Welcome!

Dutch Consortium to Reduce Emissions from Antibiotics Production

Kick off

29 April 2020

Kick off Agenda

10.00 Opening & welcome by *Maarten van Dongen*

10.05 Brief introductions of initiators
>> Program Coalition Sustainable Pharmacy:
Bogin, VIG, Neprofarm, KNMP; *Brigit van Soest-Segers*
>> European Water Stewardship; *Tom Vereijken*
>> AMR Insights; *Maarten van Dongen*

10.20 Effects of pharmaceuticals on the environment; the PREMIER study
Dr. Caroline Moermond, RIVM, Centre for Safety of Substances and Products

10.35 Antimicrobial resistance as a global threat to health and food safety
Dr. Maarten van Dongen, AMR Insights

10.50 Break

11.00 Treatment technologies to reduce antibiotic emissions
Dr. Ir. Alette Langenhoff, WUR, Department of Environmental Technology

11.20 NL Consortium Reduction Antibiotics from Residual Flows
Design, opportunities, participation
Dr. Maarten van Dongen, AMR Insights & *Tom Vereijken MBA*, EWS

11.30 Q&A

11.50 Next steps and next meeting

12.00 Closure

We welcome 60+ Participants from…

- Access to Medicine Foundation
- AIGHD
- AMR Insights
- AstraZeneca
- BKH Water
- Brightwork BV
- Centrient Pharmaceuticals
- CEW
- Deventer Ziekenhuis
- Dutch Ministry of Health
- Erasmus MC
- ESEP Milieutechniek
- Evides Water Company
- Healthy Ageing Network NNL
- KWR Water Research Institute
- MediSchoon
- Ministerie van LNV
- Ministry Econ. Affairs & Climat Policy
- Ministry Infrastrure and Water Management
- Nijhuis Industries
- NX Filtration
- MVO Nederland
- NL Vereniging van Ziekenhuizen
- Pfizer
- Pharmafilter
- PUM
- RIVM
- Royal HaskoningDHV
- RUG
- Schuttelaar & Partners
- Sociaal Economische Raad (SER)
- Sphereon
- Stowa/H2OK
- Takeda
- Teva
- TNO
- TNO EMSA
- TUD - Waternet
- UU / Utrecht Holdings BV / NCOH
- van Remmen UV Technology
- VIG/Bogin/Neprofarm/KNMP
- Wageningen Food & Biobased Research
- Wageningen University & Research
- Water Alliance
- Water Stewardship Academy
- Waterschap Aa en Maas
- WaterWindow
- WLN
- Xylem Water Solution Nederland

Points to consider

- Questions & remarks: please type & submit! We will address these at the end of the webinar
- The webinar will end at 12:00 PM latest
- We will contact you after the webinar to invite you for further involvement in the Consortium
- Issues not addressed during this Kick off: please email to info@amr-insights.eu

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Programma duurzame farmacie

Kick-off 29 april Nederlands Consortium Reductie Antibiotica in Reststromen

Brigit van Soest-Segers, programmanager duurzame farmacie

BOGIN Neprofarm KNMP

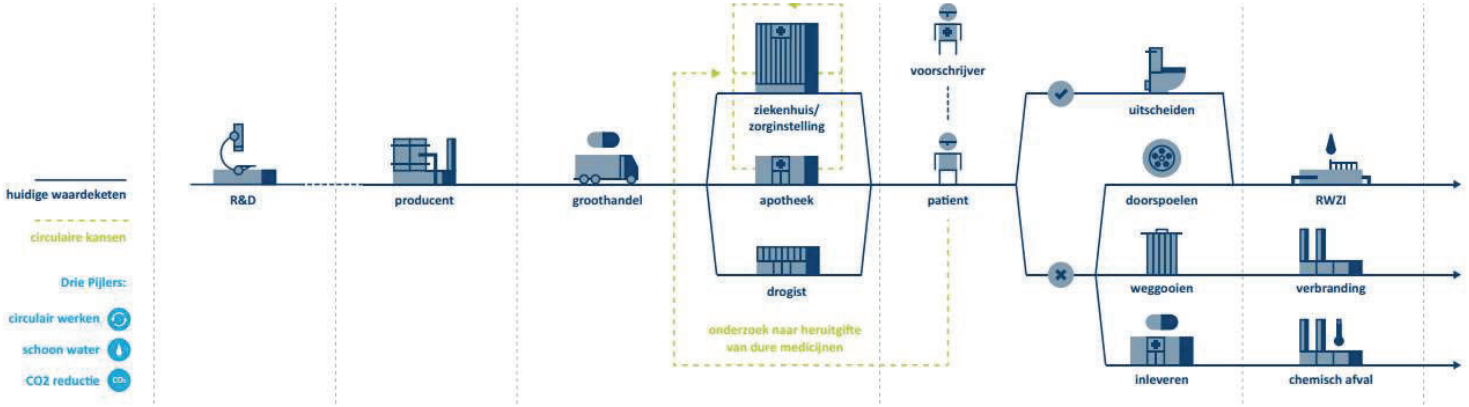
Waarom programma duurzame farmacie?

Geneesmiddelen leveren een onmisbare bijdrage aan onze gezondheid

Maar…..geneesmiddelen kunnen ook een negatieve invloed op het milieu hebben.

DUURZAME FARMACIEKETEN

Ketenverantwoordelijkheid



Milieu impact

Medicijnen veroorzaken **1,98 Mton** aan CO_2 uitstoot per jaar. Dit is 18% van alle emissies door de gezondheidszorg in Nederland.[1]

Ieder jaar wordt er **36.000** ton aan verpakkingsmaterialen gebruikt. Voornamelijk papier, karton en kunststof.[2][3]

Jaarlijks worden er **1,6 miljoen** doosjes medicijnen vernietigd in de distributiefase.[3]

Per jaar wordt er **100 miljoen** euro aan medicijnen verspild in de gebruiksfase. 40% hiervan valt te voorkomen.[4]

83% van alle patienten houdt medicijnen over. Een kwart van de patienten die thuis medicijnen weggooit spoelt ze door toilet of gootsteen.[5]

140 ton medicijnresten (excl. 30 ton contrastmiddelen) worden jaarlijks geloosd in het oppervlaktewater.[6]

Medicijnresten in het milieu kunnen schadelijke effecten hebben op waterorganismen; zoals weefselschade, geslachts-, en gedragsverandering.[6] Antibioticaresten vergroten het risico op resistentie.

(1) Gupta Strategists, 2019. (2) Brancheplan Duurzaam Verpakken – Farmacie en zelfzorggeneesmiddelen, 2019. (3) Schatting van enkele farmaciebedrijven. (4) C.L. Bekker, 2018. (5) Effecten van een pilot inzamelweek, 2020. (6) Moermond et al., 2016.

Bogin, VIG, Neprofarm en KNMP tekenen Green Deal Duurzame Zorg: 4 pijlers

Bevorderen circulair werken
- Voorkomen van verspillingen van medicijnen en gebruik materialen
- Verhogen inzamelen van ongebruikte medicijnen
- Verduurzaming verpakkingen (bijv. minder materialen en verhoging recyclebaarheid)
- Duurzaam en circulair inkopen
- Papierloos werken

Schoon water: medicijnresten uit het water
- Bij ontwikkeling van medicijnen rekening houden met milieu
- Informatie over milieuaspecten delen
- Gebruiksinstructies gericht op reductie milieu impact ontwikkelen en verspreiden
- Schone afvalstromen bij productie/productieketen
- Juiste zorg op het juiste moment op de juiste plek (personalised healthcare/ farmacogenetica testen)
- Minder milieubelastende grondstoffen

Co2 reductie
- Vermindering transport, CO_2-neutrale productie

Gezondmakende leefomgeving en milieu
- Leefstijlinterventies

Voorbeelden van ontwikkelingen:

- Naar verwachting stijging AMR als gevolg van COVID-19
- Binnen EFPIA, AESGP, Medicines for Europe aandacht voor het milieu – gezamenlijke werkgroep ingericht – Eco Pharmaco Stewardship initiative
- Pharmaceutical Supply Chain Initiative (PSCI) https://pscinitiative.org/home
- AMR Industry Alliance https://www.amrindustryalliance.org/
  - Discharge limits for antibiotic residues in water
- Ketenaanpak medicijnresten uit water https://medicijnresten.org/
- UvA rapport in opdracht van brancheverenigingen geneesmiddelenbedrijven en zorgverzekeraars
  - Initiatief ronde tafel SER: Businesscase for change
  - formuleren van gezamenlijk duurzame en circulaire inkoopcriteria
- Aanscherping Environmental Risk Assessment Guideline in kader van toelating geneesmiddelen (2006)
- Aanscherping EU Strategic Approach to Pharmaceuticals in the Environment

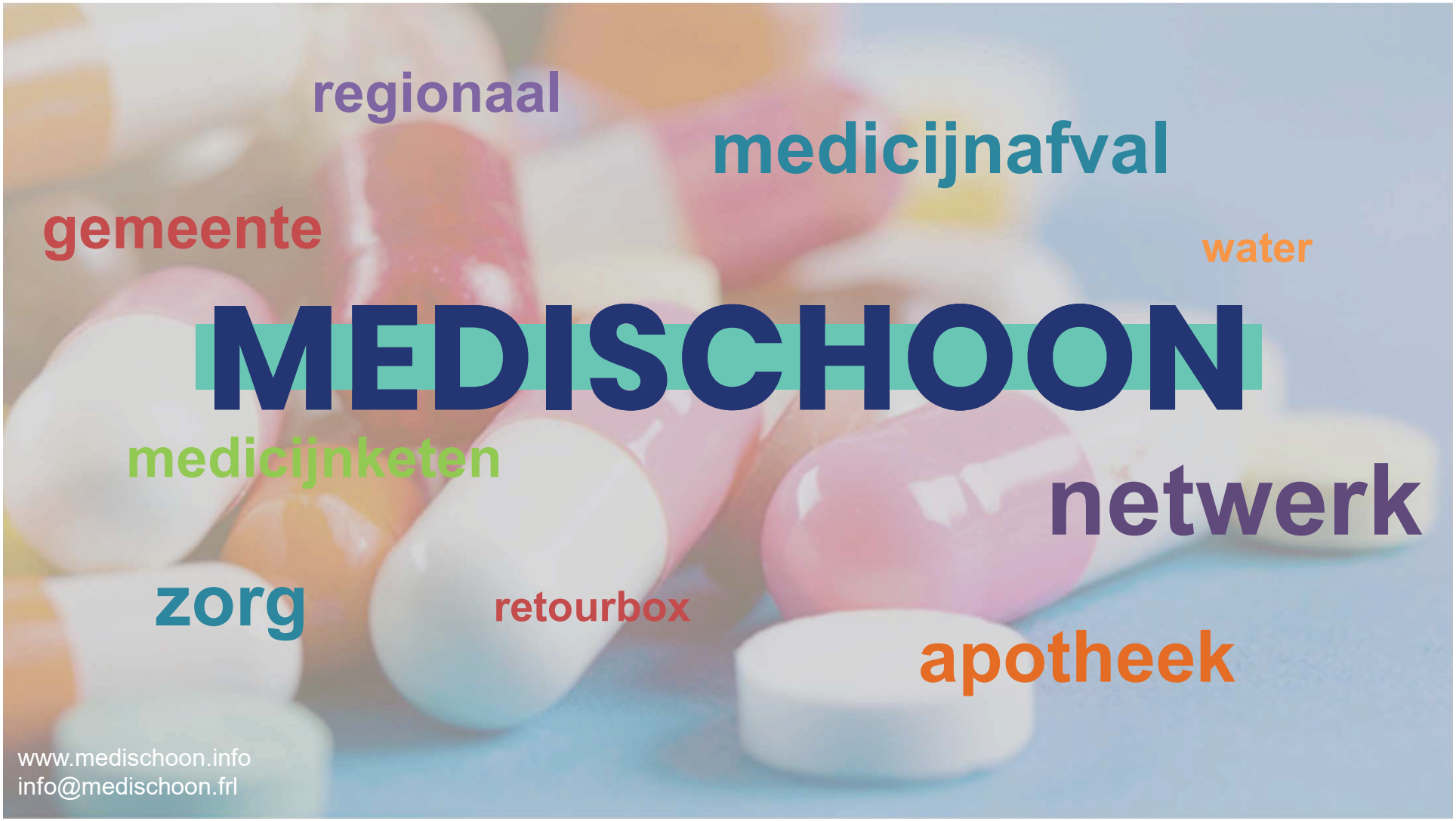
NU MOMENTUM

Water Stewardship Academy

www.ews.info
contact@ews.info

MEDISCHOON

WATERPROTECT


regionaal
medicijnafval
gemeente
water
MEDISCHOON
medicijnketen
netwerk
zorg
retourbox
apotheek
www.medischoon.info
info@medischoon.frl

MediSchoon versterkt de regionale medicijnketen

www.medischoon.info
info@medischoon.frl

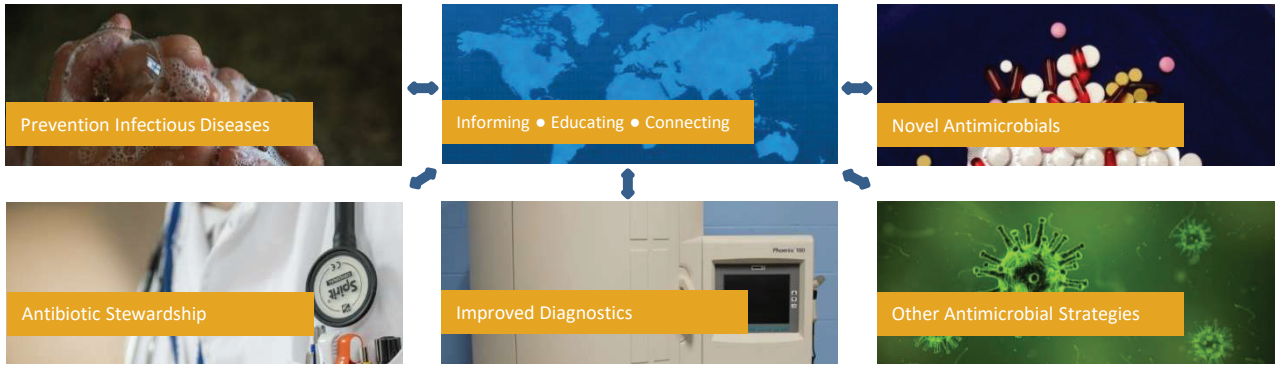

AMR INSIGHTS
TOWARDS A WORLD FREE FROM AMR
Introduction
2020
AMR INSIGHTS:
INFORMING ● EDUCATING ● CONNECTING

AMR INSIGHTS
TOWARDS A WORLD FREE FROM AMR

ANTIMICROBIAL RESISTANCE

Antimicrobial resistance (AMR) is considered the biggest global threat of Health and Food Safety[1]. AMR develops when bacteria, fungi or viruses are exposed to antibiotics, antifungals or antivirals. As a result, the antimicrobials become ineffective and infections may persist. In addition, medical interventions including surgery, caesarian sections, chemotherapy and stem cell therapy may become impossible. It is estimated that AMR causes 700,000 casualties per year with the low- and middle income countries (LMIC) bearing the harshest burdens. More recent recalculations even indicate substantially higher numbers. According to the 'Review on Antimicrobial Resistance' by Jim O'Neill we may face some 10,000,000 casualties per year in 2050 with cumulative GDP loss of $ 100 trillion[2]. "Planet earth faces the very real threat of having to survive in a 'post-antibiotic' era in which there are few, if any, antibiotics which effectively and affordably cure infections." [3]

GLOBAL SOLUTIONS TO AMR:



1) https://www.who.int/en/news-room/fact-sheets/detail/antimicrobial-resistance
2) https://amr-review.org/
3) https://www.daghammarskjold.se/publication/antimicrobial-resistance-and-sustainable-development-a-planetary-threat-but-a-financing-orphan/

AMR INSIGHTS
TOWARDS A WORLD FREE FROM AMR

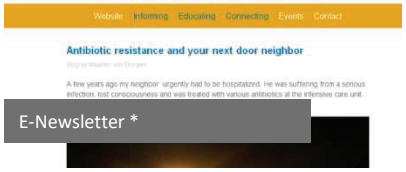
AMR INSIGHTS INFORMS, EDUCATES AND CONNECTS PROFESSIONALS

AMR Insights is committed to eliminating antimicrobial resistance because it does not accept that millions of innocent people need to die as a result of resistant bacteria and other microorganisms.

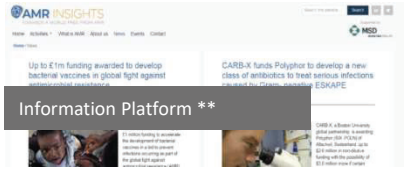
The mission of AMR Insights is to save lives by Informing, Educating and Connecting professionals involved in Antimicrobial resistance.

AMR Insights achieves its mission by providing:

INFORMING:



E-Newsletter *



Information Platform **

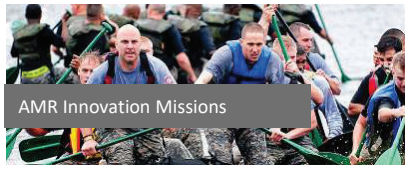
EDUCATING:


Masterclasses on AMR


Seminars on AMR topics

CONNECTING:

Int. Matchmaking Symposia


AMR Innovation Missions

* Ca 20 Newsletters in 2020; sent to 5,500 professionals in EU, USA, Asia & ROW
** Ca 35,000 visits per year; visitors from USA, EU, Asia & ROW

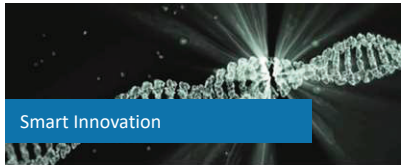
AMR INSIGHTS
TOWARDS A WORLD FREE FROM AMR

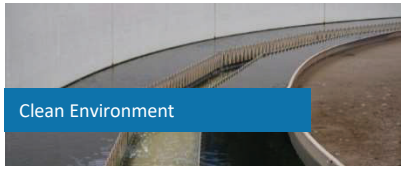
AMR INSIGHTS TARGETS 6 FOCAL AREAS

AMR Insights supports professionals in Public, Private and Non-Governmental Organizations worldwide. These include Healthcare Institutes, Authorities, Academia, Industry and NGO's. AMR Insights is active at all management layers and in all areas where AMR deserves attention.

In order to serve professionals in the best possible way AMR Insights targets 6 different Focal Areas. Within each Focal Area, professionals deal with AMR in a multitude of ways but with the same overall goal. This overall goal is expressed in the name of the Focal Area.

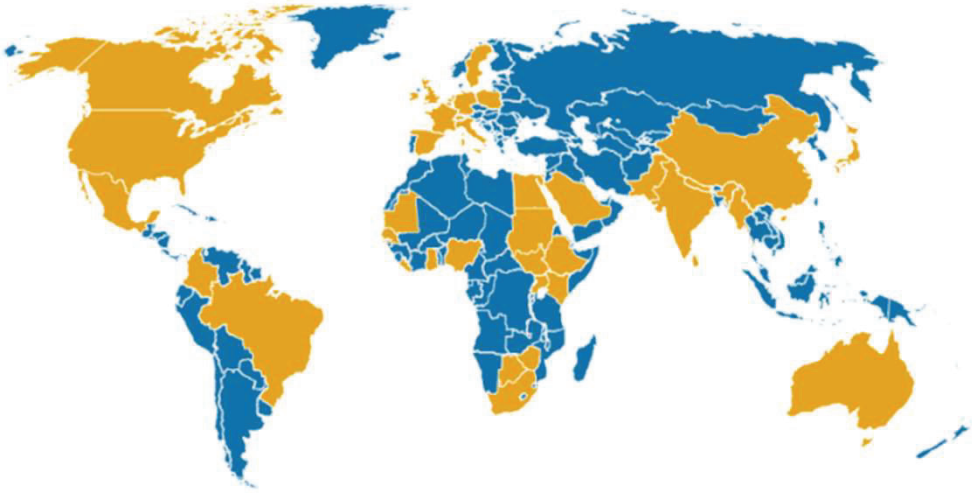
THE 6 AMR INSIGHTS FOCAL AREAS:





AMR INSIGHTS®
TOWARDS A WORLD FREE FROM AMR

160+ AMR INSIGHTS AMBASSADORS in 50 countries (April 2020)



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National Institute for Public Health
and the Environment
Ministry of Health, Welfare and Sport

De effecten van geneesmiddelen in het milieu; het PREMIER onderzoek

Caroline Moermond

RIVM - Centrum voor veiligheid van Stoffen en Producten (VSP)

Geneesmiddelen en ecologie

- Acute effecten (sterfte) meestal niet relevant
- Continue blootstelling aan zeer lage concentraties: aantasting populatie en ecosysteem door subtielere effecten zoals voortplanting/gedrag

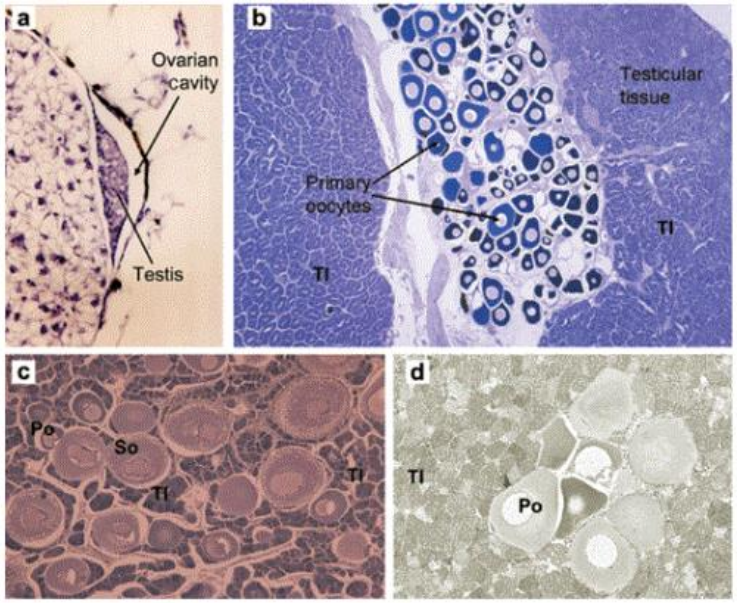
Vervrouwelijking van vissen

- 51 locaties bij rioolwaterzuiveringen in Engeland
- 25% van alle blankvoorns tekenen van vervrouwelijking. In sommige rivieren zelfs 100%

Tyler and Jobling, 2008. BioScience 58(11): 1051-1059

Vervrouwelijking van vissen

- 51 locaties bij rioolwaterzuiveringen in Engeland
- 25% van alle blankvoorns tekenen van vervrouwelijking. In sommige rivieren zelfs 100%
  - Chemisch (hormoon niveaus, vitellogenin)
  - Sperma van lage kwaliteit
  - Vorming van eicellen in testes en vrouwelijke eileiders



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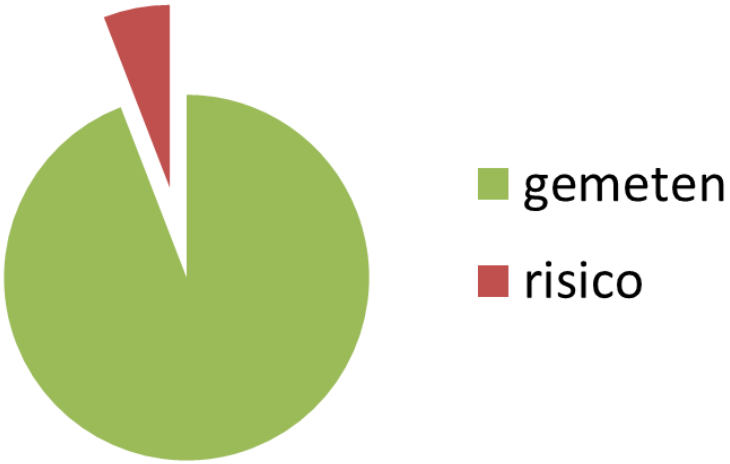
Geneesmiddelen en drinkwater

- Nederlands drinkwater voldoet aan alle kwaliteitseisen
- Maar: Geneesmiddelen worden wel in drinkwater gemeten
  - Analysemethodes steeds nauwkeuriger
  - Ook mengsel van aanwezige stoffen is veilig

De Nederlandse situatie

- Versnipperde monitoringsdata
- Geneesmiddelen zijn aanwezig in oppervlaktewater, grondwater en (soms) in drinkwater.
- 2014: Van de 80 geanalyseerde stoffen, werden er 29 geregeld aangetroffen.
- Een risico is aanwezig voor 5 van deze 22 stoffen.



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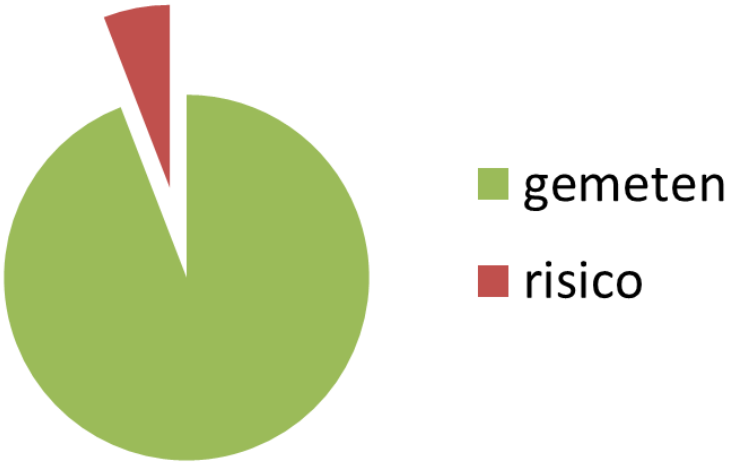

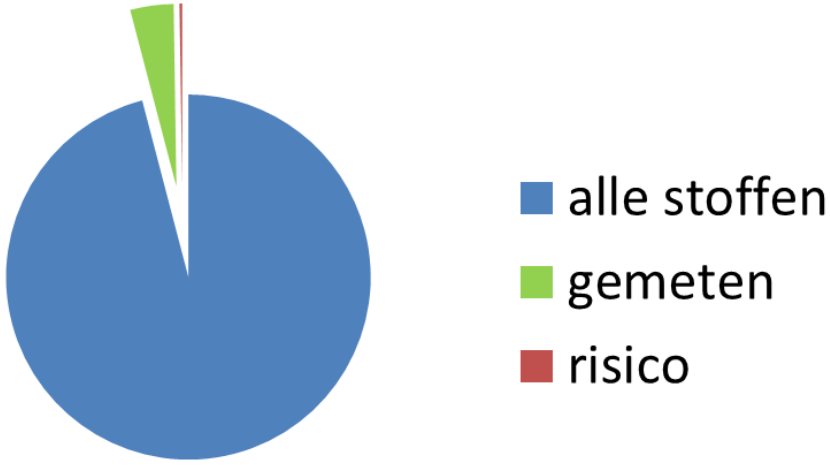

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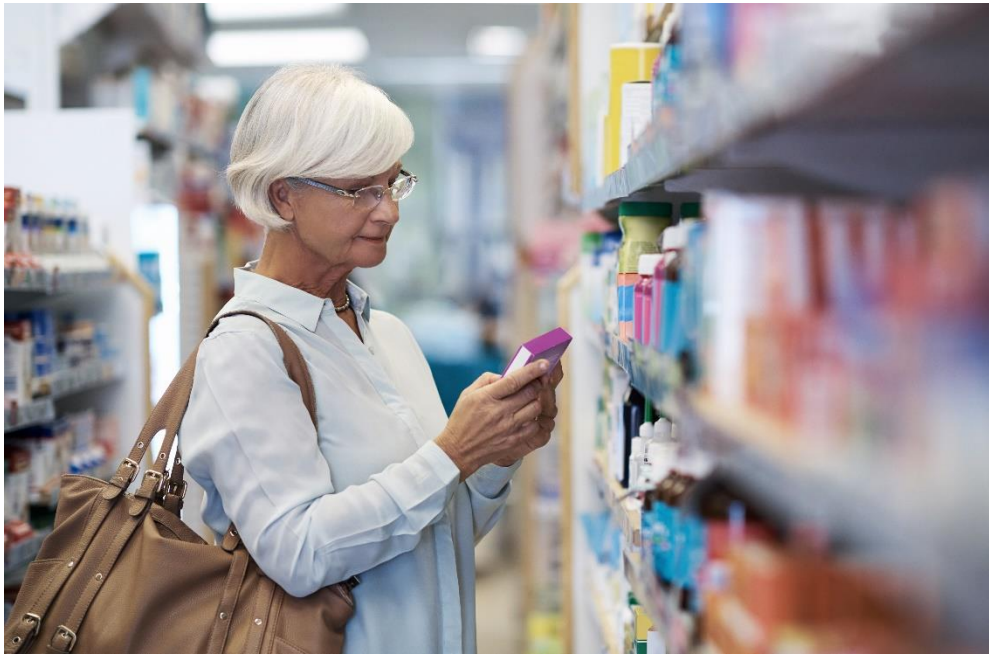
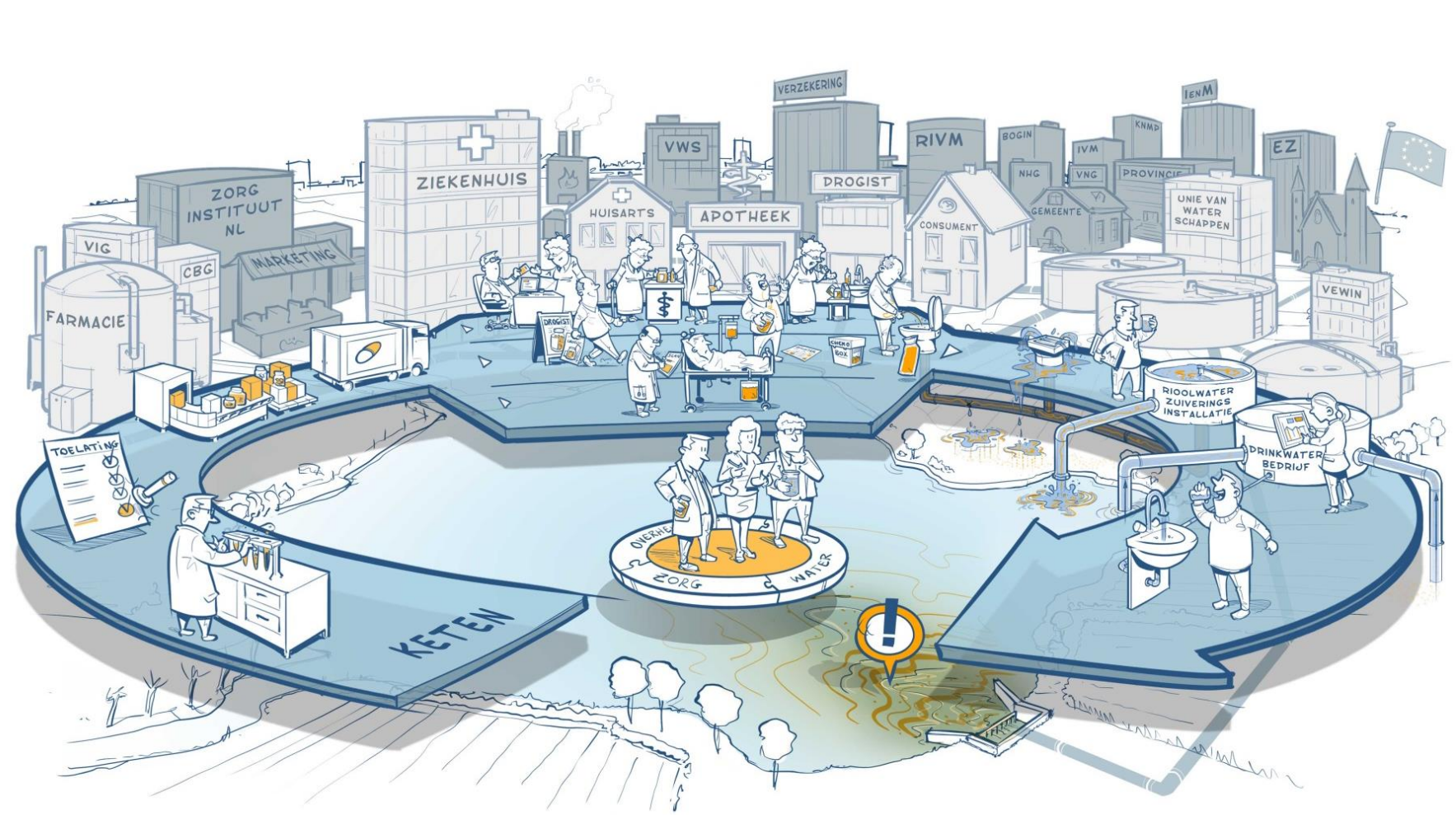
Binnenkort een update:

in 2017/2018 risico voor ‘iets meer’ stoffen

Toekomstige ontwikkelingen

- Klimaatverandering → fluctuaties in rivierafvoer
- Vergrijzing en medicalisering





https://jamdots.nl/view/239/Medicijnresten-uit-water


GEBEURT DIT NOG IN UW PRAKTIJK?
OH.... MAG DAT?
NEE JOH! RESTJES MOETEN HIERIN!!
DMV VISUAL THINKING '16

AMR in het milieu – RIVM activiteiten

- Nationale studies:
  - Bronopsporing van AMR (e.g. ziekenhuizen)
  - Emissies met afvalwater en mest
  - Concentraties en blootstelling in oppervlaktewater
- International:
  - WHO Tricycle project: One Health surveillance of AMR
  - Blootstelling RWZI medewerkers (JPI AWARE)
  - Mestverwerking (JPI ARMIS)
  - Gebrekkige sanitatie en AMR

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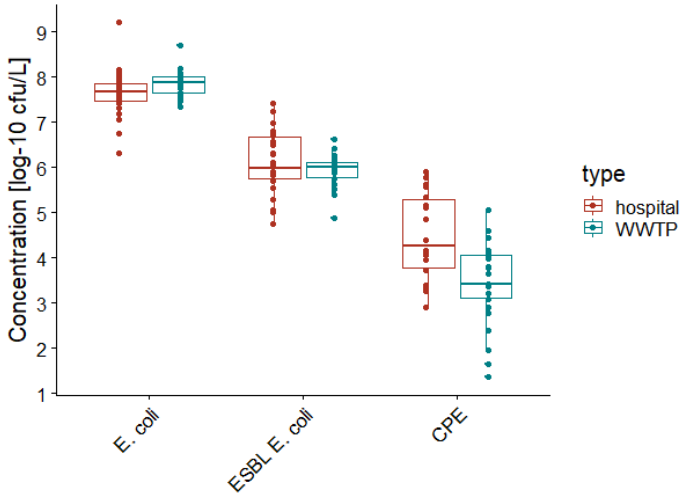
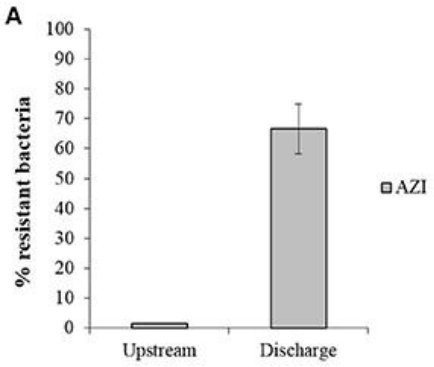
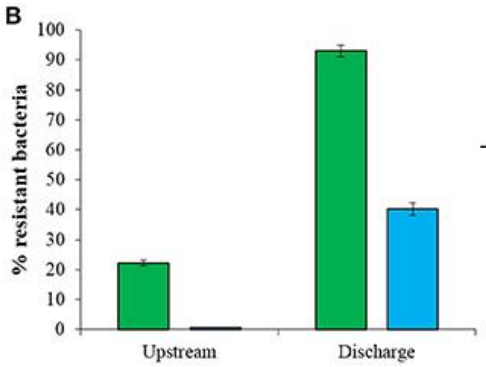
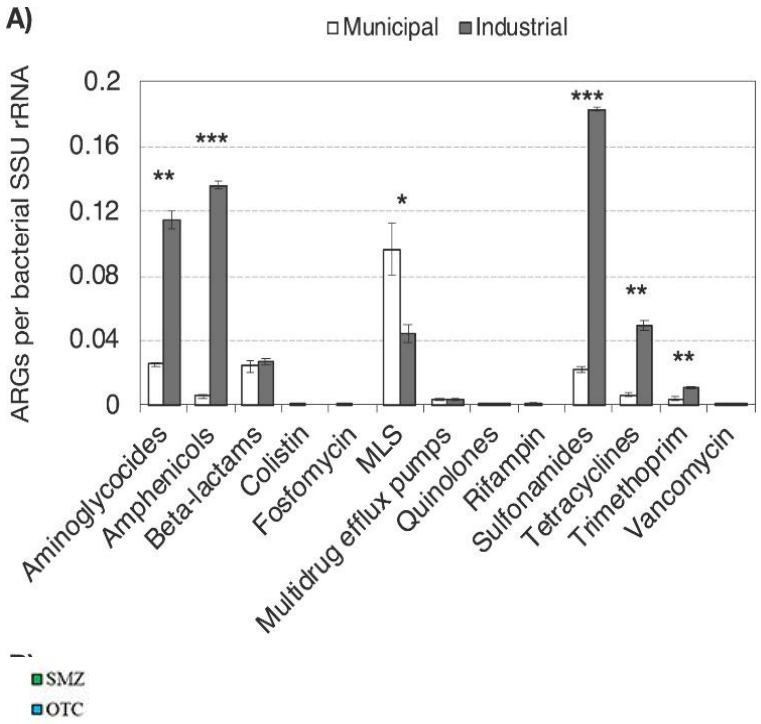


Relevantie van AMR voor productie



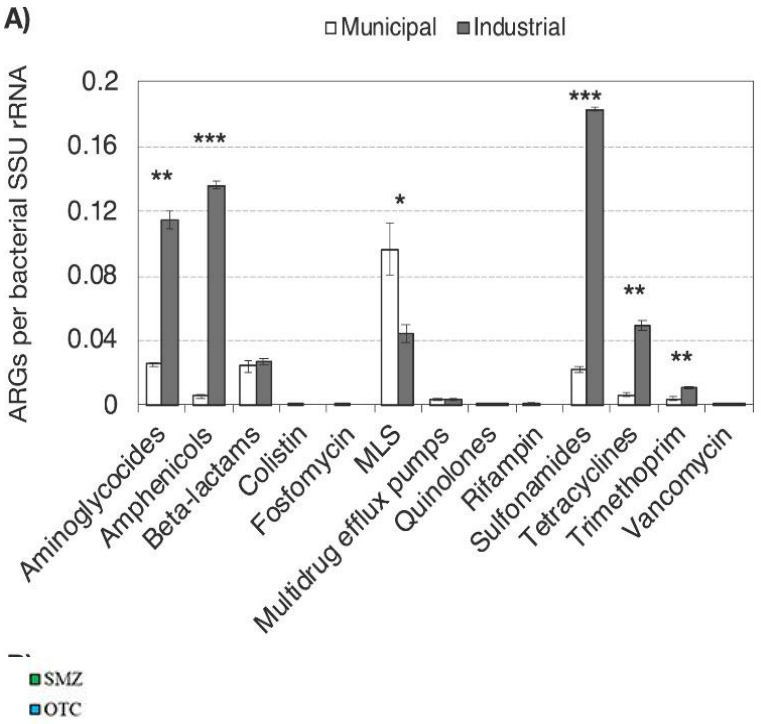


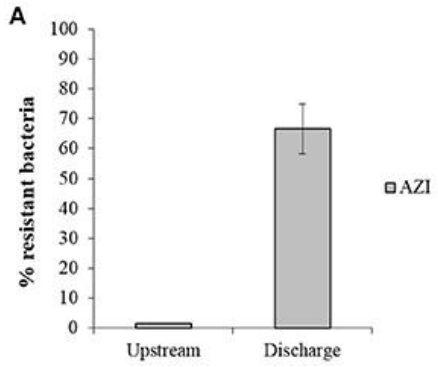


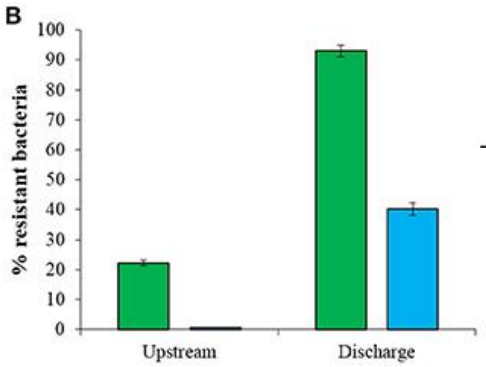
e.g. Marathe 2016, 2018, Bengtsson-Palme 2019, Gonzalez-Plaza 2018

Relevantie van AMR voor productie

- Selectie van AMR in effluenten..
  - In Europe
  - And India







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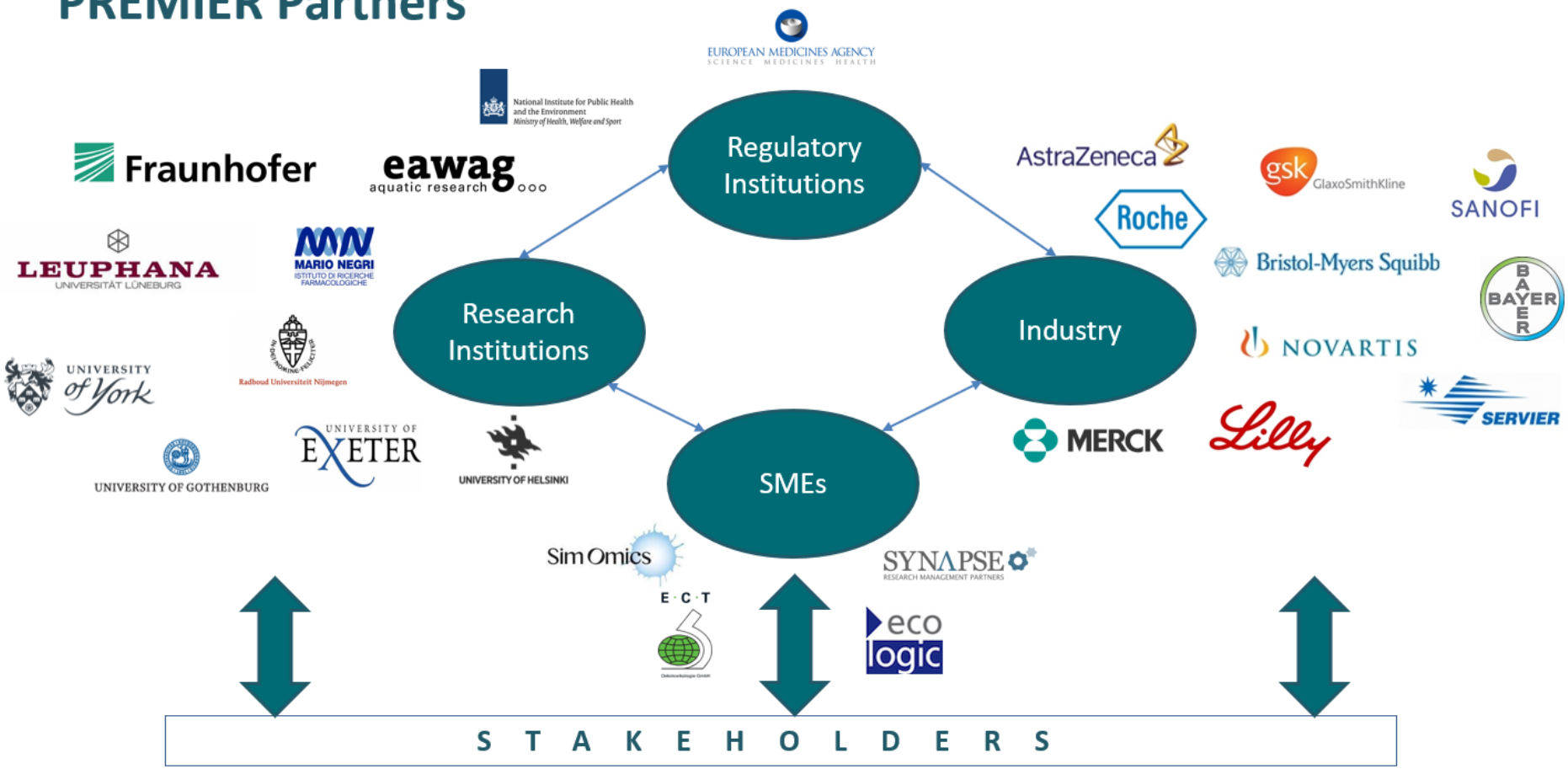
PREMIER:
Prioritisation and Risk Evaluation of MedIcines in the EnviRonment

- Gefinancierd door EU (Horizon 2020); helft van het onderzoek wordt uitgevoerd (en betaald) door industrie
- Totaal budget ongeveer 10 miljoen Euro
- Start September 2020
- Lead: Radboud Universiteit.
- RIVM is consortium partner en WP lead

PREMIER Partners



PREMIER: doelen

- Doelen:
  - Prioriteren van ‘oude’ geneesmiddelen (voor 2006 op de markt)
  - Ecotox testen voor de 25 hoogst geprioriteerde stoffen
  - Database (publiek beschikbaar!)
  - Beoordelings tool en handleidingen
  - Ontwikkeling van nieuwe testen (in vitro) en modellen, om dierproeven te verminderen
  - (On)mogelijkheden van Green Pharmacy
  - Veel interactie met stakeholders en producten gericht op stakeholders

Meer informatie:

https://www.rivm.nl/geneesmiddelen-in-milieu

https://www.rivm.nl/antibioticaresistentie/antibioticaresistentie-in-dieren-voedsel-milieu

Kick off Agenda

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Design, opportunities, participation
Dr. Maarten van Dongen, AMR Insights & *Tom Vereijken MBA*, EWS

11.30 Q&A

11.50 Next steps and next meeting

12.00 Closure

AMR INSIGHTS
TOWARDS A WORLD FREE FROM AMR

Antimicrobial resistance: Global threat to Health and Food Safety

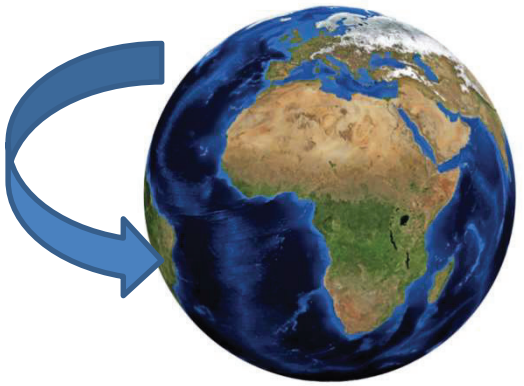
Dr Maarten B.M. van Dongen

Antimicrobial resistance (AMR)

- Complex, abstract
- For most professionals a distant problem
- Overflow of information, publications, data, statistics, guidelines, action plans
- Lack of understanding and insights
- AMR in 10 ‘statements’

1. AMR a global threat

- Can affect any body, everywhere, any time
- Global spreading (travel, transport):
  - Microorganisms
  - Plasmids (genetic material)
  - Antimicrobials

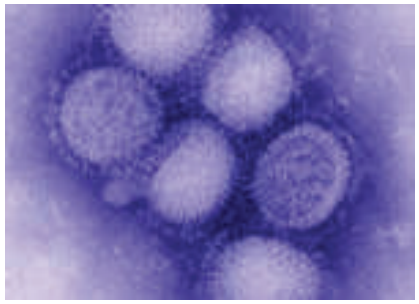


2. AMR a hidden threat

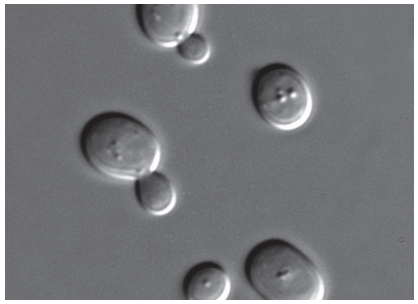
- Diagnosed?
- Documented?
- Data collected?

3. AMR applicable to most microorganisms

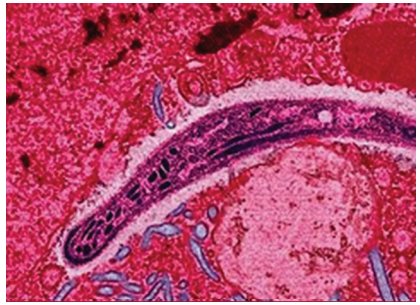
Bacteria



Viruses



Yeasts



Parasites

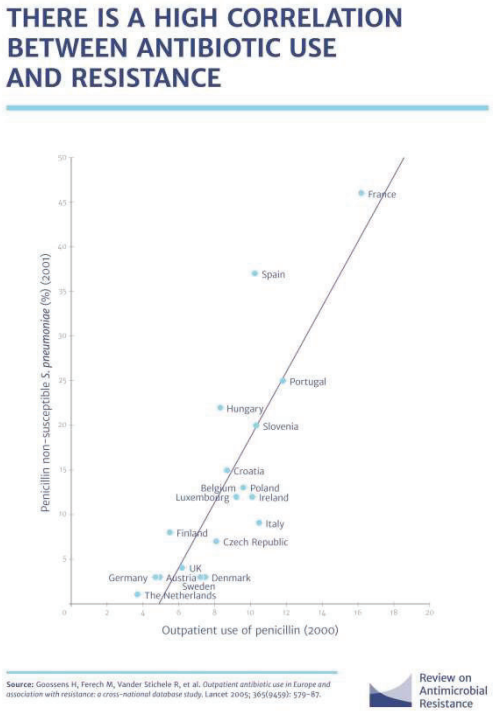
Fungi

Antimicrobial resistance: AMR

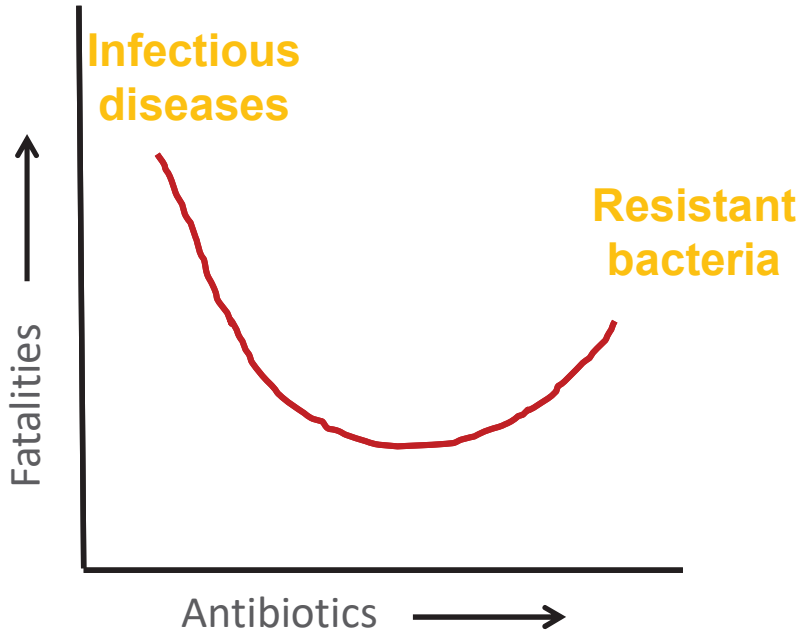
Antibiotic resistance: ABR

Other resistancies

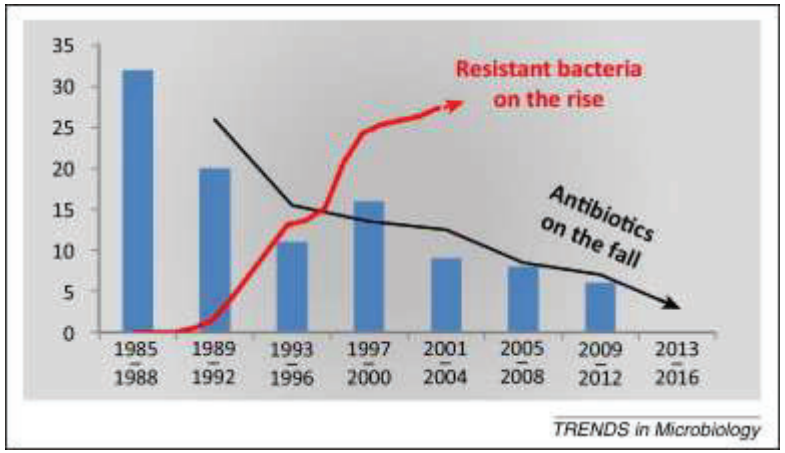
4. Correlation antibiotic use and resistance



5. Banning antimicrobials not a solution

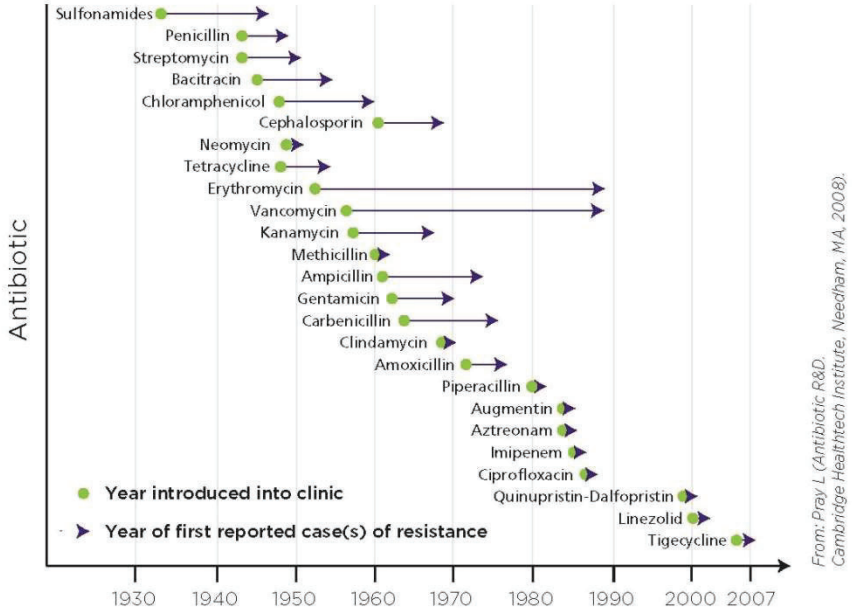


6. AMR escalating



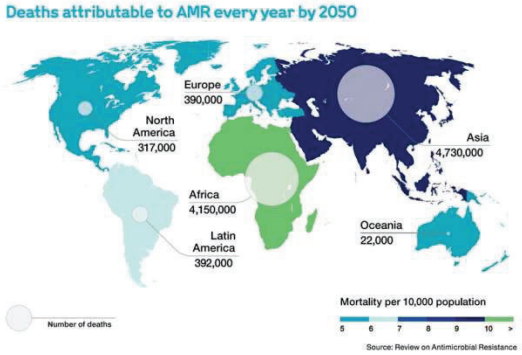
7. AMR -> medical interventions impossible

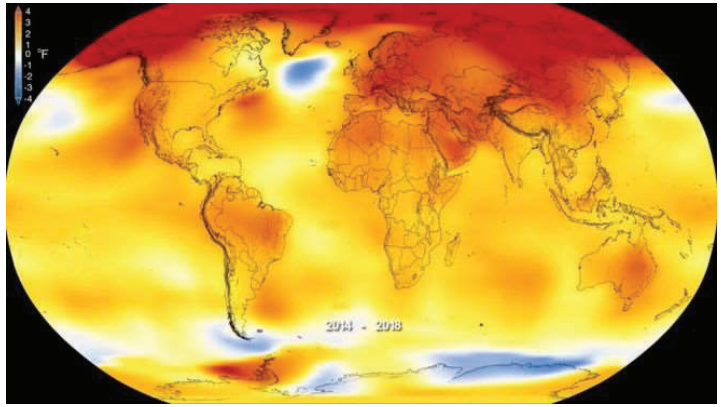
8. AMR observed with all available antibiotics



Note: *Some of the dates are estimates only.*

9. There is no one single solution to AMR





10. AMR arises from different sources of antimicrobials

NB COVID-19 & AMR

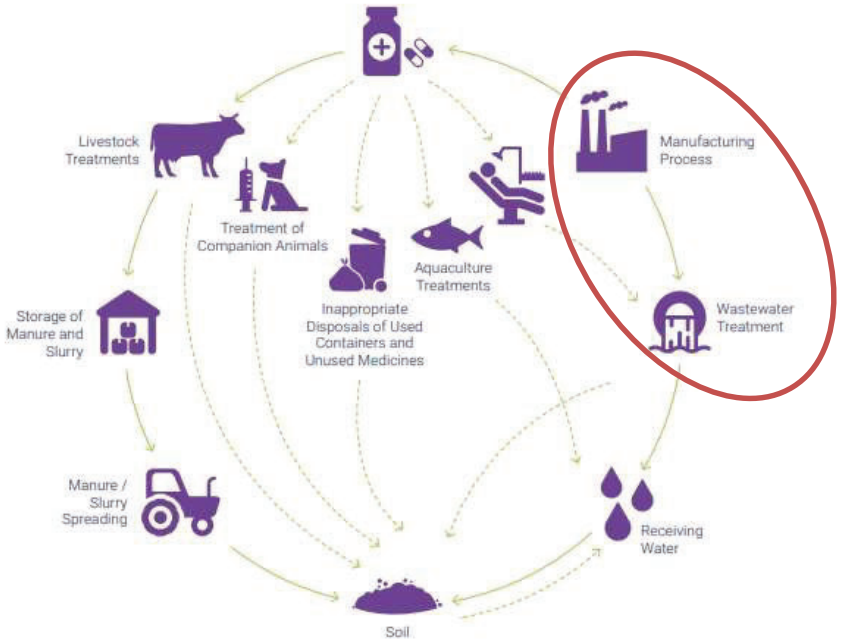
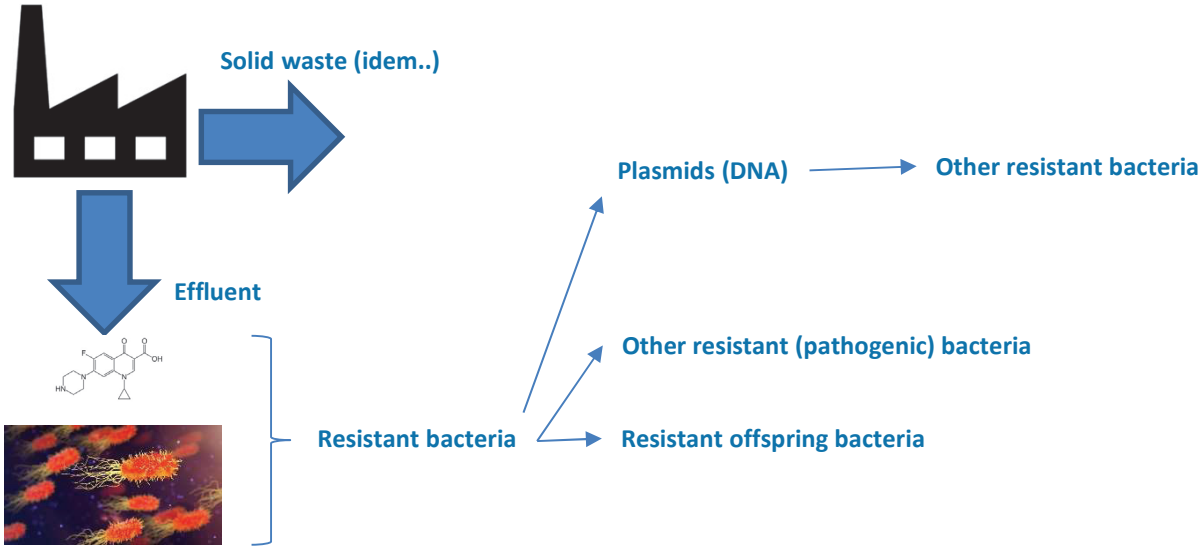
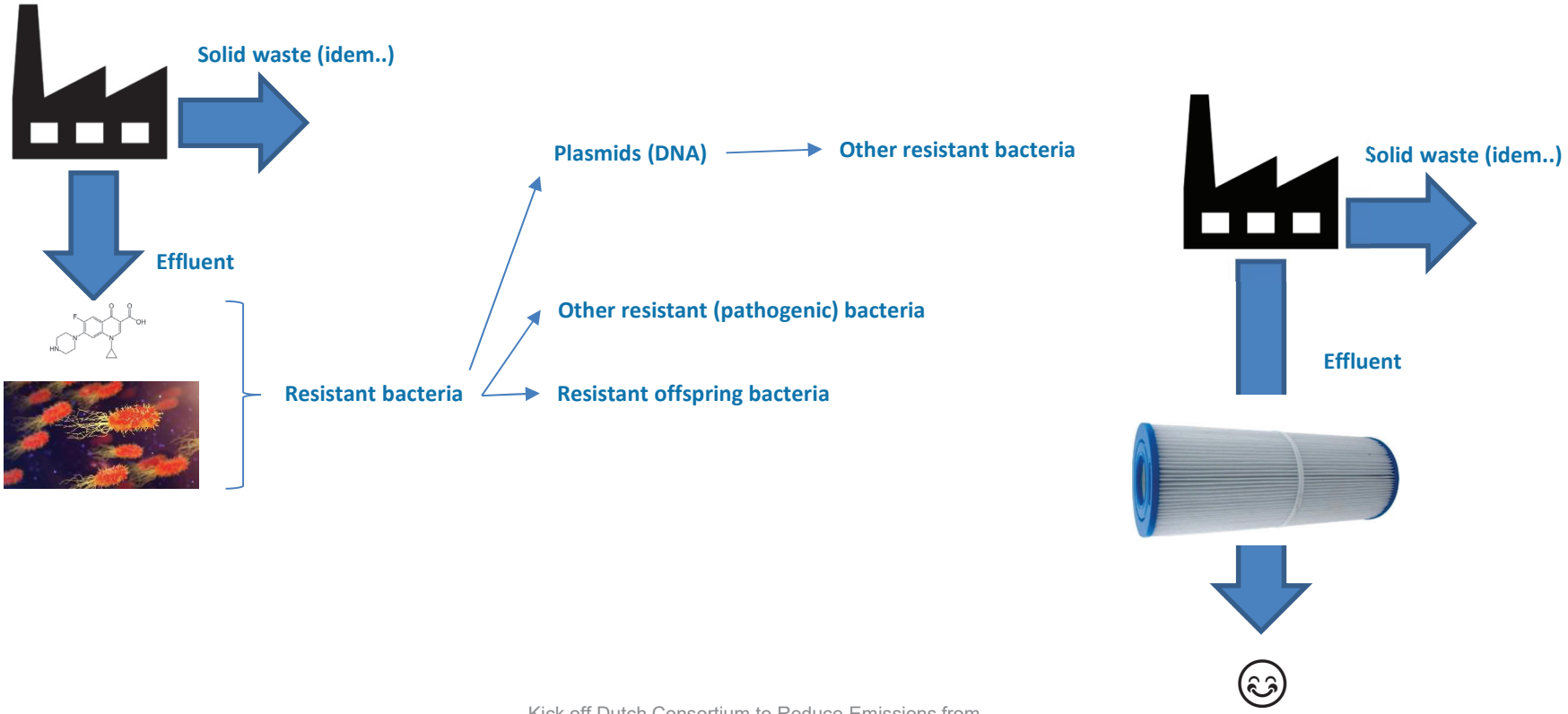


FIGURE 14: SOURCES OF ANTIMICROBIALS IN THE ENVIRONMENT. (ADAPTED FROM BOXALL, ALISTAIR B.A., 'THE ENVIRONMENTAL SIDE EFFECTS OF MEDICATION', EUROPEAN MOLECULAR BIOLOGY ORGANIZATION REPORTS, VOL. 5, NO. 12, 2004.)

Emissions from antibiotic production



Emissions from antibiotic production



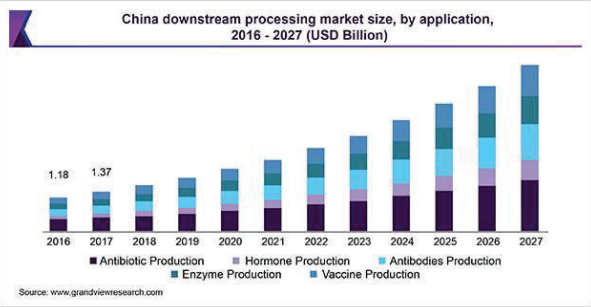
Studies on treated industrial effluents, waterways, river sediment, soil and groundwater where pollution with APIs from manufacturing is documented.

Collapse			
country	pharmaceuticals detected	matrices/max. concentration	year
China	oxytetracycline—antibiotic	effluent: 1065 mg l−1	1988
China	oestrogenic sex steroids	effluent: ethinyloestradiol 51 ng l−1	2006
China	oxytetracycline—antibiotic	effluent: 19.5 mg l−1surface water: 712 µg l−1	2008
China	penicillin G and its metabolites	effluent: penilloic acida 44 mg l−1surface water: penilloic acida 11.6 mg l−1	2008
China/Taiwan	many	surface water: diclofenac 27 µg l−1	2008
China/Taiwan	sulfonamides, NSAIDs and other drugs	effluent: sulfametoxazole 1.34 mg l−1; ibuprofen 1.5 mg l−1	2009
Croatia	sulfonamide antibiotics	effluent: sulfaguanidine more than 1.1 mg l−1	2008
Denmark	sulfonamide antibiotics and intermediates/metabolites	groundwater: sulfaguanidine 1.6 mg l−1	1995
Germany	phenazone and metabolites	groundwater: phenazone 3.95 µg l−1tap water: phenazone 0.4 µg l−1	2002
Germany	phenazone and metabolites	groundwater: phenazone 2.5 µg l−1tap water: phenazone 0.25 µg l−1	2004
India	salicylic acid—anti-inflammatory	effluent: 2270 mg l−1	1993
India	many, including fluoroquinolone antibiotics	effluent: ciprofloxacin 31 mg l−1	2007
India	many, including fluoroquinolone antibiotics	effluent: ciprofloxacin 14 mg l−1groundwater: cetirizine 28 µg l−1 surface water: ciprofloxacin 6.5 mg l−1	2009
India	fluoroquinolone antibiotics	river sediment: ciprofloxacin 914 mg kg−1 organic material	2011
India	fluoroquinolone antibiotics	groundwater: ciprofloxacin 770 ng l−1soil: ciprofloxacin 7.2 µg g−1 organic matter	2014
Israel	venlafaxine and metabolites	effluent: venlafaxine 11.2 µg l−1	2012
Israel	carbamazepine and venlafaxine	effluent: venlafaxine 11.7 mg l−1b	2013
Korea	lincomycin—antibiotic	effluent: 43.9 mg l−1	2011
Norway	bacitracin—antibiotic	effluent: up to 250 kg per discharge	2005
Pakistan	several antibiotics	surface water: sulfamethoxazole 49 µg l−1	2013
Spain	venlafaxine	effluent: 2.6 µg l−1	2014
Switzerland	venlafaxine—antidepressant	surface water: 0.8 µg l−1	2004
Switzerland	oseltamivir—antiviral	surface water: 160 ng l−1	2010
USA	narcotic opioids	effluent: metaxalone 3.8 mg l−1	2010

Emissions from antibiotic production

Target country China

- China is the largest producer of APIs: it supplies up to 90% of antibiotics worldwide
- Annual production of antibiotics in China 210,000 tons/year (a)
- Estimated use of 96,000 tons/year animal use



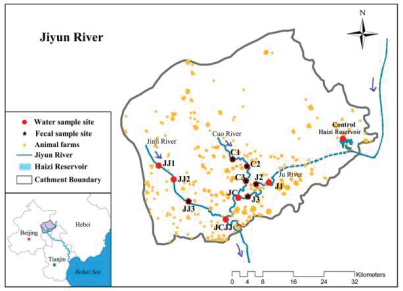


Figure 1. Map of sampling sites in the Jiyun River.

Table 1. Frequencies and concentrations of the 12 target antibiotics in the Jiyun River (n = 12).

Class	Compound	Frequency(%) (%)	Range (Mean)(ng L^{-1}) (ng/L)	MDLs((ng L^{-1}))
Tetracyclines (TCs)	Tetracycline (TC)	83.33	n.d-11.00 (2.17)	2.14
	Oxytetracycline (OTC)	91.67	n.d-100.00 (16.12)	2.35
	Chlortetracycline (CTC)	83.33	n.d-40.60 (12.92)	2.87
	Doxycycline (DOC)	58.33	n.d-11.75 (2.84)	2.45
Quinolones (QLs)	Ciprofloxacin (CFC)	100.00	3.56–24.80 (11.61)	2.15
	Enrofloxacin (EFC)	100.00	0.55–13.41 (3.79)	0.25
	Ofloxacin (OFC)	100.00	1.34–102.00 (27.89)	1.10
Sulfonamides (SAs)	Sulfadiazine (SDZ)	100.00	0.03–385.70 (62.45)	0.01
	Sulfamethoxazole (SMX)	100.00	4.29–230.00 (54.65)	1.15
	Sulfamonomethoxin (SMM)	75.00	n.d-450.00 (147.64)	1.10
	Sulfameter (SM)	100.00	0.51–387.00 (92.97)	0.16
	Sulfachinoxalin (SCX)	91.67	n.d-13.95 (2.90)	0.57

n.d: non-detected.
MDLs: method detection limitations for the 12 compounds.
doi:10.1371/journal.pone.0111026.t001

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Dutch Consortium to Reduce Emissions from Antibiotics Production

Kick off

29 April 2020

Short break: we will start again at 11:00 AM

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Treatment technologies to reduce antibiotic emissions

Alette Langenhoff, Environmental Technology

Wilfred Appelman, Food Biobased Research

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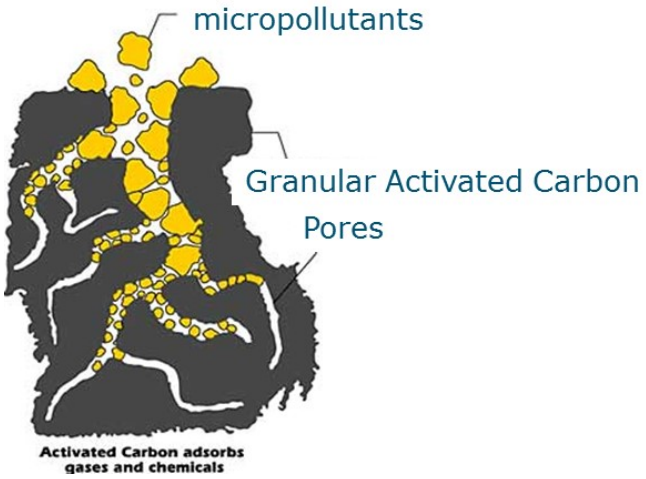
Water Treatment; Removal technologies

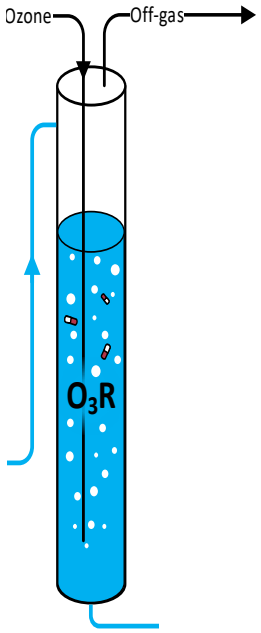
1. Biological

2. Physical



3. Chemical

4. Combinations !!



1. Biological removal technologies

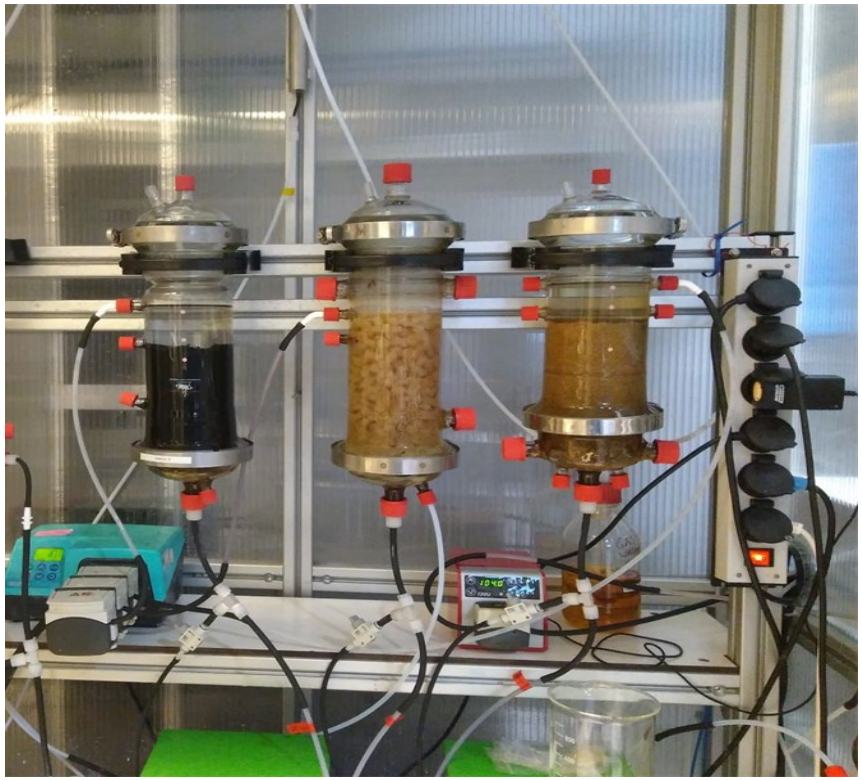
Strength biological techniques

- Cost-effective
- Low energy input
- Sustainable

Prerequisites biological techniques

- Suitable bacteria
- Suitable environmental conditions
- Depends on organic chemical

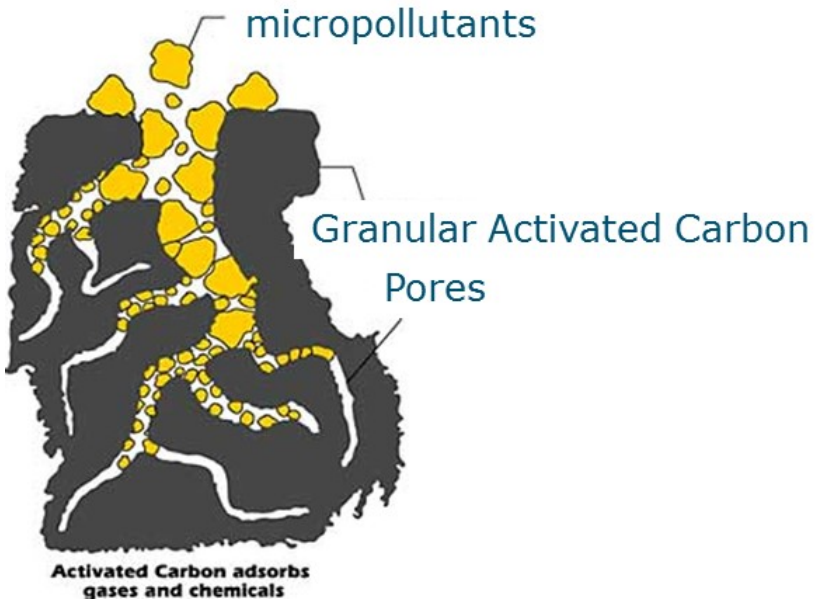
1. Biological removal technologies



2. Physical removal technologies

Adsorption

- Granular Activated Carbon
- Other sorptive materials



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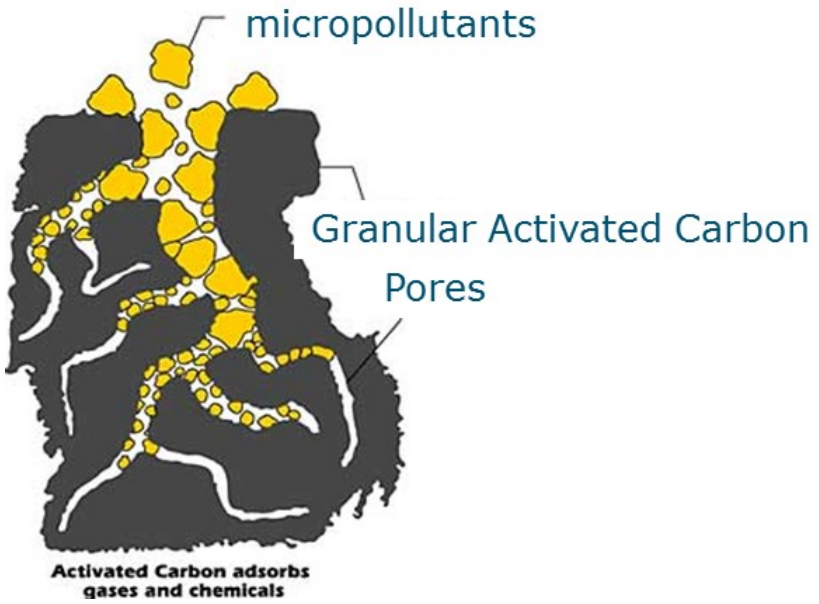
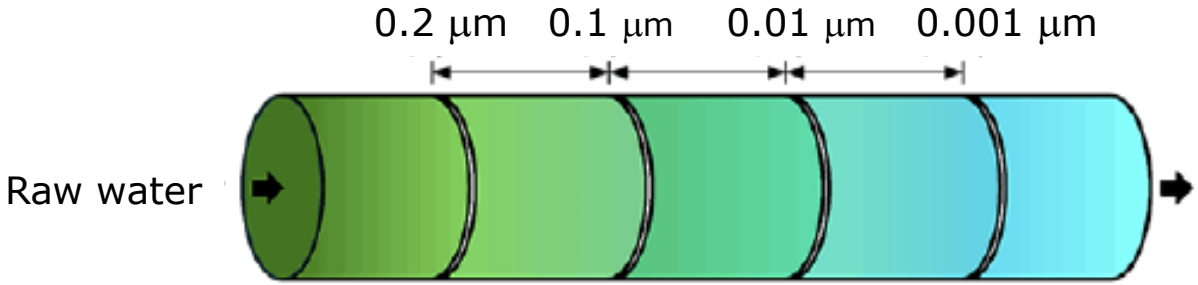


Filtration (membranes)

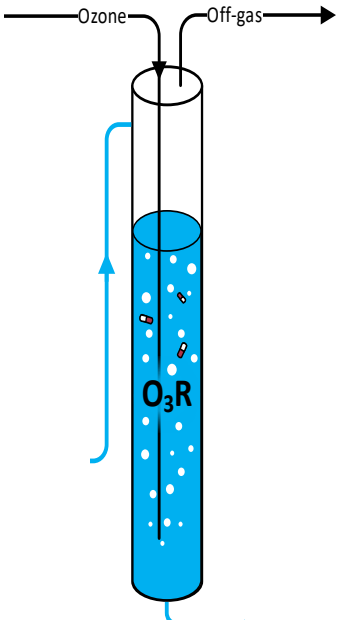
- Molecular Size
- Chemical structure



3. Chemical removal technologies

Advanced oxidation

- Ozonation (O_3)
- Light / UV
- Hydrogen Peroxide (H_2O_2)



- Electrolysis
- TiO_2/UV-Vis
- Fenton/ Photo-Fenton
- Photocatalysis
- Wet oxidation
- H_2O_2, UV, O_3

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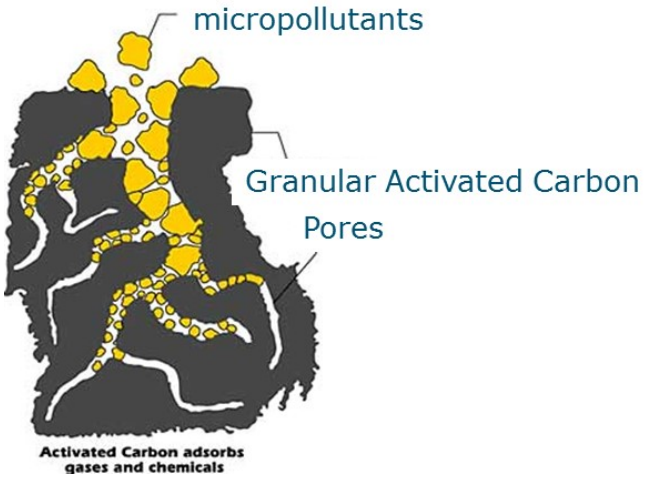
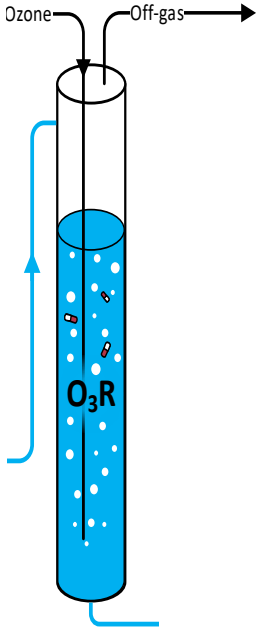
4. Combinations of removal technologies

1. Biological

2. Physical

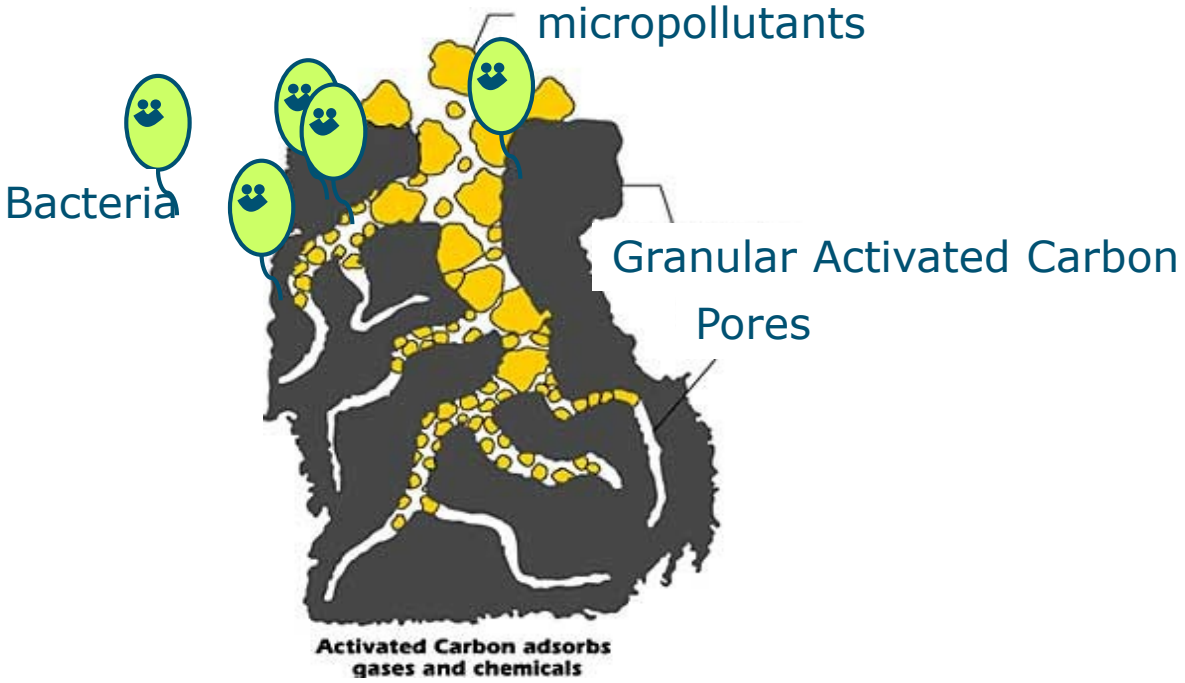


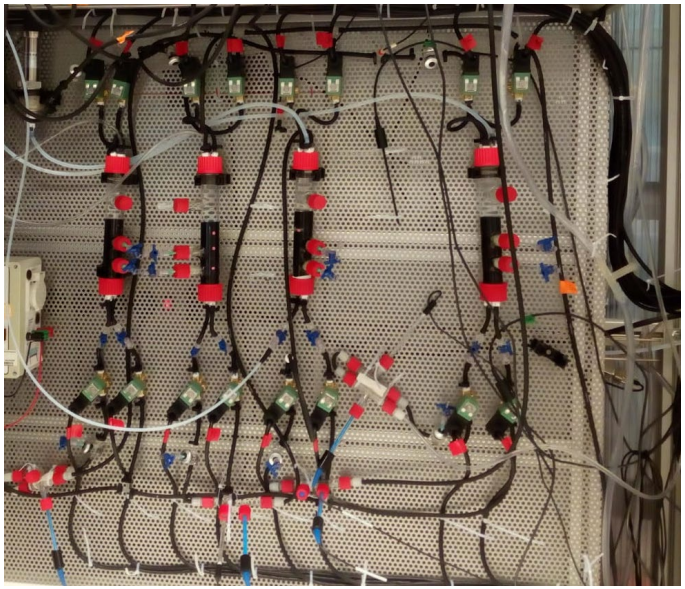
3. Chemical



4. Combinations of removal technologies

- Adsorption on activated carbon
  - With biologically regeneration of activated carbon





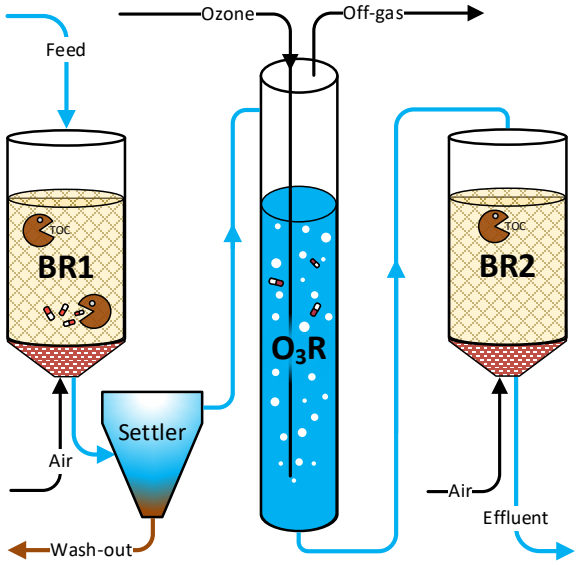
Piai ... Langenhoff, Journal of Hazardous Materials, 2020

4. Combinations of removal technologies

BO_3B reactor;

Complementing biology with ozone

- Removal organic compounds (TOC) in BR1
- Micropollutant removal O_3 reactor, limited ozone needed
- Removal of toxic byproducts in BR2



de Wilt .... Langenhoff, Water Research, 2018

Application of removal technologies

Adapt our current treatments to remove antibiotics

(Post treatment)

- Reactors
- Natural systems

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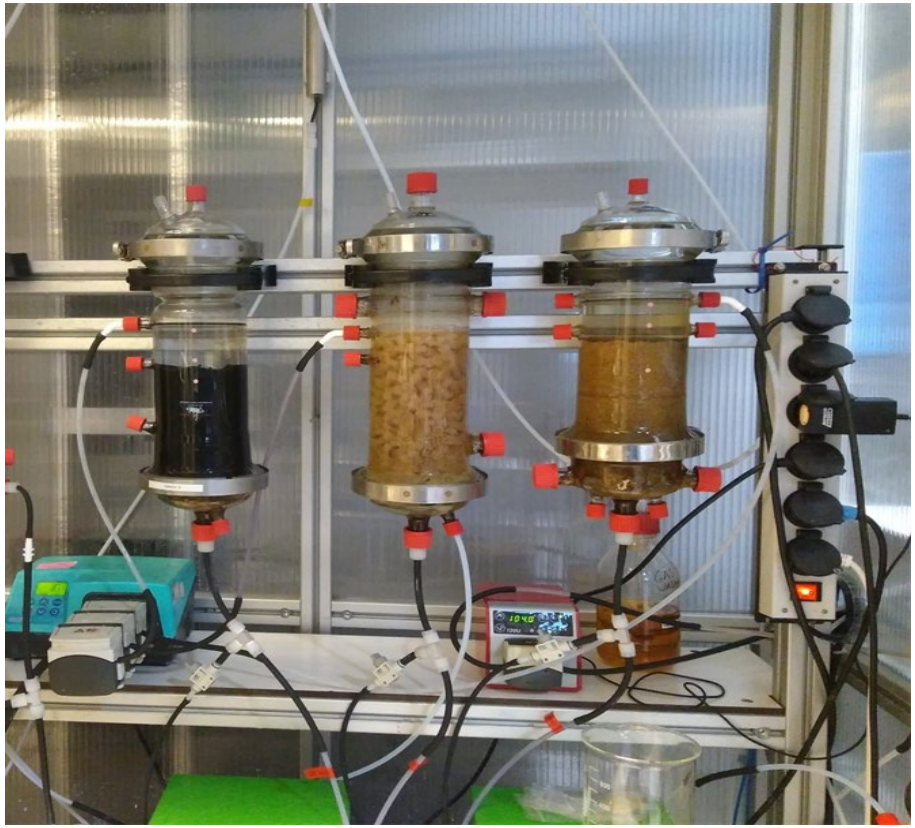
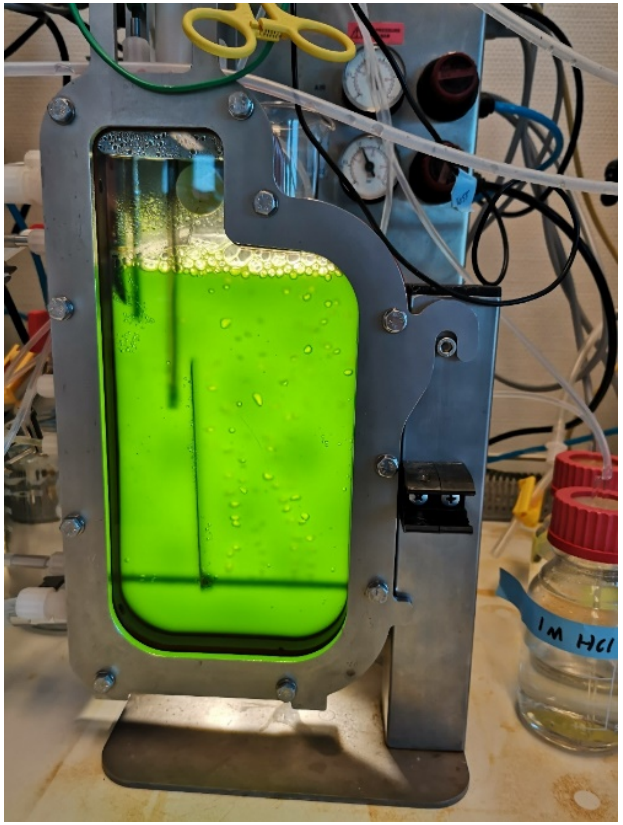
Removal technologies; Reactors





Removal technologies; Natural systems

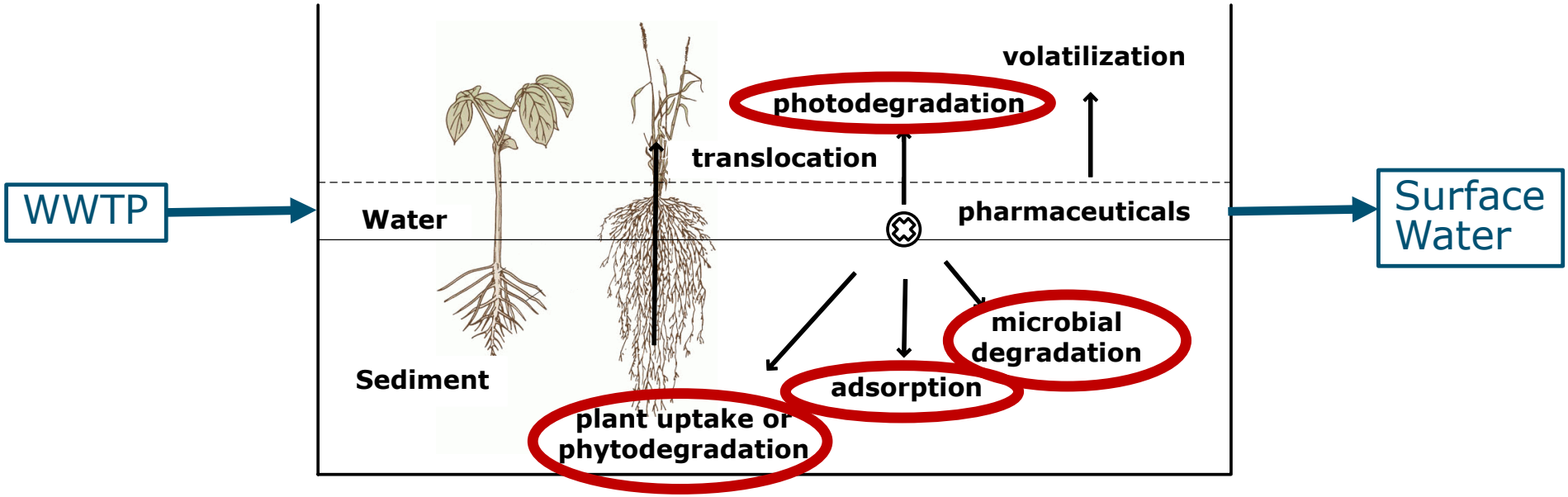
- Use nature to treat contaminants in nature

He, PhD thesis WUR, 2017

Removal technologies; Natural systems

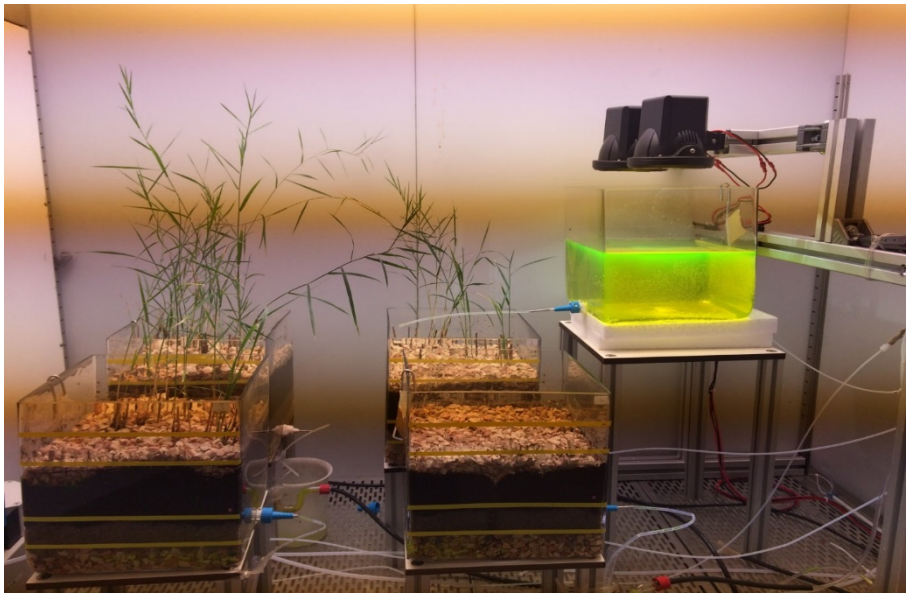
Removal technologies; Natural systems

Constructed wetlands, many removal processes involved



He .. Langenhoff, Applied Catalysis B: Environmental, 2016

Removal technologies; Natural systems



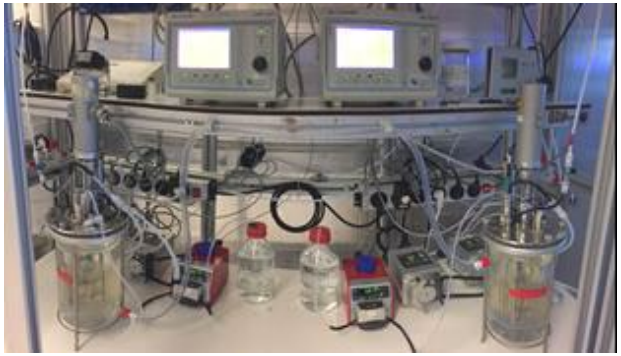
Removal technologies; Natural systems

Advantages / mechanisms

- Sorption and biodegradation work together
- Plant uptake and enzymatic degradation important removal mechanism

Treatment technologies to reduce antibiotics emissions

- Potential removal technologies
  - Biological
  - Physical
  - Chemical
- Application of removal technologies
  - Reactors
  - Natural systems



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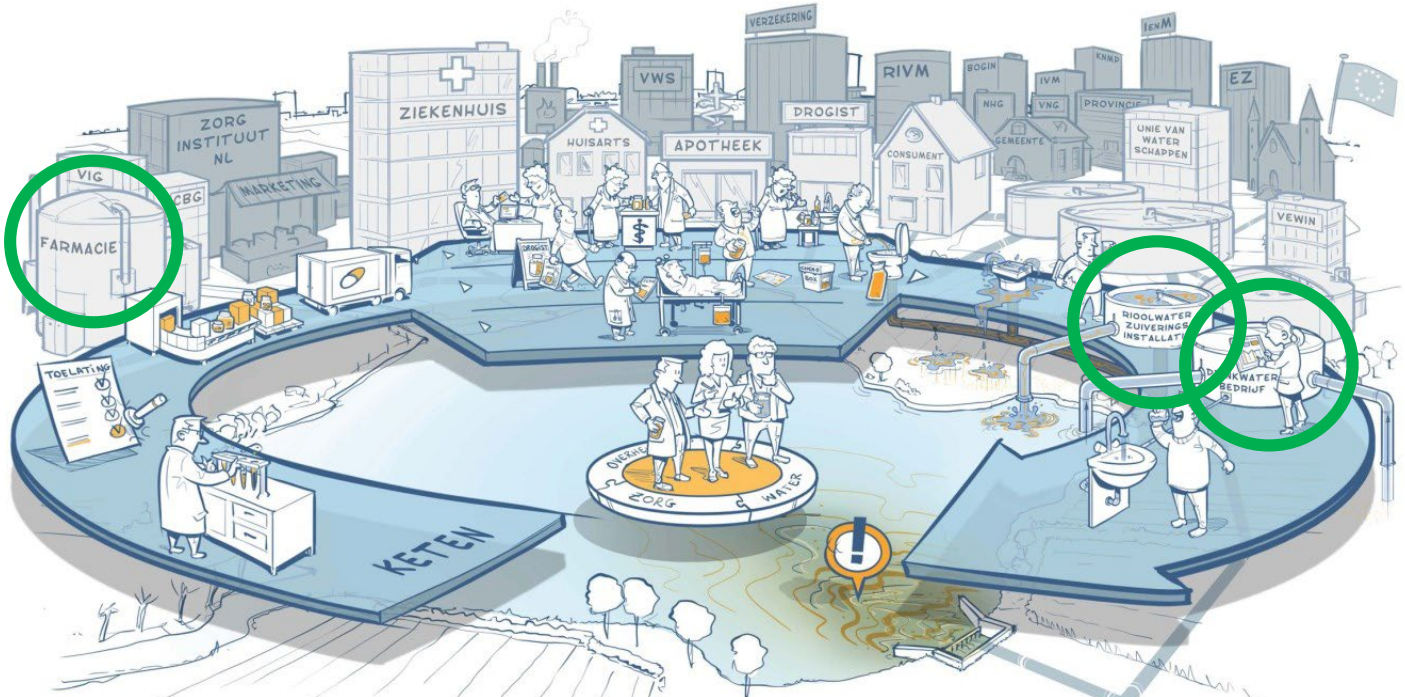
Conclusion

- Various approaches to remove antibiotics from wastewater (hospital, industry, domestic)
- Identify suitable technologies
- PPS project; developing solutions with stakeholders



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Our contribution

- Independent assessment of issue
  - Together with companies, government, ...
- Selection of most suitable solution
  - State of the art and beyond
  - Definition of criteria
- Demonstration/pilots
  - Fundamental research
  - Applied research

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Alette.Langenhoff@wur.nl
Wilfred.Appelman@wur.nl

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Dutch Consortium to Reduce Emissions from Antibiotics Production

Design

- Public Private Consortium open to:
  - Academia
  - Commercial companies (start ups, SMEs, multinationals)
  - Authorities (including Topsectors)
  - Branch organisations
  - Governmental institutions
  - NGOs

- Support existing technology solutions to reduce emissions from hospitals, waste water plants, antibiotics production
- Support innovation (R&D) to develop more affordable and sustainable technologies
- Scope will grow: NL -> EU -> Global (India, China, LIMCs)

Dutch Consortium to Reduce Emissions from Antibiotics Production

Opportunities

- Collaborating to add to curbing AMR:
  - Operational involvement in concrete projects (NL, EU, global) to reduce emissions
  - Joint innovation projects to reduce emissions
  - Positioning as a global / sustainable / responsible organisation

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Participation:

- Open to Public and Private Organizations
- Participating organisations co-fund Phase II: 950 Euro (ex VAT) per organisation to fund Phase II
- Participating organisations bring in at least one representative follow up activities and meetings

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Phase II (6-8 weeks):

- Strategic Plan
- Funding opportunities (& feasibility) within / outside NL
- Connecting globally
- Inclusion Technologies (of Participants) in Technology Database
- Presentation to in the next online meeting end of June

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Funding sources:

- JPIAMR Aquatic Pollutants (25 mio euro): www.jpiamr.eu/11th-call/
- Horizon Europe
- Funding related to the RAMP-platform
- Water Test Network (demonstration pilots)
- SME-related subsidy programs at national (RVO.nl) or European levels
- Green Deal related calls
- Specific funding schemes aiming to reduce medicinal residues in water
- Other..

Kick off Agenda

10.00 Opening & welcome by *Maarten van Dongen*

10.05 Brief introductions of initiators
>> Program Coalition Sustainable Pharmacy:
Bogin, VIG, Neprofarm, KNMP; *Brigit van Soest-Segers*
>> European Water Stewardship; *Tom Vereijken*
>> AMR Insights; *Maarten van Dongen*

10.20 Effects of pharmaceuticals on the environment; the PREMIER study
Dr. Caroline Moermond, RIVM, Centre for Safety of Substances and Products

10.35 Antimicrobial resistance as a global threat to health and food safety
Dr. Maarten van Dongen, AMR Insights

10.50 Break

11.00 Treatment technologies to reduce antibiotic emissions
Dr. Ir. Alette Langenhoff, WUR, Department of Environmental Technology

11.20 NL Consortium Reduction Antibiotics from Residual Flows
Design, opportunities, participation
Dr. Maarten van Dongen, AMR Insights & *Tom Vereijken MBA*, EWS

11.30 Q&A
11.50 Next steps and next meeting
12.00 Closure

Next steps and next meeting

	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Kick Off	x									
Invites										
Phase II										
Assembly			x							
Connecting globally										
Funding										
Prepare Consortium activities NL										
Idem activities international										

Closing remarks

- Recording of this webinar will be made available to participants
- **We will contact you for further involvement**

Check out updates on the Consortium Website:

https://www.amr-insights.eu/new-netherlands-consortium-to-reduce-emissions-from-antibiotics-production/

Contact:

AMR Insights

Keizersgracht 482, 1017 EG Amsterdam, The Netherlands

T. +31 (0)65 155 8068 • **T.** +31 (0)20 214 6068

E. Info@AMR-Insights.eu • **W.** www.AMR-Insights.eu

Thank you!

Dutch Consortium to Reduce Emissions from Antibiotics Production

Kick off

29 April 2020