Newsletter #3

for project MEDWwater

In this newsletter you fill find information about activities carried out during 3rd and 4th project period and the actual information about project related topics.

Interreg Latvija–Lietuva
European Regional Development Fund

EUROPEAN UNION

MEDWwater

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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

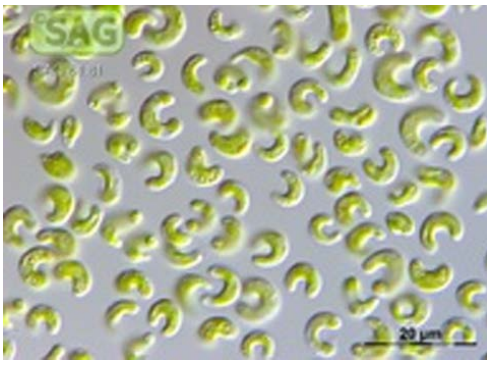
Nature Needs No Pill

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

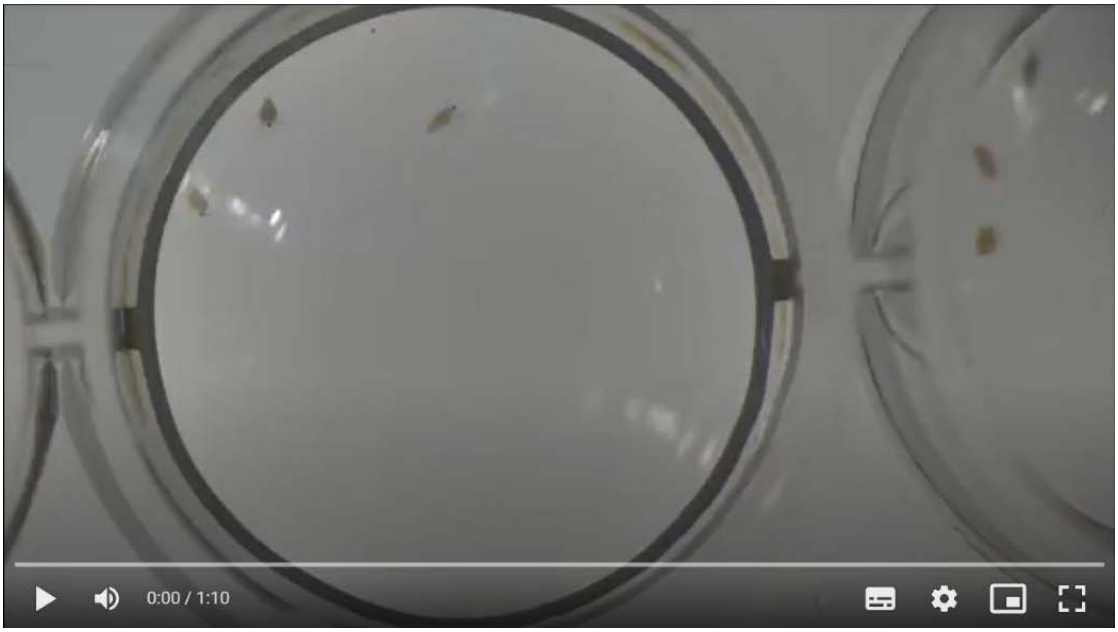
Application of ecotoxicology test methods in project MEDWwater for whole effluent assessment

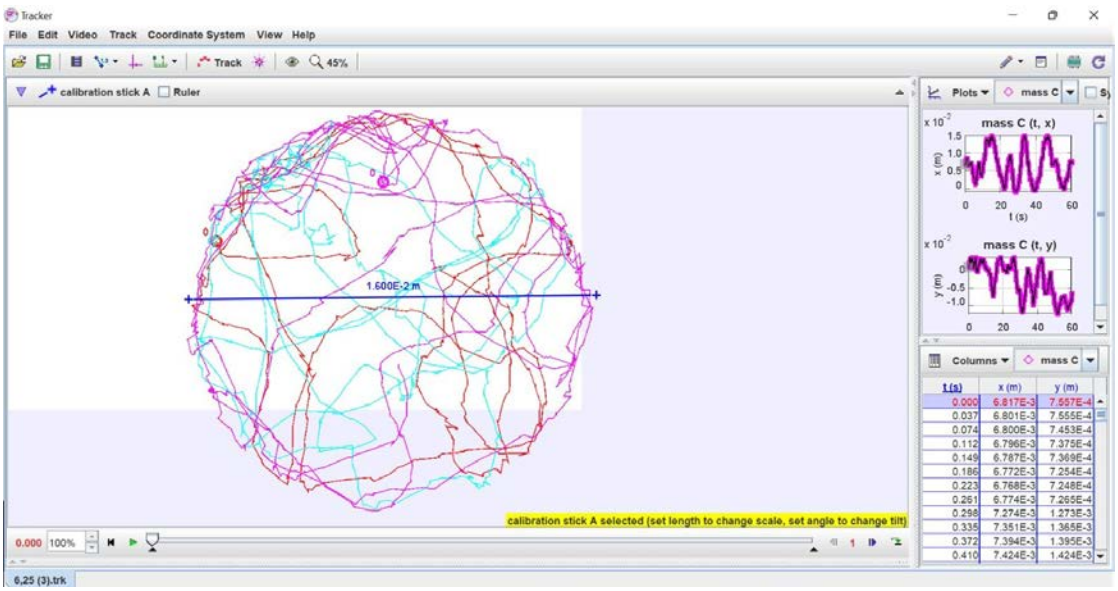
Ecotoxicology is the study of the effects of toxic chemicals on biological organisms, especially at the population, community, ecosystem, and biosphere levels. Ecotoxicology is a multidisciplinary field, which integrates toxicology and ecology.
The ultimate goal of ecotoxicology is to reveal and predict the effects of pollution within the context of all other environmental factors. Based on this knowledge the most efficient and effective action to prevent or remediate any detrimental effect can be identified. In those ecosystems that are already affected by pollution, ecotoxicological studies can inform the choice of action to restore ecosystem services, structures, and functions efficiently and effectively.
Ecotoxicology is a relatively young discipline that made its debut in the 1970s[2] in the realm of the environmental sciences. Its methodological aspects, derived from toxicology, are widened to encompass the human environmental field and the biosphere at large.
An ecotoxicity test or bioassay aims to predict the potential effects of the bioavailable fraction(s) of a substance, a mixture of substances or a whole environmental sample on living non-target organisms, upon being discharged in environmental compartments.
In order to assess waste water impact on the environment and treatment efficiency, in project MEDWwater ecotoxicity tests are made in accredited ecotoxicity laboratory of Latvian Institute of Aquatic ecology with two different test organisms from two levels of food chain:

- Unicellular green algae *Desmodesmus subcapitata* (ISO 8692:2012)
- Cladocera *Daphnia magna* (ISO 6341:2012)



As research shows that lot of pharmaceutical concentrations have sublethal effect in MEDWwater project we try to look also on sublethal effect of Daphnia magna by filming them in the end of the test and then analysing swimming speed and trajectory.





INFORMATION PREPARED BY
Ieva Putna-Nīmane, researcher at LIAE

Technical consultation for better treatment of pharmaceuticals provided for Lithuanian and Latvian wastewater treatment plants by experienced foreign expert

Since the very beginning of MEDWwater project it was declared that both Lithuania and Latvia lack of competency in the field of reducing pharmaceutical pollution loads and knowledge on available advanced treatment technologies.

In order to fill in the knowledge gap and get the examples of WWTPs optimization options seeking to improve removal rates of pharmaceuticals during treatment process a foreign expert (Dipl.-Ing. Michael Stapf) from Kompetenzzentrum Wasser Berlin (KWB) has been outsourced to deliver technical consultation for selected wastewater treatment plants.

The main aim of technical consultation was to provide MEDWwater project partners and wastewater treatment plant operators with up-to-date information on the application of advanced treatment (ozonation, activated carbon) in other EU/European countries (available strategies, methods, removal effectiveness, costs, pros and cons), provide a brief overview of active pharmaceutical substances (APIs) entry pathways into the aquatic environment, review of APIs at the WWTPs and in the waterbodies and evaluation with respect to available PNEC data (using the available information/ data from MEDWwater, CWPharma, CWPharma2 and MORPHEUS projects); highlight the limitations of APIs of WWTPs with conventional treatment technology and a need to optimize treatment processes; assess WWTPs regarding possibilities for the implementation of API elimination technology based on available data by the WWTP and an on-site visits; suggest possible scenarios for reducing pharmaceutical emissions – estimated load reductions, greenhouse gas emissions & costs; provide simplified investments and operational cost estimation for the implantation of a full-scale API elimination stage; evaluate upgrading priorities for LV/ LT WWTPs based on available data.

Important part of technical consultation included live visits to the selected WWTPs (Klaipėda and Kretinga in Lithuania, Liepaja in Latvia) in order to analyse current technological aspects and evaluate perspectives of the application of advanced treatment technologies at a later stage.

Several photos from the study trip are provided below:

Discussion with Head of Technological Processes Supervision service at AB Klaipėdos vanduo (Klaipėda WWTP facility). Photo by Sergej Suzdalev.

Studying secondary treatment with aerators and clarifier at Kretinga WWTP.
Photo by Sergej Suzdalev.

Presenting up-to-date information on the application of advanced treatment (ozonation, activated carbon) in other EU/European countries to study trip participants. Photo by Sergej Suzdalev.

Based on the available data for the 16 selected WWTPs in Latvia and Lithuania, following conclusions have been drawn from the technical consultation:

APIs concentrations

Even though API concentrations vary between different WWTPs, the overall pattern is similar. The API loads are closely linked to size of the WWTPs and are dominated by a few APIs (Paracetamol, Ibuprofen, Diclofenac, and Oseltamavir). APIs in the WWTP effluent that have the highest potential to pose a risk to the aquatic environment are Diclofenac, Ibuprofen, Azithromycin, and Amoxicillin. However, more sampling campaigns are required to improve the current data basis (two sampling campaigns).

Water quality parameters

DOC as the most important design parameter is not measured at any of the WWTPs. Also, concentrations of bromide are not measured at any of the WWTPs so it is not possible to assess the bromate formation potential at an ozonation process. Therefore, it is recommended to start measuring DOC, bromide, and nitrite (in case not already measured yet) in order to get a solid data basis for potential further decisions and feasibility studies.

Technologies:

Most of the investigated WWTPs are not suitable for a PAC treatment, because of their current way of excess sludge disposal. Due to lack of information on bromide and nitrite concentrations, it is currently not possible to assess the suitability of an ozonation. There are no obvious barriers for implementation of a GAC filtration. At the moment, most of the investigated WWTPs do not have an existing tertiary treatment stage that can be used in combination with API elimination technologies (e.g. ozonation post-treatment).

Where to implement an API elimination:

As there are no legal obligations, the implementation of a targeted API elimination can currently only be done on a voluntary basis and WWTP operators must have an own motivation to do so. Following the 'Swiss approach', WWTPS might be chosen with the target of a general API load reduction, protection of water resources or protection of aquatic ecosystems. Implementation of an API elimination at big WWTPs also has the advantage that the specific treatment costs (€/m^3) will be lower compared to the ones of small/medium size WWTP. Another approach could be the implementation of the different treatment technologies at medium sized WWTPs for demonstration and knowledge transfer.

INFORMATION PREPARED BY
Sergej Suzdalev, researcher at Klaipėda unversity, Marine Research Institute (LT)

D.T.3.1. report "An overview of policies / strategies for applying advanced cleaning technologies" has been published

Report has been published here:

https://videscentrs.lvgmc.lv/files/Par_LVGMC/Projekti/MEDWwater/Projekta_rezultati/ 3_1_report_Overview_policies_strategies_for_applying_advanced_cleaning_technologies_vfin.pdf

What measures are available to reduce pollution of API?

Concentrations of active pharmaceutical ingredients (API) in environment can be decreased with help of such **regulatory measures** such as:

- develop and implement environmental quality regulations and water quality standards for API;
- determine requirements for API pollution reduction in polluting activity permits;
- promote the use of the best available technical techniques in API production, use (management) and wastewater treatment;
- issue permits (licenses) for pharmaceutical activity;
- implement good manufacturing practices and appropriate inspections.

API reduction measures also include **take back and disposal of pharmaceutical waste.** In Lithuania, the legislation on the waste management of pharmaceutical waste is more organized than in Latvia. In Lithuania, all pharmacies are obliged to accept invalid medicines. However, there are also gaps in the legislation of the neighboring country in defining the roles of various institutions, so pharmacies are currently covering the costs of destroying the collected unused medicines. Some pharmacies in Latvia accept invalid medicines (74% of pharmacies), but this is not a mandatory obligation established by law. There are cities in Latvia where it is not possible to hand over medication at all, especially in small cities (for example, Alsunga, Jaunpils, Kabile). It would be useful for residents to offer this option in all pharmacies - one place where it is possible to buy new medicines, close to home.

From an environmental point of view, the best way to dispose of API is to incinerate the medication at high temperatures (1100-1300 °C). One way to increase the proportion of invalid drugs in the volume of incinerated waste would be to define all invalid drugs in the hazardous waste legislation. All medicines from households are classified as hazardous waste in Denmark and Finland. It is necessary to clearly define the roles of various interested parties in the legislation at all stages of implementation: division of responsibilities and financing mechanism in the legislation; waste treatment practices, that are defined in legislation.

Most methods for reducing FAV loads entering the environment through **wastewater treatment** plants (WWTP) are still in research, development or pilot stages in Europe. The main **technologies** that can provide reductions in API and priority substance loads are ozonation, adsorption on activated carbon, membrane bioreactors (MBR) and moving bed biofilm reactors (MBBR). Most of these methods have been implemented in Switzerland, Germany and Sweden.

Other cost-effective **end-of-pipe measures** are also available, such as:

- waste water / emissions fee – tax for the discharge of waste water into a water body in order to stimulate the reduction of emissions;
- waste water tariffs or taxes for WWTP modernization – to indicate the costs to society and consumers for FAV treatment (widely used in Switzerland);
- subsidies for improving wastewater treatment – financial support from governments to stimulate WWTP operators to invest additional funds in wastewater treatment and to promote research on additional treatment methods;
- extended **producer responsibility schemes** - instead of consumers being responsible for the costs of wastewater and waste management, producers are to some extent responsible for financing them (companies can internalize these costs and are encouraged to produce medicines more cost-effectively and sustainably).

You can also use **voluntary measures** such as consulting services - support from governments in the form of information, advice, consultations. Voluntary agreements on wastewater treatment may be concluded - non-legally binding agreements concluded on a case-by-case basis between WWTP operators and a public authority to improve wastewater treatment practices.

Measures to **reduce API loads at** their **source** are widely used in Sweden. **Educational measures** include training doctors, nurses, pharmacists at university level and later training in considering the environmental impact of FAV, deciding what to prescribe, handling medicines and providing guidance to patients. Two databases in Sweden - "Pharmaceutical substances and the environment" (Janusinfo, 2019) and FASS are mentioned as an example of an **informational measure.** They are used to develop guidelines on how to take environmental impacts into account when prescribing medicines, or for other purposes such as waste management. In some cases, substances have been replaced by less harmful ones in a special list - Wise List, which is used in public procurement. Information dissemination measures include information campaigns to encourage the handing over of invalid medicines to pharmacies, including informing about the impact of API on the environment; bonus credits offered by pharmacy networks for handing over invalid medications; advice from pharmacists on alternative medicines that are less harmful to the environment; an eco-label developed by a pharmacy network for environmentally friendly medicines; labeling to draw attention to the most environmentally harmful API (labeling has been used in Sweden for ointments containing diclofenac); imparting knowledge on how to prevent illness and the need for medication (eg, effective hand washing to prevent the spread of infection). **Other tools** to reduce the burden of API at the source are substance bans, substance restrictions, substance taxes, development of green pharmaceuticals and related subsidies, pollution taxes for API producers, voluntary agreements between the public and private sectors, best environmental practices in healthcare institutions (improved diagnostics, rational use of API and targeted medication regimens), as well as product taxes levied on high-risk products to encourage consumers to change their consumption behavior.

INFORMATION PREPARED BY
Anete Kublina, senior specialist at LEGMC

Educational campaign “Nature needs no pill”

At the end of May, together with pharmacies and cooperation partners we started educational campaign “Nature needs no pill”. During this campaign, which will run until the end of this year, citizens will be invited to use medicine responsibly and bring back to pharmacy unused or old medicine for proper disposal.

A large number of Latvian pharmacies take part in this campaign, placing stickers in visible places informing that they accept unused or old medicine.

Two of the pharmacies in Lithuania have published info graphics in their monthly publications.

All project partners and our project bloggers were involved in implementation of communication activities by taking active part in creation of content of materials (video, infographics etc.), also taking part in and communicating with media regarding campaign and project results and posting information in social media. During the 3rd project period, we issued two press releases in Latvia and two - in Lithuania. Press releases were published by both local and national media. The first was about project results, but the second about beginning of campaign “Nature needs no pill”. In Lithuania, press briefing was organised by the Klaipeda University. Also the national television expressed huge interest and created TV stories based on our information.

All materials of campaign “Nature needs no pill” you can find in campaign landing pages:

https://www.kurzemesregions.lv/dabaitabletinevajag/

https://www.kurzemesregions.lv/gamtaivaistunereikia/

INFORMATION PREPARED BY
Liena Freimane, Project communication coordinator

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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