source 11). The impact on the purchasing behaviour of customers is continuously increasing. BUND also runs a campaign against microplastics in cosmetics, feels out the big companies and exerts pressure so that the voluntary commitment of the cosmetics industry makes further progress. Numerous other associations and initiatives are also conducting campaigns to avoid and reduce microplastics.

## Possible solutions to replace microplastics in cosmetics

What alternatives are there for the industry not to use microplastics and polymers in their products? Substitutes are i.e. bio-waxes such as vegetable waxes or beeswax. Microplastics can also be replaced by certain clays or silica minerals. Some manufacturers of cosmetics also use nut shells, sugar surfactants, silicic acid, linseed and healing earth from glacial loess deposits in their scrubs. According to the cosmetics industry, plastics are cheap to produce and can be given special

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properties needed for the products during synthesis. If demand were to change and legislation were to point in a corresponding direction, there would be more alternatives. Industry concerns are the quality standards and whether the desired properties are met in the cosmetic products. In Germany, two institutes of the Fraunhofer Institute are working on microplastics in cosmetics and alternatives to them. One is the Institute for Environmental, Safety and Energy Technology (UMSICHT) in Oberhausen and the Institute for Microstructure of Materials and Systems (IMWS) in Halle. The Fraunhofer Institute UMSICHT has published a comprehensive study on microplastics in cosmetics as well as detergents and cleaning agents. The IMWS is working together with companies on this as part of the KostLigCel research project.

### **Political and legal requirements on microplastics in cosmetics**

In Sweden and the UK microplastics in cosmetics have already been banned by law. In Germany, the Industrial Association for Personal Hygiene and Detergents (IKW) represents the cosmetics manufacturers. According to a voluntary commitment, microplastics are to be removed from cosmetics by 2016. Unfortunately, this only worked in part. The European Chemicals Agency (ECHA) was planning to restrict the use of microplastics from 2022, but still in 2023 this ban was not yet implemented.

### **Current status in the cosmetics industry**

Many cosmetics manufacturers do not sufficiently comply with the voluntary commitment to no longer use microplastics. Some smaller companies advertise that they do not use microplastics and provide information about the problem. The bigger companies also use less microplastics, but there are still a lot of products that contain microplastics. In its shopping guide on microplastics in cosmetics, the German environmental organisation BUND lists which products still contain microplastics (2019). A number of apps (i.e. ToxFox) help the customer to check in a shop whether or not a product contains microplastics or also other substances that are harmful to health or the environment.

### **The approach of GNF in the framework of Blue Lakes: Identify the relevant actors**

In the beginning of the project, a list of relevant stakeholders and multipliers on regional and national level and the relevant cosmetic companies and manufacturers has been compiled (deliverable B.5.1) as well as a list of relevant events (deliverable B.5.4) and sector specific media contacts (deliverable B.5.5). Companies have been contacted but most companies did not show interest in an exchange and GNF.

### **Understand and define the topic**

In March 2021, GNF published and circulated a 16 pages "Fact sheet on microplastics in cosmetic products" in German and English language. In the fact sheet, GNF has also identified the positions and policies of relevant companies from the cosmetics industry such as Beiersdorf, Colgate Palmolive, Johnson & Johnson, L'Oréal, Protcer and Gamble and Unilever but also drugstore such as dm, Müller, Rossmann and Body Shop. The fact sheet can be downloaded on GNF's project website.

### **Approach and involve the industry**

Despite rather few positive feedback from the cosmetics industry, GNF organised a Round Table "Mikroplastik und die Kosmetikbranche" on 25.11.2022 as an Online Event.

### **Conclusion**

The cosmetics industry is not particularly interested in a dialog on the subject of microplastics and cosmetic products. Voluntary measures to avoid microplastics in cosmetic products have not been particularly successful in our opinion to date. We therefore assume that only a regulatory approach will significantly reduce or avoid the microplastic additives in cosmetic products that are actually not necessary or substitutable in the long term. The cosmetics industry currently appears to be waiting for a clear decision or regulation from the European Union or ECHA and is unlikely to take action

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until then. Since microplastic additions (micro beads) in cosmetic products are usually easily substitutable or generally not necessary for the function, a clear ban would be a sensible measure.

### **Political and legal requirements on microplastics in the cosmetics industry**

As mentioned earlier, the EU member countries in the REACH committee voted in April 2023 to restrict intentional added microplastics in various products, including detergents and personal care products. To our knowledge, this overdue ban of microplastics in cosmetic products is not yet valid. It is expected, that the Committee will allow longer transitional periods (5 - 8 years) until the final substitution of synthetic polymer micro particles in make-up and other cosmetic products.

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## Chapter 5: Impact on Governance of decision-making processes

Action B.6 aimed to strengthen the governance processes of key Italian institutional stakeholders responsible for water management, in order to improve existing national policy and legislation including aspects related to MPs pollution and to create a cooperative model between the network of involved institutions. One of the main priorities was sharing information among various partners and involving numerous relevant national, regional, and local administrations concerned with the issue of inland water pollution, through the coordination of ABDAC.

Starting from June 2020, a specific Project Impact working group has been set up and include representatives of ABDAC, ENEA, UNIVPM, ARPA Umbria and Legambiente.

The **Lake White Paper** (DB6.1) is an institutional tool aimed at sharing knowledge and needs to address the problem of MPs in inner water. It was drafted based on the large amount of information collected during the implementation of action B6. The Lake White Paper is a starting point for concretely addressing the issue of MPs pollution in lakes since it contains a range of operational proposals aimed at improving the current Italian legislative framework for the purpose of promoting a better management of MPs in fresh waters.

ABDAC and Legambiente identified in the Permanent Observatory on Water Uses of the Central Apennine District (here forward ABDAC Water Uses Observatory) the best context in which to activate the **Working Panel**, whose activities started in January 2020 and continued till the end of the project. A total of **8 plenary meetings** and **12 bilateral meetings** of the Working Panel were held as expected by the project.

The list of Working Panel plenary meetings is reported in the following Table 11.

Number	Description	Date
1	Permanent Observatory on Water Resources of the Central Apennine District	18/02/2020
2	Permanent Observatory on Water Resources of the Central Apennine District	15/12/2020
3	Permanent Observatory on Water Resources of the Central Apennine District	20/04/2021
4	Permanent Observatory on Water Resources of the Central Apennine District	29/11/2021
5	Permanent Observatory on Water Resources of the Central Apennine District	19/05/2022
6	Permanent Observatory on Water Resources of the Central Apennine District	14/12/2022
7	Permanent Observatory on Water Resources of the Central Apennine District	23/02/2023

8	Permanent Observatory on Water Resources of the Central Apennine District	20/04/2023
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**Table 11: Working Panel plenary meetings.**

The White Lake Paper took into consideration the main project results for preventing the spread of microplastics in surface water bodies, such as the Lake Paper (action B.1), the Monitoring Protocol (action B.2) and the Technical Protocol (action B.3). Considering the technical complexity to carry out this task and the need to elaborate an exhaustive document being able to provide effective and concrete proposals to deal with MPs management and reduction in inner water, ABDAC identified, in accordance with Legambiente, a recognized expert on water management and EU policies which was appointed to lead and speed up the process.

In May 2022, a detailed **roadmap** for the elaboration of the **White Lake Paper** was drafted and shared with all the project's partners. Moreover, **15** selected public and private **stakeholders** were identified and then interviewed through a semi-structured interview, with the aim of collecting opinions and comments to explore perceptions on the various aspects of the problem.

The contents of the Lake White Paper were then developed during plenary and bilateral meetings (informative sessions) and through the administration of a questionnaire, with the aim of:

- Exposing to institutional stakeholders the work carried out within the LIFE Blue Lakes project;
- Collecting and integrating the suggestions arose by the stakeholder into the Lake White Paper

The preliminary draft of the White Paper was shared in spring 2022 with the project partners and during institutional plenary and bilateral meetings with identified relevant stakeholders. The White Lake Paper was then revised and integrated in the following months taking into account the contribution provided by the stakeholders, and finally it was delivered in June 2023. The final version of the Lake White Paper was presented during a National Conference that was held in Rome on 19/07/2023.

The White Lake Paper provides information about the definition of microplastics, their origin and quantification in Italian inland waters. Moreover, a summary of the European and Italian legislation on the prevention of microplastic pollution is included.

## Conclusion

The White Lake Paper highlights how the actions and documents developed within the LIFE Blue Lakes project including the proposals for innovative and effective monitoring and management are essential elements in the identification of the gaps that will need to be filled in order to solve the problem of the presence of microplastics in inland surface waters. A paper version of the Lake White Paper was printed and a digital version has also been made available online in both Italian and English language.

In line with the EU strategy regarding plastics and the Action Plan for the Circular Economy, LIFE Blue Lakes project partners carried out relevant dissemination activities as part of the project actions. The main aim of these activities was to prevent and reduce MPs pollution as soon as possible, in line with the current implementation of European regulations. The operative proposal provided by the Lake White Paper can be immediately applied in pilot actions in existing planning and programming tools relating to the management of water resources.

Taking into consideration both the monitoring of surface waters, pending the obligation that will be expected with the future transposition of the updates to the water framework directive and the specific directive on urban waste water (directive 271/91), and for drinking water intended for human



consumption (Directive (EU) 2020/2184 of the European Parliament and of the Council, of 16 December 2020, concerning the quality of water intended for human consumption was transposed into Italian law through Legislative Decree 23 February 2023, n. 18. The Decree has been in force since 6 March 2023), it was found that the Monitoring protocol (B.2) integrates well with other existing ones, including that of the *Istituto Superiore della Sanità* responsible for water intended for human consumption for the implementation of specific monitoring.

Attention must also be paid to the need to reduce the production of microplastics at the source, directing efforts on the economic activities affected by the production considered to cause the generation of microplastics, but also optimising the management of solid urban waste. The very recent REGULATION (EU) 2023/2055 OF THE EUROPEAN COMMISSION of 25 September 2023 concerning the registration, evaluation, authorization and restriction of chemical substances (REACH) with regard to synthetic polymer microparticles goes in this direction.

## Chapter 6: Impact on Citizens of the 5 lakes involved

The evaluation of the dissemination activities on citizens of the 5 lakes involved and the general public completes the assessment of the project impact on the target groups.

### Events

During all events organized in the context of action D.2, a short questionnaire was distributed to participating people to assess their opinion on the information received.

The following questions were included:

- Are you aware of the impacts of microplastics on biodiversity and health?
- To what extent the information received was interesting / useful?
- Does the information received will influence your behaviour (e.g. choice of commercial products, choice of tourist offers, etc.)?
- What commitments are you available to make to reduce your plastic impact?

The questionnaire was also uploaded on a [Google Form](#) in order to reach a greater audience. A QR code linking to the online form was printed and disseminated during the summer events (Lakes Days, Roadshow, public conference, etc.).

Here below the main results of the survey.

Fig 12 shows that up to the end of the project in September 2023, a total amount of **175 people** answers have been collected.

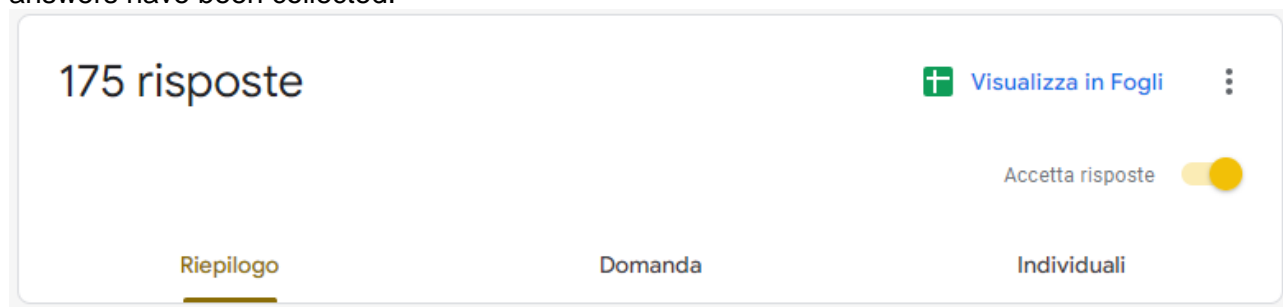


Fig. 12 Number of respondents

The gender distribution among respondents (Fig. 13) is almost balanced as around 51% of the feedbacks were provided by female, 47,4% by males and the remaining 1,7% replied "other".

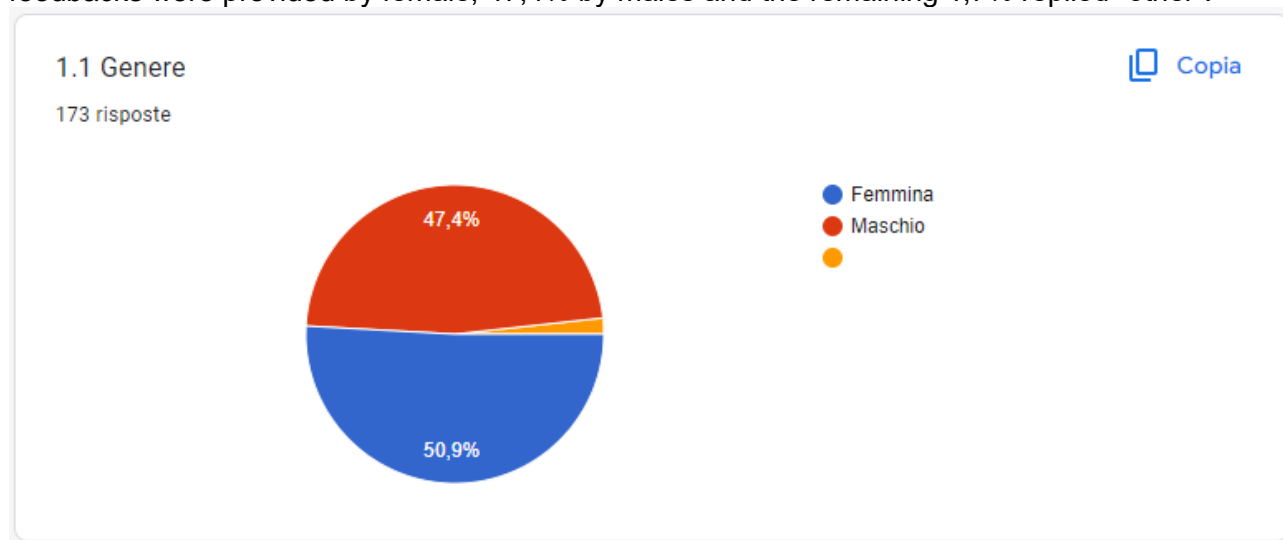
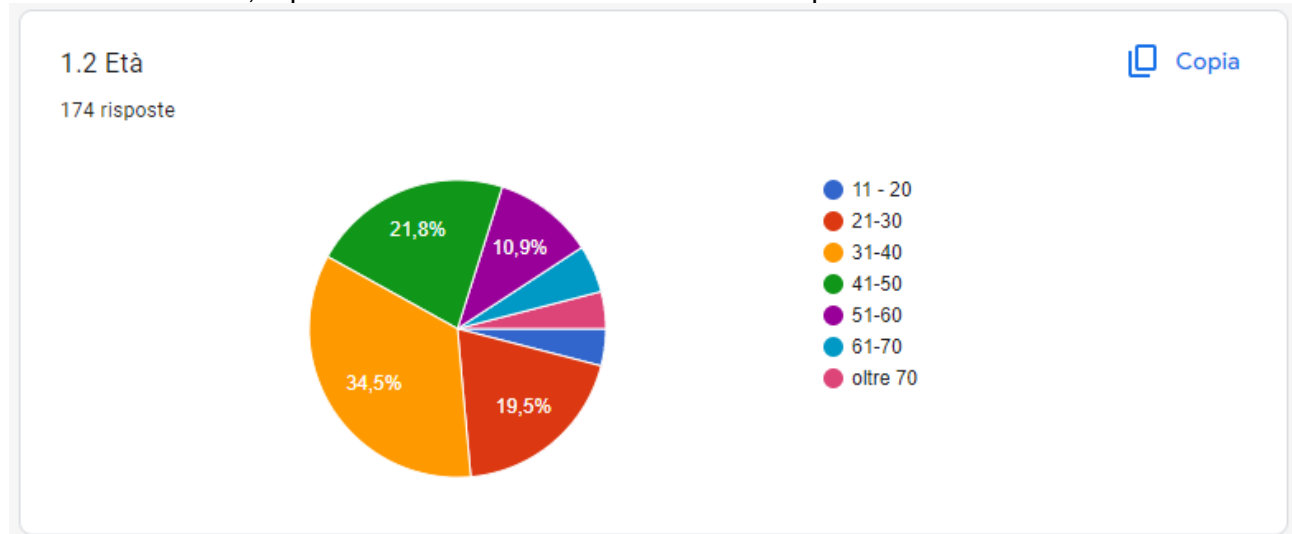


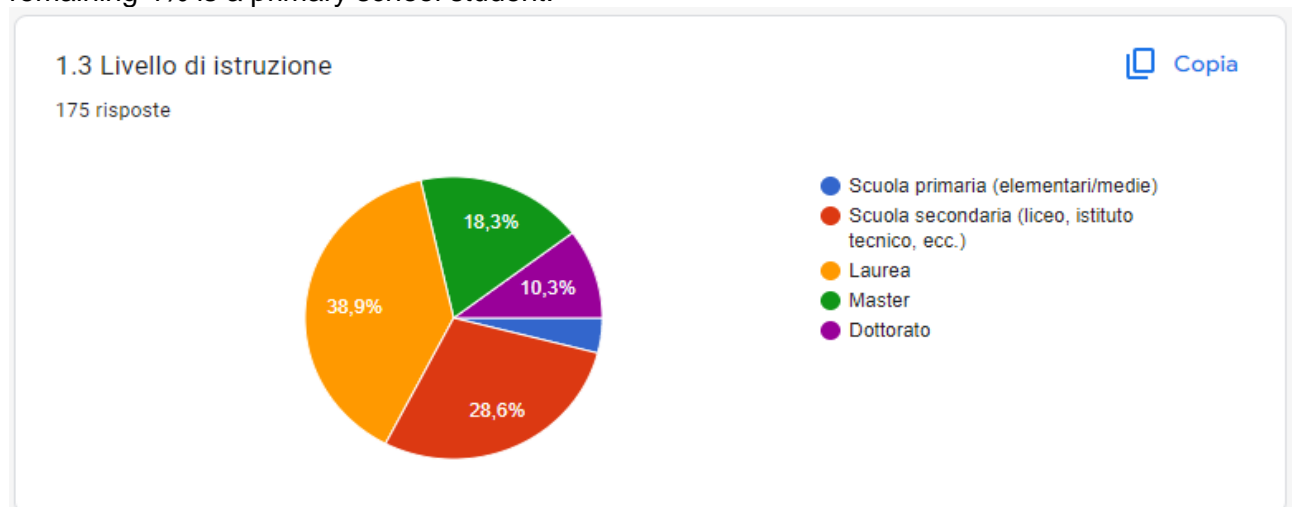
Fig. 13 Gender distribution of respondents

The age distribution (Fig. 14) shows that a third of the respondents (34,5%) is among 31 and 40 years old. Both the age classes 21-30 and 41-50 represent a fifth each of the total number of respondents. A 10,9% belongs to the age class 51-60. The remaining 3 class ages, namely 11-20, 61-70 and over 70, represent a 14% of the total amount of respondents.



**Fig. 14 Age distribution of respondents**

The education level is shown on Fig. 15: 38,9% of the respondents has a bachelor's degree; 28,6% has a secondary school diploma; 18,3% has a Master's degree; 10,3% has a PHD's degree. The remaining 4% is a primary school student.



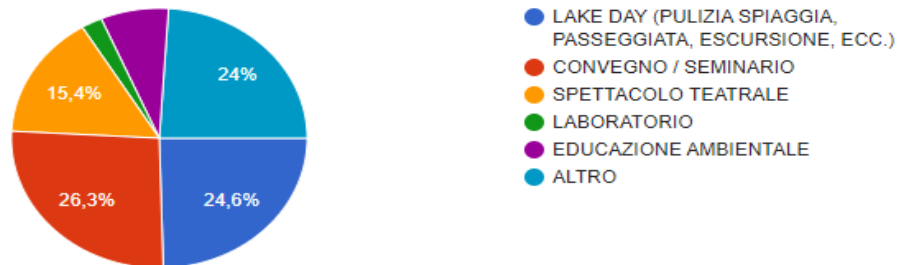
**Fig. 15. Education level of respondents**

Fig. 16 shows the replies to questions 1, concerning the project's events attended by the respondents: around a fourth (24,6%) joined a Lake day event in one of the project targeted lakes; almost the same share 26,3% participated to conferences and seminars organized in the context of the project. People who attended the theatre shows Monday are 15,4% of the respondents. The remaining ones joined activities including labs, talk shows, environmental education activities for schools and "other activities".

### 1) A QUALE EVENTO DEL PROGETTO LIFE BLUE LAKES HAI PARTECIPATO?

[Copia](#)

175 risposte



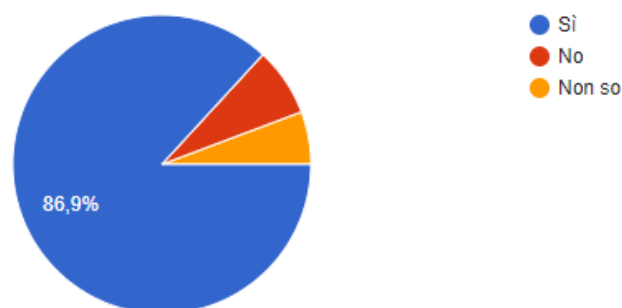
**Fig. 16. Question 1: “Which life blue lakes project event did you attend?”**

Replies to questions 2 (Fig. 17) shows that almost 90% of the respondents is aware of the impact microplastics have on biodiversity and human health.

### 2) SEI CONSAPEVOLE DELL'IMPATTO CHE LE MICROPLASTICHE HANNO SULLA BIODIVERSITA' E LA SALUTE UMANA?

[Copia](#)

175 risposte



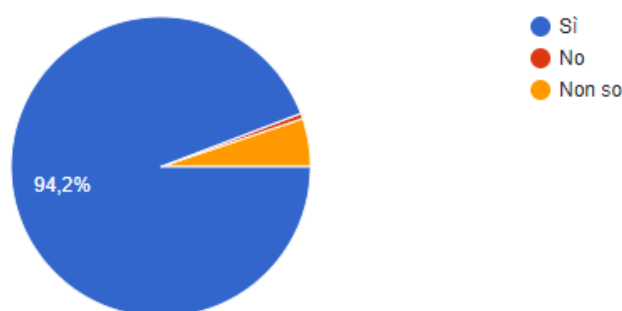
**Fig. 17. Question 2: “Are you aware of the impact microplastics have on biodiversity and human health?”**

According to the replies to questions 3 (Fig. 18), more than 94% of the respondents believe that information they received thanks to the project activities is useful and interesting, while, according to the replies to question 4 (Fig. 19), almost 83% think that the information they received will influence their future behaviours.

### 3) LE INFORMAZIONI CHE HAI RICEVUTO SONO STATE UTILI E INTERESSANTI?

[Copia](#)

173 risposte



**Fig. 18. Question 3: “Was the information you received useful and interesting?”**

#### 4) LE INFORMAZIONI CHE HAI RICEVUTO INFLUENZERANNO I TUOI COMPORTAMENTI FUTURI?

 Copia

173 risposte

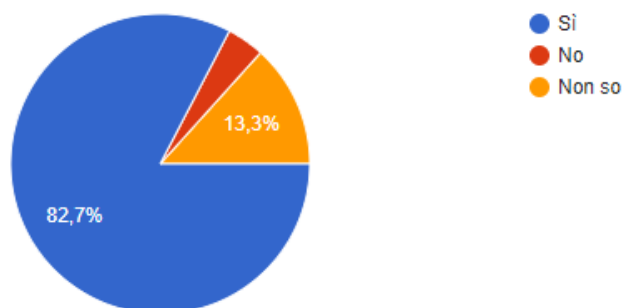


Fig. 19. Question 4: “Will the information you received influence your future behaviors?”

On fig. 20 is shown that 108 people out of 175 (almost 62%) replied to the open question concerning the commitments they think they can make from now on to reduce the impact caused by plastic. Most of the replies focused on reducing the purchase of products with plastic packaging and avoid single-use plastic as much as possible; buying cosmetics that avoid microplastics; paying more attention to washing clothes in the washing machine and preferably choosing clothing made from natural materials; improving separate waste collection and recycling. Other key issues are consume less, influence policies on reducing the use of plastic, especially in packaging and raising public awareness on this issue.

#### 5) CHE IMPEGNI PENSI POTRAI PRENDERE D'ORA IN AVANTI PER RIDURRE L'IMPATTO CAUSATO DALLA PLASTICA?

108 risposte

- Evitare plastica monouso
- Riciclare e fare la raccolta differenziata
- Raccogliere i rifiuti prodotti
- Sbizzarrirsi con la fantasia. Le bottiglie di plastica e i tappi possono essere riutilizzati per dar vita ad altri prodotti, gioielli, borsette, prodotti di uso domestico..
- Consumarne meno
- Fare la raccolta differenziata con più attenzione
- Ridurre il più possibile il consumo di plastica nella vita quotidiana.
- Attenzione ai rifiuti, attenzione ai cosmetici che scelgo, attenzione alle iniziative collaterali di sensibilizzazione
- ridurre l'utilizzo di plastica nella vita quotidiana, scegliere indumenti realizzati con materiali naturali, utilizzare utensili da cucina in legno, acciaio o vetro, acquistare prodotti che non abbiano imballaggi in plastica

Fig. 20. Question 5: “What commitments do you think you can make from now on to reduce the impact caused by plastic?”

## School activities

During the years 2021-2022 and 2022-2023, schools of the main municipalities located close to the targeted Italian lakes were involved in a educational program aimed at protecting their lakes and reinforcing the link with their territory. An **Edukit**, describing the project, including a poster and a manual for teachers with examples of educational activities on plastic pollution and circular economy, was produced in **500 copies** and distributed to schools and teachers. **2 editions** of a contest addressed to students of primary and secondary schools were organized involving a total of **1120 students** and **112 teachers**. Students were invited to prepare a work in different forms (streeep cartoon, drawing, photo, videos, etc.) communicating in an incisive and original way how to cope with the problem of plastics and microplastics in lakes and promote virtuous actions and/or behaviours. The best three works of each edition were awarded with dedicated gadgets (cotton backpacks, water bottles, notebooks and pens).

After the end of the educational activities for students, feedback of students and teachers have been collected in order to assess to what extent the initiative has led to an effective awareness raising on the topic of MPs. Figure below shows the questionnaires distributed to students.

The questionnaire for students foreseen a total of 10 questions (see fig.x). For the first five questions the students were expected to use a rating scale from 1 to 5 and tick the box with their rating: 1. Not at all; 2. A little; 3. Quite a lot; 4. A lot; 5. Very much. The first 5 questions were: 1. Did you enjoy this project? 2. Did you feel involved during the project activities? 3. Do you think the project helped you to change some of your bad behaviour with regard to plastics and microplastics? 4. After doing the project, did you have the opportunity to give advice on correct behaviour to family or friends? 5. Do you think you discovered new things about plastics and microplastics that you did not know before? For the remaining questions, the students were expected to freely formulate their thoughts. The remaining questions were: 6. What is the new information you didn't know before? 7. Which topic interested you the most? 8. Which activity did you enjoy the most? 9. What else would you have liked to do that you didn't get a chance to do in or outside the classroom? 10. What commitment would you make to reduce the use of plastics in your daily life?

According to the approved project proposal, at least 100 questionnaires were expected to be distributed to students and teachers. The actual number of questionnaires filled in is **150** (143 students and 7 teachers). The results showed that the involved students for the most part have really appreciated the educational path proposed by the project experts. Most of the students (138) scored 4 to 5 (out of 5) the questions related to what extent they appreciated the project and whether they felt involved in the proposed activities. Similarly, a large part of students (129) believes that thanks to the educational activities they will change behaviour toward the consume/use of goods containing plastics and microplastics: Moreover, around 70% of them (102) scored 3 to 4 to the questions asking if they had the chance to give suggestions or advise to their relatives and friends on correct behaviours toward the use of plastic goods, while 25% scored 5. Most of the involved students (95%) claims that they have learned new information about plastic and microplastic pollution thanks to the project scoring 3 to 5.



### QUESTIONARIO DI VALUTAZIONE PER GLI **STUDENTI**

Faccio parte della classe ..... della scuola ..... della città .....

Ciao!

Ti chiediamo di compilare questo breve questionario sull'attività svolta per il progetto **LIFE BLUE LAKES** per aiutarci a capire se questo progetto ti è stato utile e ti è piaciuto.

Potrai utilizzare questa scala di gradimento e barrare la casella con il tuo giudizio:

1. Proprio no!    2. Un po'    3. Abbastanza    4. Molto    5. Moltissimo

Ti è piaciuto questo progetto?	1	2	3	4	5
Ti sei sentito/a coinvolto/a durante le attività legate al progetto?	1	2	3	4	5
Pensi che il progetto sia servito a modificare qualche tuo comportamento sbagliato rispetto alle plastiche e microplastiche?	1	2	3	4	5
Dopo aver svolto il progetto hai avuto modo di dare consigli sui comportamenti corretti a casa o agli amici?	1	2	3	4	5
Pensi di aver scoperto delle cose nuove sulle plastiche e microplastiche che prima non conoscevi?	1	2	3	4	5

Quali sono le nuove informazioni che prima non conoscevi?

Quale argomento ti è interessato di più?

Quale attività ti è piaciuta di più?

Cos'altro ti sarebbe piaciuto fare, che non avete avuto modo di fare in classe o fuori?

Quale impegno ti prenderesti per ridurre l'utilizzo della plastica nella tua vita quotidiana?

Scrivici un commento, se vuoi!

Fig. 21 Questionnaire for students

#### Website

The LIFE Blue Lakes website has been online since April 2020 at <https://lifebluelakes.eu/> and it was periodically updated with news, articles, activities in which partners are involved and can be consulted in Italian, German and English languages. **233** articles have been published on the website up to the end of the project that reached about **19.800** users who have visited **48.000** pages in 3 years (data collected through google analytics monitoring). The main channels of access to the website are search engines or direct access to the website, almost **90%** compared to other sources (Facebook, Bing, legambiente.it or LinkedIn). Other data from Google Analytics give users' behaviour in using the website: **1.86 page views per session**, with an average length of stay of **1:53 minutes** and a bounce rate of **72.5%**

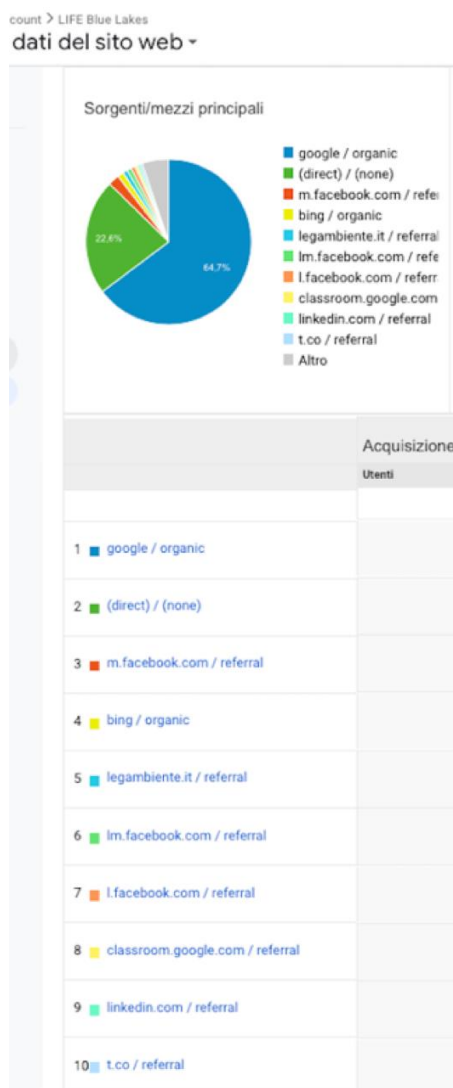


Fig. 22 Website insights

## Social media

The project web communication was also carried out through four social networks: Facebook, Twitter, Instagram and YouTube. A Facebook page dedicated to the project was opened to create a specific container for project-related topics. As for Twitter and Instagram, Legambiente pages are used to take advantage of an existing fan base that is already aware of the project's themes. The same applies to YouTube, where the Legambiente channel has a playlist dedicated to LIFE Blue Lakes. Each of these has different targets and performances, but over time they have proved to be a good tool for spreading the project's messages and activities.

On table 12 the numbers of followers, published posts and people/contacts reached by any social media channel are reported.

Tab. 12 Numbers of followers, published posts and people/contacts reached by any social media channel

SOCIAL NETWORK	FOLLOWERS	POSTING	REACH	INTERACTIONS
FACEBOOK	880	395	87.572	7.059
TWITTER	1.334	159	195.145	3.201



INSTAGRAM	1.350	141	18.109	5.468
YOUTUBE	3.190	40	3.462	108

### Press release

During the project implementation, **45 press releases** were realized at national and local level (Italy) and in Germany, and they are available on the project's website.

A press review including about **740 articles** in both printed and online newspapers, TV and web reports on very relevant channels such as Italy Rai News 24, La Repubblica, Il Fatto quotidiano, Italia 1, Canale 5 and SuperQuark was provided. This press review is available on the project's website.

Table 13 summarizes main results achieved by the media and press activities (D.2) compared to those expected in the project proposal.

**Tab. 13 Main results achieved by the media and press activities**

PROJECT GOALS	By the end of the project	November 2020	May 2021	June 2022	July 2023	The end of the project
Article pieces on the website	100	20	71	143	216	233
Tweets	200	42	70	123	159	165
Posts on Facebook	200	73	135	240	395	433
Posts on Instagram	200	37	65	93	141	157
<u>Videos</u> on YouTube	50	9	21	32	40	49
Press releases	40	7	12	28	43	45
Article pieces in the monthly newspaper La Nuova <u>Ecologia</u>	4	1	1	2	8	8