Newsletter #1

for project MEDWwater

September 2021

The first period of project MEDWwater is over. In this newsletter you fill find information about activities carried out during this period and the actual information about project related topics.

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CONTENT

Project LLI-527

"Pharmaceuticals in wastewaters – levels, impacts and reduction" MEDWwater

Project aims to increase the efficiency of pharmaceutical substances pollution management and to increase cooperation between governmental institutions and wastewater treatment plant operators.

Total projects size
673 773 EUR

Out of them co-funding of European Regional Development Fund
572 707 EUR

Project duration:
February 1, 2021 – December 31, 2022

PROJECT PARTNER:

- Latvian Institute of Aquatic Ecology Agency of Daugavpils University, ***www.lhei.lv***
- Kurzeme Planning Region, ***www.kurzemesregions.lv***
- Latvian Environment, Geology and Meteorology Centre, ***www.videscentrs.lvgmc.lv***
- University of Klaipeda, ***www.ku.lt***
- State Agency of Medicines of Latvia, ***www.zva.gov.lv***
- State Medicines Control Agency under the Ministry of Health of Republic of Lithuania, ***www.vvkt.lt***

Project is co- financed by

Interreg V-A Latvia – Lithuania Programme 2014-2020
www.latlit.eu

Nature Needs No Pill

LATVIJAS HIDROEKOLOĢIJAS INSTITŪTS
KURZEMES PLĀNOŠANAS REĢIONS
LATVIJAS VIDES, ĢEOLOĢIJAS UN METEOROLOĢIJAS CENTRS
Klaipeda University
Zāļu valsts aģentūra
STATE MEDICINES CONTROL AGENCY

25 APIs have been selected for detailed investigation and chemical analysis

There is not enough knowledge about the possible long-term effects of pharmaceuticals, which requests further research. Currently, the standard monitoring procedures are missing to measure pharmaceuticals content in the waste water and other waterbodies. In order to clarify API pollution amount and it`s environmental risk in Latvia and Lithuania in project MEDWwater 25 APIs has been selected for detailed investigation and chemical analysis analysis:

- *Aciclovir*
- *Amoxicillin*
- *Atorvastatin*
- *Azithromycin*
- *Betahistine*
- *Carbamazepine*
- *Ciprofloxacin*
- *Clarithromycin*
- *Diclofenac*
- *Erythromycin*
- *Hydroxychloroquine*
- *Ibuprofen*
- *Meldonium*
- *Metformin*
- *Metoprolol*
- *O-desmethylvenlafaxine*
- *Oseltamavir*
- *Paracetamol*
- *Perindopril*
- *Ramipril*
- *Rosuvastatin*
- *Sulfamethoxazole*
- *Telmisartan*
- *Trimethoprim*
- *Venlafaxine*

For these specific APIs together with project partners State Agency of Medicines of Latvia and State Medicines Control Agency under the Ministry of Health of Republic of Lithuania information about sales amounts will be collected. Also information about API ecotoxicity will be collected and analyzed in order to detect their environmental risks.

1st project Advisory Board meeting has been held

In 8th of June 2021 projects MEDWwater 1st Advisory Board meeting has been held where project partners and organizations that supported project during it`s preparation stage met on-line.

Agenda of the meeting:

14:00 – 14:15 **Welcome and self-introduction**

14:15 – 14:45 **Overall project description – aims, goals and activities LIAE (LP) Implementation Activity No 1 “Consumption and risks of active pharmaceutical substances in Program area” (Presentation of the work plan; Responsibilities; Outputs)**

14:45 – 15:15 **KU (PP4) Implementation Activity No 2 “Pharmaceuticals loads in WWTPs systems and relevant water bodies”**

15:15 – 15:45 **LEGMC (PP3) Implementation Activity No 3 “Strategic approaches to the reduction of APIs discharges from WWTPs”**

15:45 – 16:00 **Discussion**

During the meeting project activities and deliverables were presented to Advisory Board and it`s member had opportunity to comment and recommend possible changes according to their needs.

INFORMATION PREPARED BY
Ieva Putna-Nīmane, researcher at LIAE

16 urban waste water treatment plants selected for further research within MEDWwater

Pharmaceuticals mainly reach the environment through the discharge of effluent from urban waste water (sewage) treatment plants – containing excreted pharmaceuticals as well as unused pharmaceuticals thrown away into sinks and toilets, despite the existence of collection schemes.

Since 2021 February MEDWwater project partners in close cooperation with environmental authorities were working on the selection of relevant municipal waste water treatment plants (WWTPs) and water bodies (waste water recipients) in Lithuania and Latvia for further investigations of actual pharmaceuticals loads. Based on the agreed selection criteria experts from Klaipėda university (LT) and Latvian Environment, Geology and Meteorology Centre (LV) have identified urban waste water agglomerations of more than 2 000 population equivalent located in both countries. When selecting WWTPs the priority was given to the ones, located in Lithuania-Latvia shared River Basin Districts of Venta and Lielupe rivers and coastal areas. Additionally, in-depth analysis of existing strategic environmental documents and available monitoring data was completed in order to identify WWTPs, characterized by less effective treatment technologies and needed to be upgraded in the nearest future. Quality of the treated waste water and presence of hazardous substances in waste waters during 2017-2019 monitoring period were also considered. In total 16 WWTPs (8 from LT and 8 from LV) were selected for further characterization and deeper research during the next MEDWwater implementation stages.


Photo: dr. Sergej Suzdalev (Klaipėda university)

The infographics (map and table): Viačeslav Jurkin (Klaipėda university)

Programme area	WWTP name	Maximum capacity, PE	Actual load[1], PE (BOD₅)	Annual volume, thous. m³	Problematic substances in wastewater[2]	Recipient	State of the recipient
Latvia							
Aizpute district (till 2021) / Dienvidkurzeme district (from 2021)	Aizpute WWTP	7980	2649	132,758	Nickel	River Tebra	Moderate
Dobele district	Dobele WWTP	20414	8091	380,600		River Bērze	Moderate
Saldus district	Saldus WWTP	15365	8056	556,627	Chrome, lead	Dīkmaņi brook → after 300 m river Ciecere	Moderate
Kuldīga district	Kuldīga WWTP	7930	9682	726,077		Ditch → River Venta	Moderate
Bauska district	Bauska WWTP	10000	5044	600,942		River Lielupe	Moderate
Talsi district	Talsi WWTP	47500	29998	535,975		River Bedzupe → river Stende after 2,7 km (catchment basin of Stende_2; LW120)	Good
Daugavpils	Daugavpils WWTP	120000	74420	3890,549	Crome, cadmium, nickel, lead	River Šuņica → river Daugava after 200 m	Moderate
Liepāja	Liepāja WWTP	105416	62955	5246,112	Cadmium, nickel, lead	Coastal water body [illegible]	Moderate
Lithuania							
Klaipėda county	Klaipėda WWTP	305 333	241 108	14 500	trifuralin, di (2-ethylhexyl) phthalate, nonylphenols (technical mixture), bisphenol A, diethylphthalate, zinc, copper, lead, vanadium, 4-nonylphenol (branched)	Klaipėda strait	Heavily modified
	Kretinga WWTP	31 697	36 556	1 464	-	Tenžė river	Very bad
Telšiai county	Telšiai WWTP	93 400	53 023	3 376	di(2-ethylhexyl) phthalate, chromium, copper, zinc, lead	Sruojupė/Tausalas	Very bad
	Mažeikiai WWTP	60 000	50 377	2 887	di(2-ethylhexyl) phthalate, zinc, copper, nickel, lead	Venta	Average
Šiauliai county	Šiauliai WWTP	182 000	79 824	6 718	trifuralin, di (2-ethylhexyl) phthalate, zinc, chromium, arsenic, aluminum	Kulpė	Bad/Very bad
	Joniškis WWTP	22 758	5 657	635	-	Sidabra	Bad
	Radviliškis WWTP	17 340	7 318	824	-	Obelė	Very bad
Panevėžys county	Rokiškis WWTP	47 700	20 526	1 172	4-nonylphenol (branched), di (2-ethylhexyl) phthalate, mercury, nonylphenols (technical mixture), zinc, arsenic, copper, cadmium, lead.	Nemunėlis	Very bad

INFORMATION PREPARED BY
Dr. Sergej Suzdalev, researcher at University of Klaipeda

The graphic identity of the Project MEDWwater has been developed, as well as the project campaign logo and slogans in Latvian, Lithuanian and English. Information related to the MEDWwater campaign can be found on social media networks using hashtags
#Dabai Tableti Nevajag #GamtaiVaistųNereikia #NatureNeedsNoPill

Gamtai Vaistų Nereikia

Dabai Tableti Nevajag

Nature Needs No Pill

First Public Event

On 11th of June first public event for project stakeholders was held with the aim to publicly introduce the project MEDWwater - its aims, main challenges and planned activities. During the second part of the event we had discussions about the project's topicality, problems, sharing our experiences and possible solutions. For those who did not have a chance to attend the event, it can be watched by clicking on the link below.
https://www.youtube.com/watch?v=ghfo4XdYOK0

MEDWwater in nutshell

We have created a 3 minute video to explaining what is the project MEDWwater and what are its intended results.
LV ***https://www.youtube.com/watch?v=oX4VR17uOSo***
LT ***https://www.youtube.com/watch?v=iXPxoZseDUg***

MEDWwater in media

Within the project we have made a list of active pharmaceutical ingredients, which will be sought for and analysed by the project researchers within water samples taken from waste water and water bodies so the impact on the environment could be established. Here is the link to TV Kurzeme video story about taking the samples and project MEDWater. ***https://www.youtube.com/watch?v=EHCf8tuqxwo&t=174s***

INFORMATION PREPARED BY
Liena Freimane, project communication coordinator

Pharmaceuticals in the environment and their effects on wildlife

All across the Europe in surface waters and groundwaters used for irrigation and drinking water production and that are essential for wildlife, pharmaceuticals are found.

Photo: Shutterstock

In Latvia and Lithuania information and monitoring of pharmaceuticals in the environment is very limited. Most data on environmental levels in both countries are collected in different projects, therefore project MEDWwater will help to fill knowledge gaps. Information is still needed to collect to understand and evaluate certain pharmaceuticals as regards their environmental concentrations in various size of WWTP and the resulting levels of risk.

Several pharmaceuticals of various categories (antibiotics, antineoplastics, nonsteroidal anti-inflammatory drugs (NSAIDs), antiepileptics, antidiabetics, etc.) have been detected in the environment (surface water, groundwater, soil, air and biota) in their original form, as metabolites or other transformation products. Pharmaceuticals have adverse effects on the environment. Residues and waste products may enter the environment and make negative impact to environment, some waste and residues may have endocrine-disrupting potential, induce behavioural changes or suppress immune system, but others may increase the risk of antimicrobial resistance.

The presence of antimicrobial pharmaceuticals in water and soil may play a role in accelerating the development of resistant bacteria.
Numerous studies have shown direct effects on wildlife from some pharmaceuticals at or even below the low concentrations found in water and soil (Niemuth, Klaper, 2015, from *European Union Strategic Approach to Pharmaceuticals in the Environment*). For example, male fish exposed to such concentrations of the main ingredient in the contraceptive pill may become feminized as a result of its effects on the endocrine system, thus affecting the capacity of the population to reproduce (Kidd et al., 2007). Fish exposed to low concentrations of certain antidepressants have been found to change their behavior in ways that could affect their survival (Dzieweczynski, 2016), but diclofenac has been found in fish and otters (Richards et al. 2011). Alarm was raised several years ago over the unexpectedly lethal effect of diclofenac on vultures in Asia, which were exposed to it via the carcasses of cattle treated with it (Naidoo V et al. 2009). A decline in populations of dung beetles is thought to be at least partly attributable to the use of anti-parasitic pharmaceuticals, including ivermectin in livestock (Verdú, 2015).

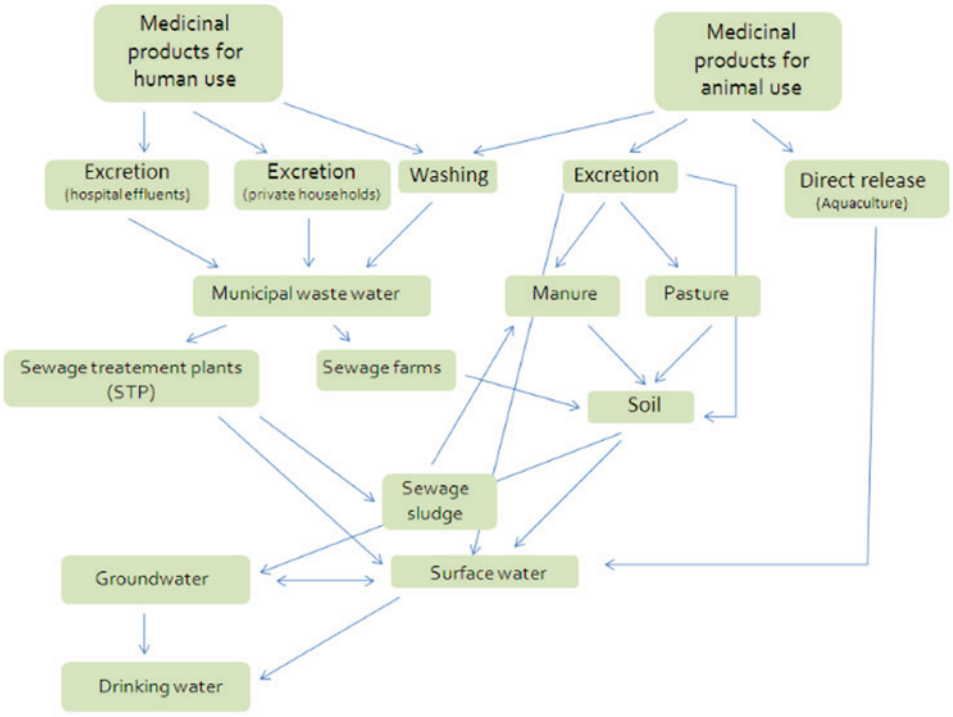
INFORMATION PREPARED BY
Maruta Vehi, senior specialist at LEGMC

Waste water treatment plant (WWTP) role in reducing pharmaceuticals in environment

Most emissions of pharmaceuticals result from the use phase, namely through human and animal excretions, but also through improper disposal of the products. The highest concentrations are found in rivers and lakes that receive (treated) wastewater (Fig. 1).

Figure 1. Emission pathways related to the use-phase of medicinal products

https://ec.europa.eu/info/sites/default/files/study_report_public_consultation_pharmaceuticals_environment.pdf



It is known that common biological treatment technologies, used for treatment of urban waste water, might not be effective enough in treatment of pharmaceuticals or other micro-pollutants. Additional treatment technologies are needed to provide treatment of emerging pollutants. Some technologies with potential to provide treatment of pharmaceuticals and priority substances are ozonation, adsorption on activated carbon or biochar, biofiltration and/or MBBR (moving bed biofilter reactor).

There are some good practices in European countries as pilot projects regarding pharmaceuticals and advanced treatment technologies for WWTP. These good practices will be evaluated during MEDWwater project and a technical European expert will develop technical review with suggestions for better treatment of pharmaceuticals. Developed document could be used as example for other wastewater treatment plants not only in Programme territory but also at national level.

Experts of wastewater treatment technologies will share their knowledge and provide examples on WWTP optimization options in order to improve API removal rates during treatment process. Technical consultation by experienced experts will provide local waste water treatment plant operators knowledge on latest developments in municipal wastewater treatment sector and possible sources of funding and/or implement advanced treatment on a voluntary basis. The consultation will determine the WWTPs upgrading priorities in Latvia and Lithuania.

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Existing policy documents as drivers to reduce pharmaceuticals in the environment

Although there are quite a lot recent policy documents at EU level, it takes time to implement them in the National regulations. By now, there are no national legislation or requirements regarding APIs in the environment, with few exemptions - Watch list monitoring under Priority Substances Directive (Directive 2008/105EC) and BREFs (EU Best Available Techniques reference documents) for industrial manufacturers under Directive 2008/1/EC concerning integrated pollution prevention and control (the IPPC Directive). The project MEDWwater will give policy orientated recommendations for national and local authorities in Latvia and Lithuania.

This article will give a short list and main findings in recent EU level strategic documents and show the actuality of the problem.

Pharmaceutical Strategy for Europe (adopted 25.11.2020) - primarily it aims at creating a future proof regulatory framework and at supporting industry in promoting research and technologies that actually reach patients in order to fulfil their therapeutic needs while addressing market failures. The strategy is also complementary to the European Green Deal and more particular the Zero Pollution ambition for a toxic-free environment, notably through the impact of pharmaceutical substances on the environment.

The **European Green Deal** zero-pollution ambition aims to protect both public health and ecosystems.

EU Action Plan: "Towards a Zero Pollution for Air, Water and Soil" (adopted by European Commission on 12.05.2021) - a key deliverable of the European Green Deal. It sets a vision for 2050: *"Air, water and soil pollution is reduced to levels no longer considered harmful to health and natural ecosystems and that respect the boundaries our planet can cope with, thus creating a toxic-free environment"*. The Commission will encourage international cooperation to address the environmental risks in other countries where pharmaceutical emissions from manufacturing and other sources may contribute, among other things, to the spread of antimicrobial resistance.

European Union Strategic Approach to Pharmaceuticals in the Environment (03.11.2019) is developed in accordance with Article 8c of the Priority Substances Directive (2008/105 / EC, as amended by Directive 2013/39 / EU), which requires the European Commission to develop a strategic approach to water pollution by pharmaceutical substances. The approach covers all phases of the lifecycle of pharmaceuticals, from design and production through use to disposal.


EUROPEAN COMMISSION

Brussels, 11.3.2019
COM(2019) 128 final

COMMUNICATION FROM THE COMMISSION

European Union Strategic Approach to Pharmaceuticals in the Environment

COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL AND THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE

European Union Strategic Approach to Pharmaceuticals in the Environment

https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1552310298826&uri=COM:2019:128:FIN

MAIN OBJECTIVES are to identify actions to be taken or further investigated to address the potential risks from pharmaceutical residues in the environment, not least to contribute to the Union's action on combatting antimicrobial resistance; encourage innovation where it can help to address the risks, and promote the circular economy by facilitating the recycling of resources such as water, sewage sludge and manure; identify remaining knowledge gaps, and present possible solutions for filling them; ensure that actions to address the risk do not jeopardise access to safe and effective pharmaceutical treatments for human patients and animals.

MAIN ACTIONS are to increase awareness and promote careful use of pharmaceuticals; support the development of pharmaceuticals intrinsically less harmful for the environment and promote greener manufacturing; improve environmental risk assessment and its review; reduce wastage and improve the management of waste; expand environmental monitoring and fill other knowledge gaps.

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For more information about the MEDWwater (LLI-527) project, please visit the following sites:

LV
https://www.kurzemesregions.lv/projekti/vides-aizsardziba/medwwater/

LT
http://apc.ku.lt/index.php/medwwater/

ENG
https://www.kurzemesregions.lv/en/projects/protection-of-environment/medwwater/
and
https://latlit.eu/?s=medwwater

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