
INTERREG
Deutschland
Nederland
MEDUWA - Vecht(e)
MEDizin Unerwünscht im WAsser
MEDicines Unwanted in WAter
MEDicijnen Uit het WAter

MEDUWA - Vecht(e)

Goal

To develop a set of innovative complementary measures that prevent the transfer of pharmaceuticals and multi-resistant bacteria from human and veterinary origins to water, food and air, and back.

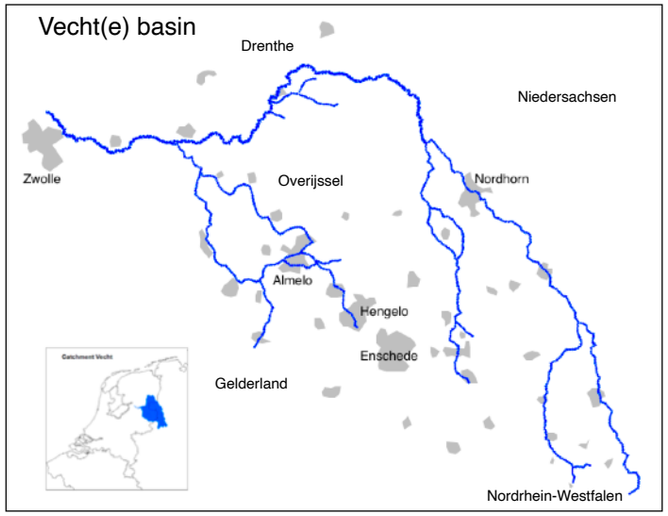
inter-sectoral cross-border coalition for action & change

MEDUWA is a German-Dutch cross-border coalition of companies, research institutes, governments, and NGO’s from the water, agricultural and (human & veterinary) health sectors.

MEDUWA - Vecht(e)

Period	02-01-2017 - 31-12-2019
Budget	€8,45 M (Own contribution €2,28 M)
Lead Partner	Universität Osnabrück
Management	Stichting Huize Aarde and The Integrated Assessment Society
R&D Institutes NL	Radboud U, Radboud UMC, Saxion UAS, U Twente, Wetsus
R&D Institutes DE	Universitäts Klinikum Münster IfH & IfMM, Universität Osnabrück IUSF
Governments NL	Waterschap Zuiderzeeland
Companies NL (10)	AVIV, Novaris Orbit Technology, Europa Ayurveada Centrum, NX Filtration, Tournois Dynamic Innovation, VitalFluid, Noldus, Demcon, AMRIF, Alloksys
Companies DE (7)	Geoplex, Microganic, InProSens, Weil Wasser, Ubisense, Aix Scientifics
Stakeholders	Vitens, Waterschap Vechtstromen, Waterschap Drents Overijsselse Delta, NLWKN, LANUV, KNMP-Oost NL, RIKILT, Kompetenzzentrum Mikroschadstoffe NRW, Commissie MER, Diergeneeskundige Dienst, Hochschule Osnabrück, Universität Oldenburg, NEFARMA, and others
Funders (INTERREG)	EFRE/EFRO; Ministerie v EZ; MWEIMH NRW; Niedersächsische Staatskanzlei; Prov. Overijssel, Gelderland, Fryslân, Flevoland
INTERREG Progr. Management	Euregio bureau Gronau-Enschede

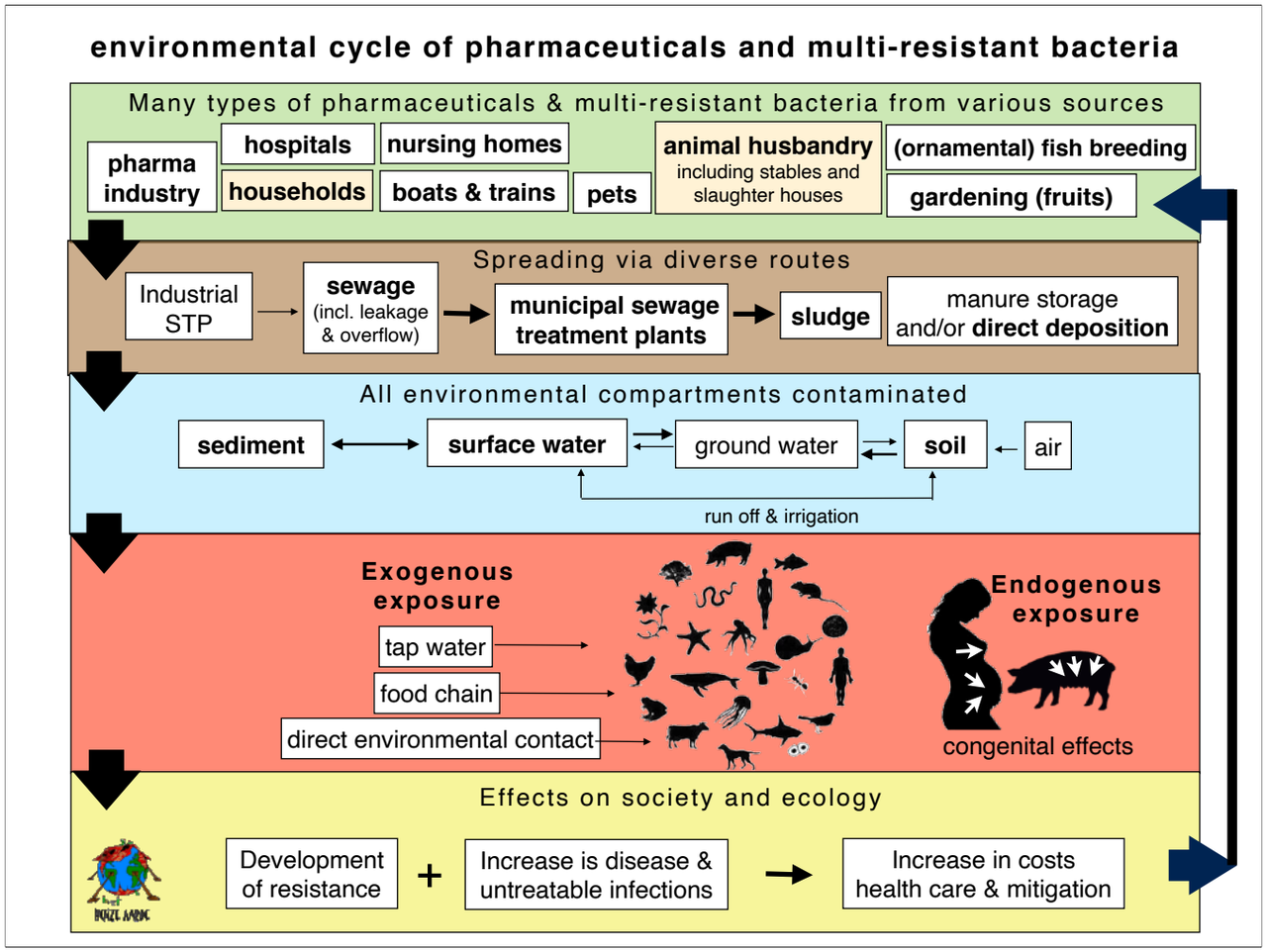
MEDUWA will be financed by INTERREG-VA-Program, has a budget of 8,45 M, and will run from January 2017 to December 2019.



Pilot area

Area floodplain: 3780 km2.
Longitude Vecht(e) river: 170 km.
Water source: 46-48% from Germany; 54-52 % from the Netherlands.
Main tributaries: Dinkel 89 km, Regge 50 km, Steinfurter Aa 46 km.
Dutch Provincies: Overijssel, Gelderland, Drenthe.
German Länder: Nordrhein-Westfalen, Niedersachsen.
Total inhabitants: 1,15 Million (DE ± 336.000; NL ± 816.000).
Main municipalities (>20,000 inhabitants): Enschede, Zwolle, Hengelo, Almelo, Hardenberg, Nordhorn, Gronau, Hellendoorn, Coevorden, Ahaus, Steinfurt, Oldenzaal, Rijssen, Dalfsen, Dinkelland, Wierden, Losser, Borne, Tubbergen.

During prolonged dry periods the rivers of this floodplain/watershed consists of 80 to 100 % treated water from sewage treatment plants. The water therefor contains relatively high concentrations of pharmaceuticals and bacteria (and their plasmids) that became multi-resistant during human and veterinary antibiotic use. After heavy rain-fall these so called micro-contaminants are spread over the land due to flooding.



All types of medications and medicine-resistant micro-organisms are being secreted by human and animal urine and feces. The main sources are households and livestock. To a lesser extent, hospitals, nursing homes, and other sources. These chemical and biological contaminants are primarily distributed through effluents from sewage treatment plants and injected farm manure. They are found in fresh and salt surface water, groundwater, sediment, soil and air. Through water, food (plants absorb medicines) and air (dust from livestock) each organism is exposed to pharmaceuticals and medicine resistant micro-organisms. This happens not only exogenous but also possibly endogenously; through egg, placenta and breast milk. The effects can manifest themselves in various forms, as well as the extra costs for society.

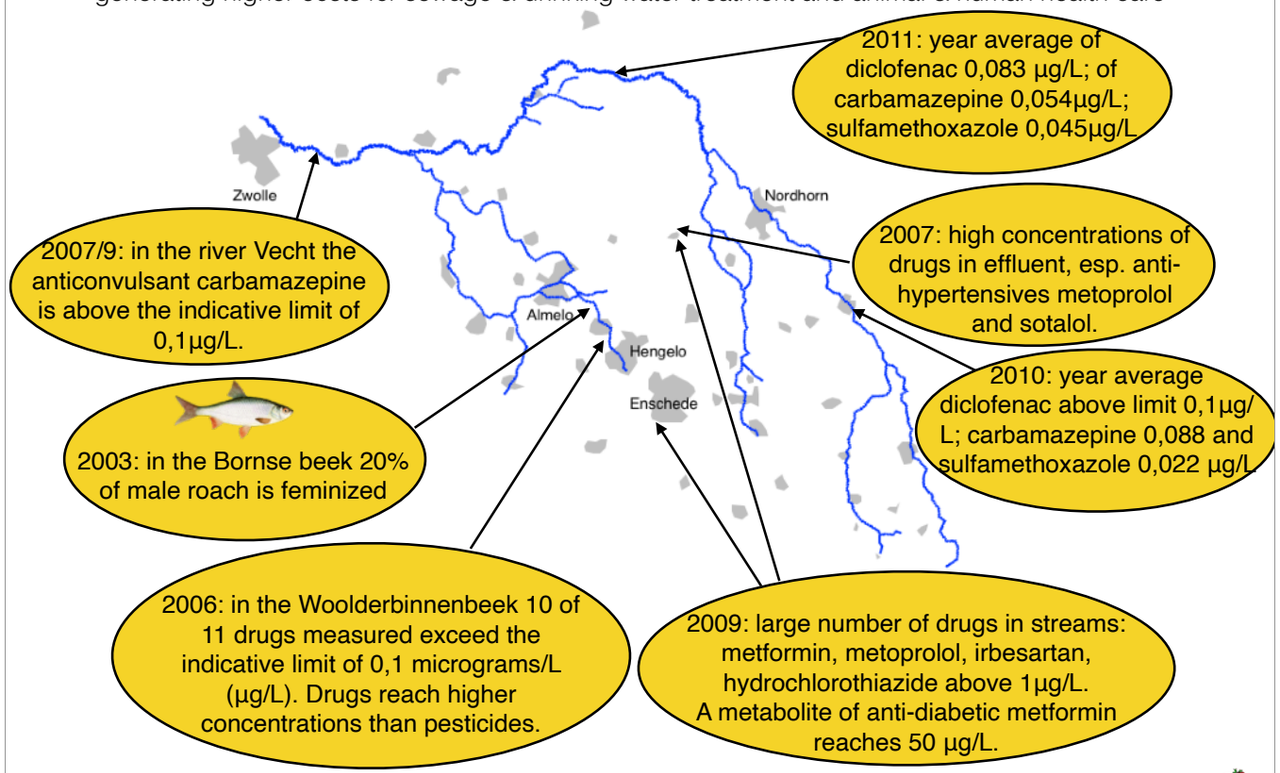
=> This diffuse distribution, along with the many forms of these molecules and microorganisms, make monitoring, toxicology, risk assessment and risk management of medicines and resistance in the environmental cycle extremely complex.

NL
Alle soorten medicijnen en medicijnresistenties worden door mens en dier via urine en ontlasting uitgescheiden. De belangrijkste bronnen zijn huishoudens en veeteeltbedrijven. In mindere mate ziekenhuizen, verzorgingshuizen, e.a. bronnen. Deze chemische en biologische verontreinigingen worden vooral via effluent van rioolwaterzuiveringsinstallaties en geïnjecteerde landbouwmest verspreid. Ze worden aangetroffen in zoet en zout oppervlaktewater, grondwater, sediment, bodem en lucht. Via water, voedsel (planten nemen medicijnen op) en lucht (stof uit veestallen) wordt ieder organisme aan medicijnen en medicijnresistenties blootgesteld. Dit gebeurt niet allen exogeen maar mogelijk ook endogeen; via ei, placenta en moedermelk. De gevolgen kunnen zich in verschillende vormen manifesteren, evenals de extra kosten voor de samenleving.

=> Deze diffuse verspreiding, samen met de vele verschijningsvormen van deze moleculen en micro-organismen, maakt monitoring, ecotoxicologie, risico-evaluatie en beheer van geneesmiddelen en resistentie in de milieukringloop uitermate complex.

pharma-contamination in Vecht(e) basin

generating higher costs for sewage & drinking water treatment and animal & human health care

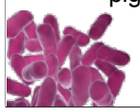


2003: Gerritsen AAM et al 2003; 2006: metingen Bornsebeek WRD; 2007: WRD; 2007/9: metingen in Vecht WGS; 2009: Oosterhuis M et al 2011; NLWKN 2013

Pharmaceuticals have been found in relatively high concentrations throughout the watershed; in some cases above the tentative limit of 0,1 microgram/L. Also the antibiotic sulfamethoxazole is demonstrated in the German and in the Dutch part of the river system. Feminized male fish has been observed.

Agriculture/cattle breeding in Vecht(e) basin

Münsterland has the highest density of pigs, cattle and chickens in Germany.



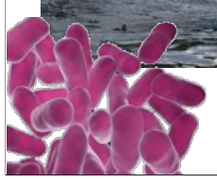
"Our latest study with veterinarians showed that up to 85% of farms have MRSA-positive animals, on both the Dutch and the German side of the border. And more than 20% of all incoming hospital patients in the region reveal livestock-associated MRSA, with a steady upward trend."

Prof. Dr. Alexander Friedrich, UMCG, in Infection-Research.de, 22-03-2010

The German/Dutch Vechte basin is characterized by intensive livestock breeding and agriculture (mainly pigs and fodder for pigs) for export purposes. This high prevalence of multi-resistant bacteria is an economic and health risk factor for the area.

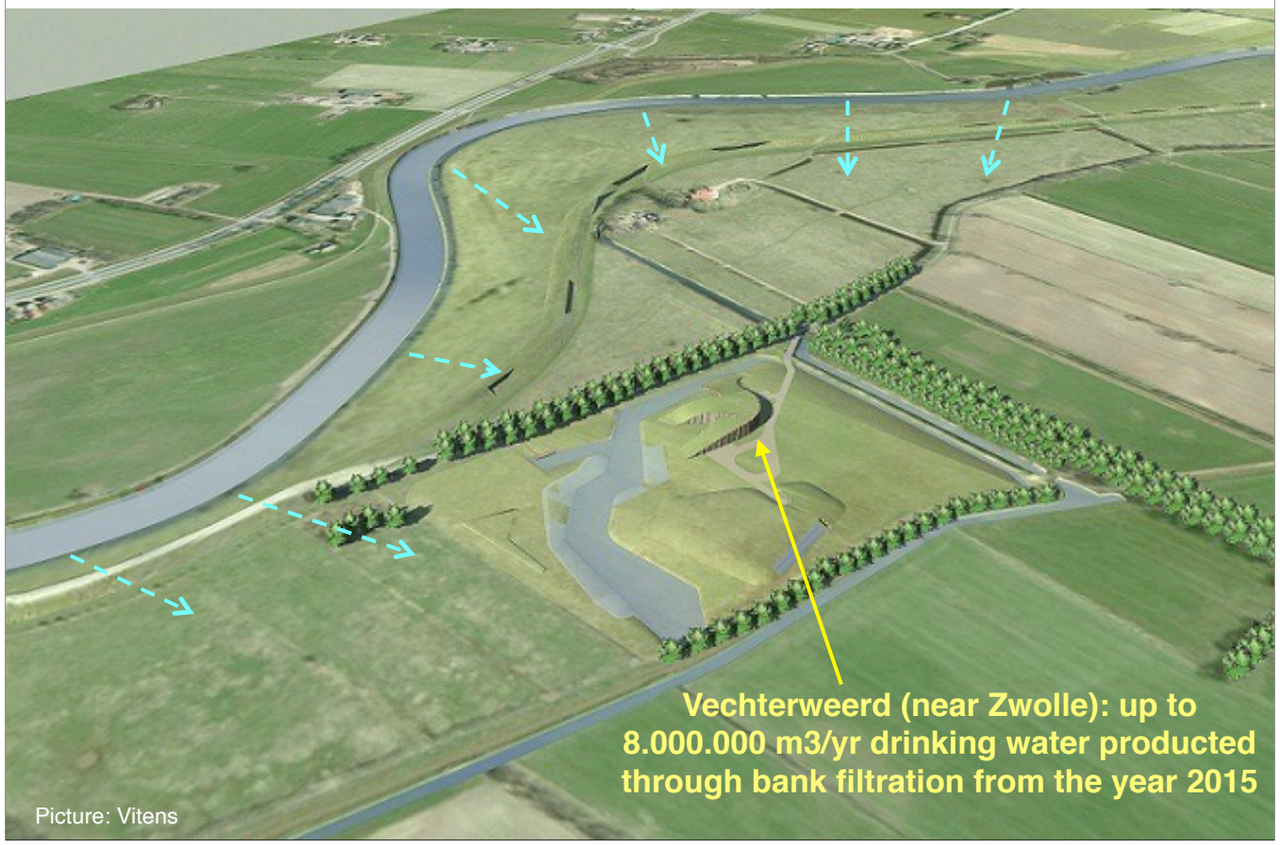
Swimming in the Vecht(e) basin

Photos: SPV De Grunte, Hardenberg

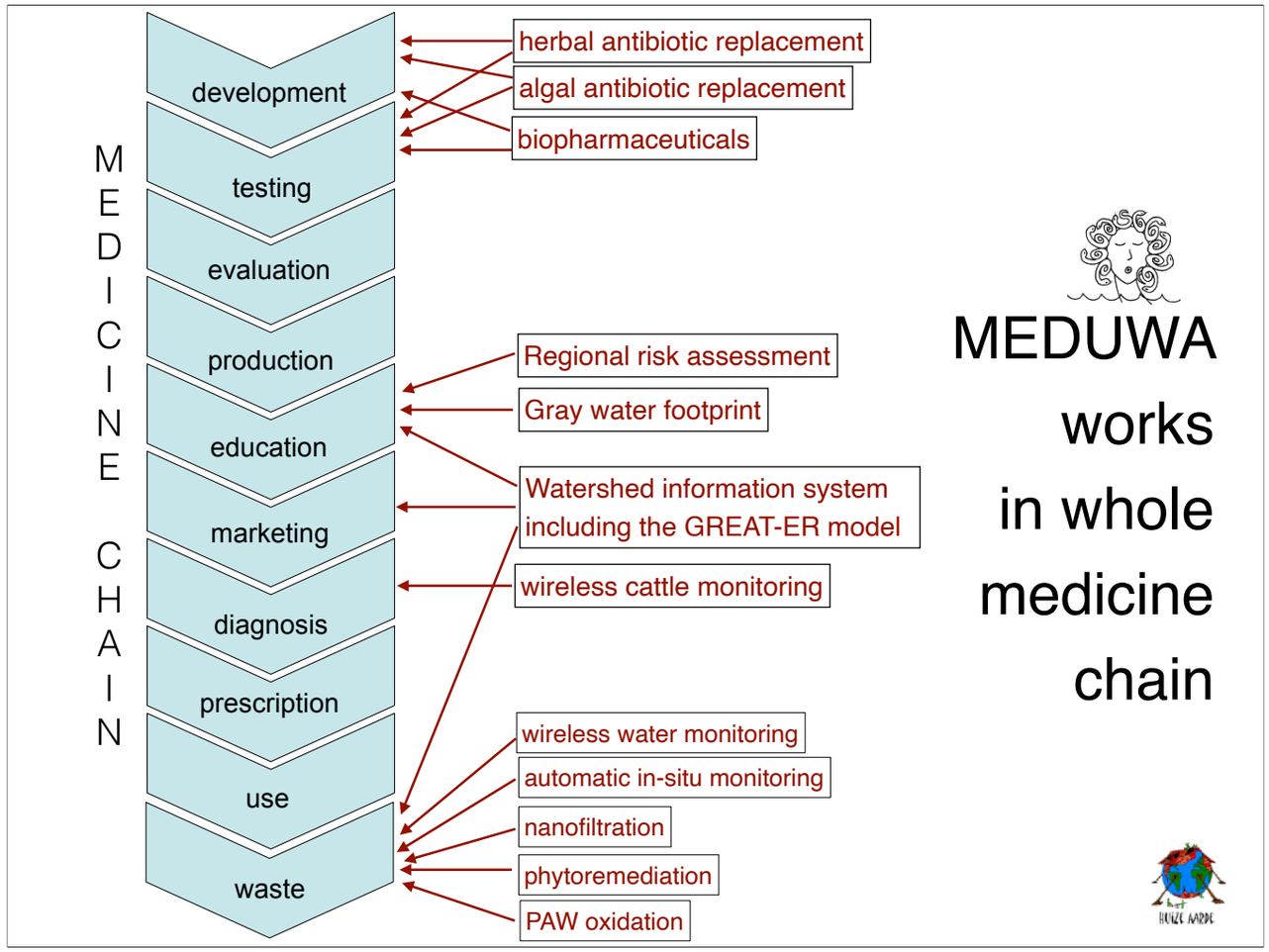


Recreational use of surface water in the area is growing, although it is recommended not to swim in this rivers. Recently ESBL-bacteria were identified in the river system. Swimmers inevitably swallow ESBL-bacteria, but the health impact is not known yet (comm. H. Schmitt, IRAS/Wetsus). This micro-contamination could restrict the development of water tourism in the area.

The Vecht as an important future drinking water source



In the Netherlands, the Vecht will become a drinking water source for up to 10% of the population of the province of Overijssel. Advanced water treatment needed will imply high costs. Contamination of this river with micro-pollutants like pharmaceuticals and multi-resistant micro-organisms goes against the EU-objective that with simple techniques drinking water can be made from surface water.



To improve the water, soil, food and air quality of this watershed, MEDUWA is developing a set of complementary measures that can be implemented in various links of the pharmaceutical chain. These include among others the development of:

- a Watershed Information System (WIS) to simulate, test the effectivity of measures under different climate scenarios;
- a Gray Water Footprint (vuilwatervoetafdruk/Grauwasserfussabdruck) that express the amount of water contaminated per treatment/patient, hospital, animal, farm, kilo of meat or liter of milk;
- a Regional Risk Assessment;
- herbal and algal alternatives to replace antibiotics;
- less persistent bio-pharmaceuticals.

All of these products deal with antibiotics and multi-resistant-bacteria.

5 intervention classes of MEDUWA

WP	product	Prevention	Mitigation	Measurement	Simulation Prediction	Visualisation Communication
1.1	Watershed info system					
1.2	Gray water footprint					
1.3	Risk assessment					
2.1	Automatic in-situ monitoring					
2.2	Wireless water monitoring					
2.3	Nanofiltration					
3	PAW oxidation					
4.1	Phytoremediation					
4.2	Herbal antibiotic replacement					
4.3	Algal antibibiotic replacement					
5	Wireless cattle monitoring					
6	Biopharmaceuticals					

MEDUWA covers different intervention classes: prevention; mitigation; analysis; measurement; simulation of measures; prediction under various management and climate scenarios; visualization; and communication.
Visualisation and communication tools like WIS, Gray Water Footprint and Regional Risk Assessment aim to strengthen socially responsible medicine use by the veterinary and human health sectors.

Vielen Dank / dank u / Thank You

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