

CWPharma – solutions for pharmaceutical management

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About the project

- Clear Waters from Pharmaceuticals - CWPharma
 - 15 partners, 7 countries and 18 associated organisations (AO)
 - Timeline 10/2017 - 9/2020
- Funding Interreg BSR
 - Total budget 3.7 M€
 - Programme funding 2.9 M€
- Part of Baltic Pharma platform (EUSBSR PA Hazards' flagship)

Project partners

Country	Organisation
FI	Finnish Environment Institute (SYKE)
FI	Finnish medicines agency (Fimea)
FI	Helsinki Region Environmental services Authority (HSY)
SE	County administrative board Östergötland (CAB)
SE	Technical facility Linköping (TVAB)
EE	Estonian Environmental Research Centre (EERC)
EE	Estonian Waterworks Association (EVEL)
DK	Aarhus university (AU)
DK	Kalundborg Utility
PL	Institute of Environmental Protection – National Research Institute (IOS)
LV	Latvian Institute of Aquatic Ecology (LIAE)
LV	Latvian Environment, Geology and Meteorology Centre (LEGMC)
DE	Berlin Center for Competence of Water (KWB)
DE	German Association for Water, Wastewater and Waste (DWA)
DE	German Environment Agency (UBA)

Associated organisations

	Type	Organisation (English)
FI	National public authorities	Ministry of the Environment
EE		Ministry of the Environment
FI	Regional public authorities	Centre for Economic Development, Transport and the Environment for Uusimaa
FI		Regional State Administrative Agency for Southern Finland
SE		Region Östergötland, Environment and Security department
SE	Sectoral agencies	Swedish Environmental Protection Agency
SE		Medical Products Agency
SE		The Swedish Agency for Marine and Water Management
SE	Interest groups including NGOs	The Swedish Association of the Pharmaceutical Industry AB LIF
SE		The Swedish Water and Wastewater Association
FI		Finnish Water Utilities Association
FI		Pharma Industry Finland (PIF)
FI		Association of Finnish Pharmacies
SE		Coalition Clean Baltic
BY		Center for Environmental Solutions
LV	Infrastructure and public service providers	Riga water, Ltd.
DE		Berlin Water Company, Research and Development
SE	Higher education and research institutions	IVL Swedish Environmental Research Institute

Aims

- Decrease the emissions and adverse effects of Active Pharmaceutical Ingredients (APIs) in the Baltic Sea region
 - Suggest practical ways to decrease the emissions
 - Knowledge transfer



WP2: Comprehensive status of pharmaceuticals

- Objectives:

- Increase knowledge about the sources, occurrence and environmental risks of pharmaceuticals
- Fill in knowledge gaps identified by the HELCOM's status report on pharmaceuticals
- Provide knowledge which is needed to identify appropriate reduction measures

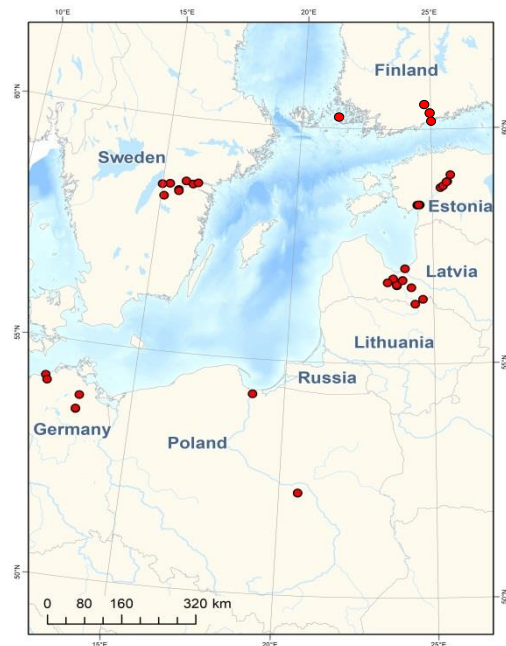


What are the current emissions and where they come from?

Case studies, literature, sales statistics, surveys (HELCOM), environmental risks

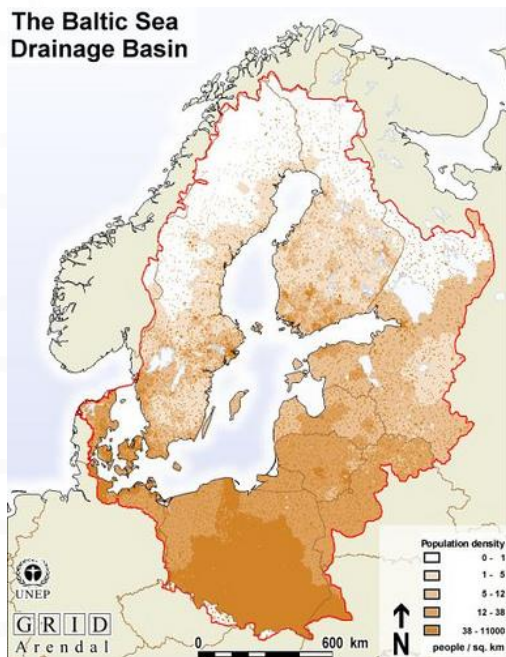
Case studies

- Estonia, Finland, Germany, Latvia, Poland, Sweden
 - WWTPs, rivers, estuaries
 - Poultry farms, fish farms
 - Hospitals, pharmaceutical industry, landfill leachate
 - Water, sludge, sediment, soil
- ~220 samples



Knowledge gaps of the HELCOM's status report

Data not available from all regions



- Sales statistics
- Environmental concentrations

Knowledge gaps of the HELCOM's status report

APIs with high consumption but no env. data from BSR

Allopurinol	15 453 kg/a*	Xanthine oxidase inhibitor, decreases uric acid production
Gabapentin	22 533 kg/a*	Originally for the treatment of epilepsy. Widely used to relieve pain.
Levetiracetam	18 663 kg/a*	Anticonvulsant medication to treat epilepsy
Mesalazine	41 966 kg/a*	Anti-inflammatory agent
Valsartan	9 139 kg/a*	Angiotensin-receptor blocker, used for a variety of cardiac conditions.

* Top 20 most sold pharmaceuticals (EE, FI, DE, SE); UNESCO and HELCOM. 2017. Pharmaceuticals in the aquatic environment of the Baltic Sea region – A status report. UNESCO Emerging Pollutants in Water Series – No. 1, UNESCO Publishing, Paris.

Knowledge gaps of the HELCOM's status report

Veterinary APIs

Carprofen	Veterinary medicine used for cattle and companion animals
Enamectin benzoate	Veterinary medicine used for fish
Fenbendazole	Veterinary medicine used for cattle, poultry and companion animals
Florfenicol	Veterinary medicine used for cattle and fish
Ivermectin	Mainly veterinary medicine
Lincomycin	Veterinary medicine used for cattle and companion animals
Tiamulin hydrogen fumarate	Veterinary medicine used for cattle
Toltrazuril	Veterinary medicine used for cattle
Tylosin	Veterinary medicine used for cattle, poultry and companion animals

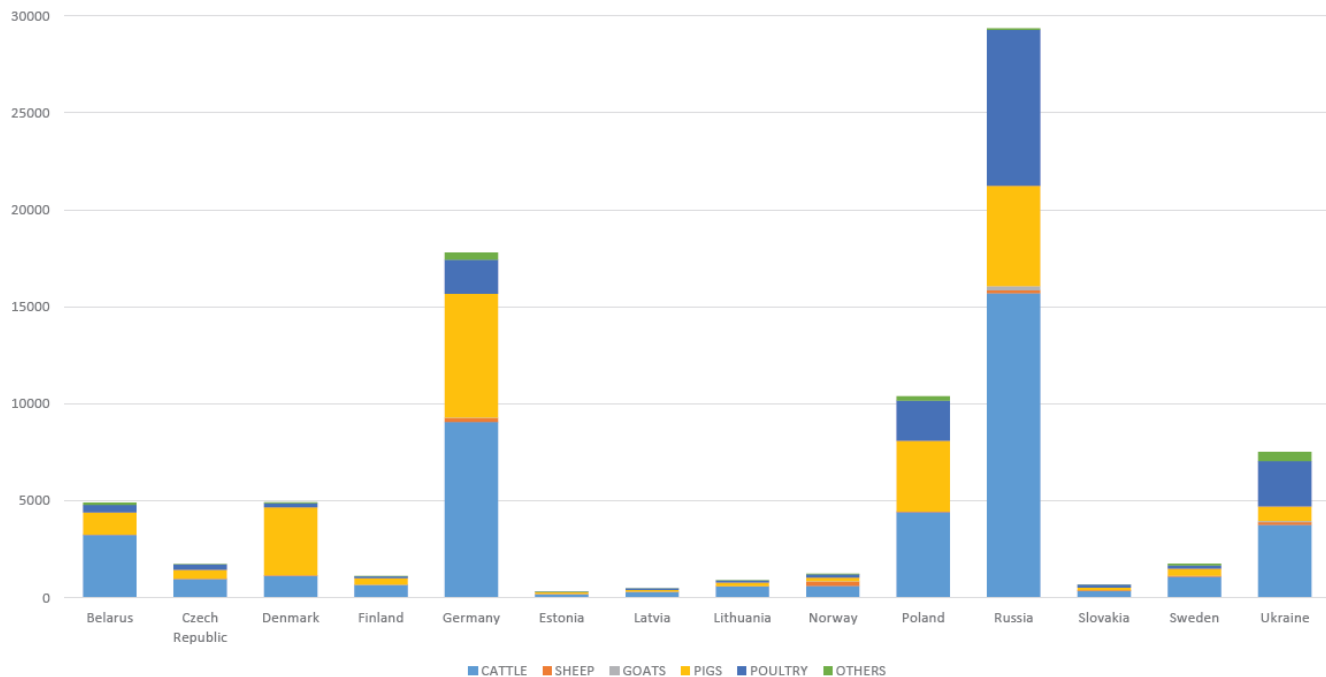


Fig. 9 Livestock population, expressed in the livestock units (1000 LSU), in the Baltic Sea catchment basin countries (EuroStat 2010, FAOSTAT 2010, Federal State Statistics Service of the Russian Federation 2013)

Reference: Skorupski J. (ed.). 2013. Report on Industrial Livestock Farming in the Baltic Sea Region – environmental protection context. Coalition Clean Baltic. Uppsala

WP3: Advanced wastewater treatment

- Objectives:
 - Demonstrate advanced wastewater treatment technologies for removal of APIs
 - Process optimization of pilot and full-scale systems
- Pilot sites:
 - Kalundborg, DK (Full-scale ozonation + MBBR)
 - Linköping, SE (Full-scale ozonation + MBBR)
 - Helsinki, FI (pilot-scale activated carbon dosing + filtration)
 - Berlin, DE (pilot-scale ozonation + 4 different filters for post-treatment)

WP3: Advanced wastewater treatment

● Outputs:

- Transferable knowledge on operation and performance of full scale tertiary treatment
- Demonstrate feasibility of flexible use of existing infrastructure in respect to the elimination of pharmaceuticals
- Increase knowledge about the need and effects for post-treatment options of ozonation or PAC.
- General guideline for operators and water authorities on how to plan, start, operate and control advanced wastewater systems for API removal.



**How the API emissions could be decreased
with advanced WW treatment?**

WP4: Low-tech risk reduction measures of pharmaceuticals

- Objective:
 - Evaluate other risk reduction measures and their potential to reduce emissions of pharmaceuticals to environment
 - Take-back and disposal of unused medicines
 - Increased awareness of APIs' environmental impacts
 - Enhanced environmental permitting of pharmaceutical plants
- Evaluation and development of current national practices in all partner countries (preferably in all Baltic Sea countries)

WP4: Low-tech risk reduction measures of pharmaceuticals

- Outputs:

- Recommendations on

- good practices for take-back and disposal of unused medicines (human and vet)
- efficient dissemination of environmental information on pharmaceuticals
- environmental permitting of pharmaceutical plants, within current legislation framework
- industrial wastewater contracts between MWWTPs & pharmaceutical plants



How the emissions could be decreased with better practices?

WP5: Scenarios, Conclusions and Action Plan

- Objectives:

- Compile results from WPs 2 - 4 to overall conclusions
- Prepare policy-orientated recommendations



What are the current emissions and where they come from



How much the API emissions could be decreased with advanced WW treatment



How the emissions could be decreased with better practices e.g. via improved take-back and disposal of unused medicines



Recommendations on the best practices

More information from
www.cwpharma.fi

