

# EU Interreg IV B project

# noPILLS

The medicinal product chain and identified strategic  
“adjusting screws” to reduce the emission  
of pharmaceutical substances in the environment

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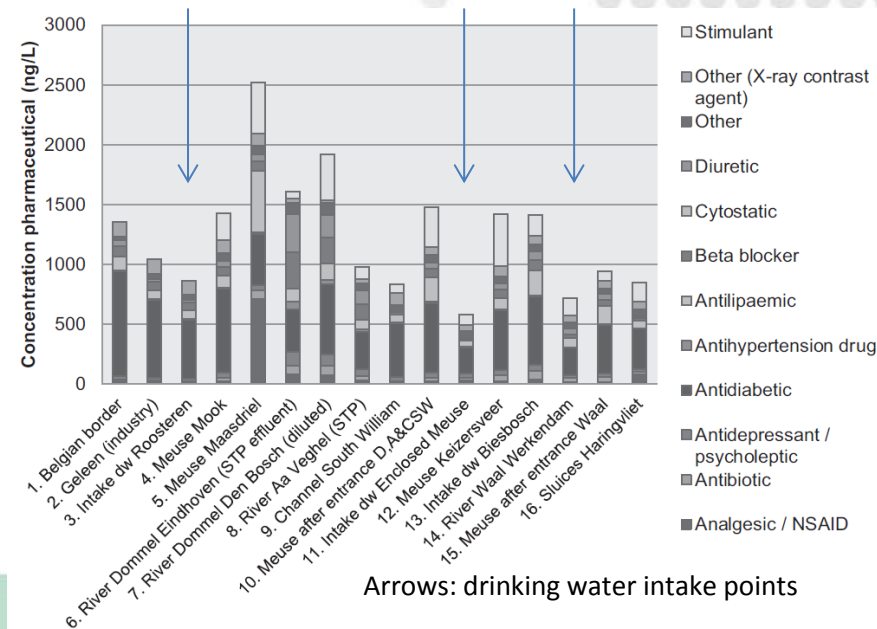
## Take home message:

Potential levers for discharge reduction are present through the whole chain



# problem

- presence of pharmaceutical residues in the environment
  - ecological effects of such compounds have been established
  - development of microbial antibiotic resistance
  - presence of residues in drinking water
- treatment of wastewater alone is not sufficient to prevent introduction in the environment:
  - technological problems
  - too costly
- may other actions than end-of-pipe technologies add to the solution??



Houtman et al. 2013





## Aim of the project

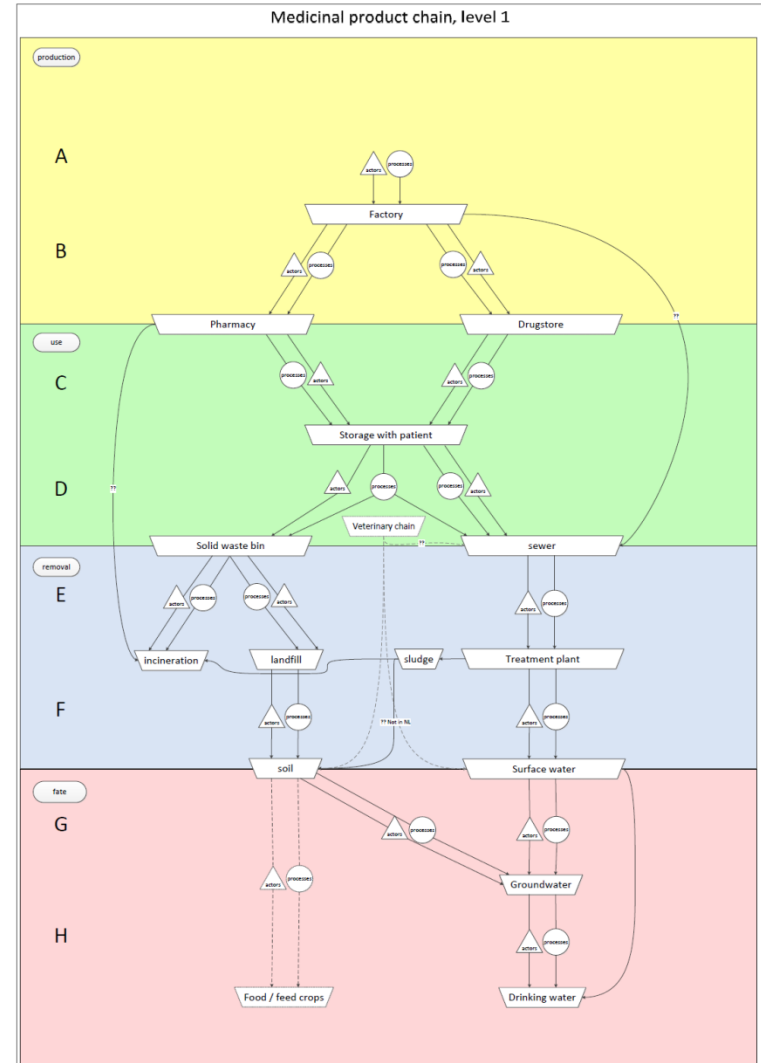
- Mapping of the medicinal product chain from development of pharmaceutical products all the way to fate of pharmaceutical residues in the environment
  - Identify
    - relevant actors
    - relevant processes
    - potential levers for change in the chain that may be used to reduce pollution of water from pharmaceutical residues

## Steps in the analysis

1. Describe medicinal product chain from development to discharge and fate in environment
2. Describe characteristics of processes and actors (social, organizational, financial, technological, policy) in each step of the chain;
3. Identify (dis)incentives (social, organizational, financial, technological, and policy): what and where they are;
4. Analyse how characteristics and incentives affect the medicinal product chain: availability, prices, marketing, residues;
5. Identify (how) these incentives could be leveraged to reduce potential input of medicinal products in the environment
6. Identify differences between countries

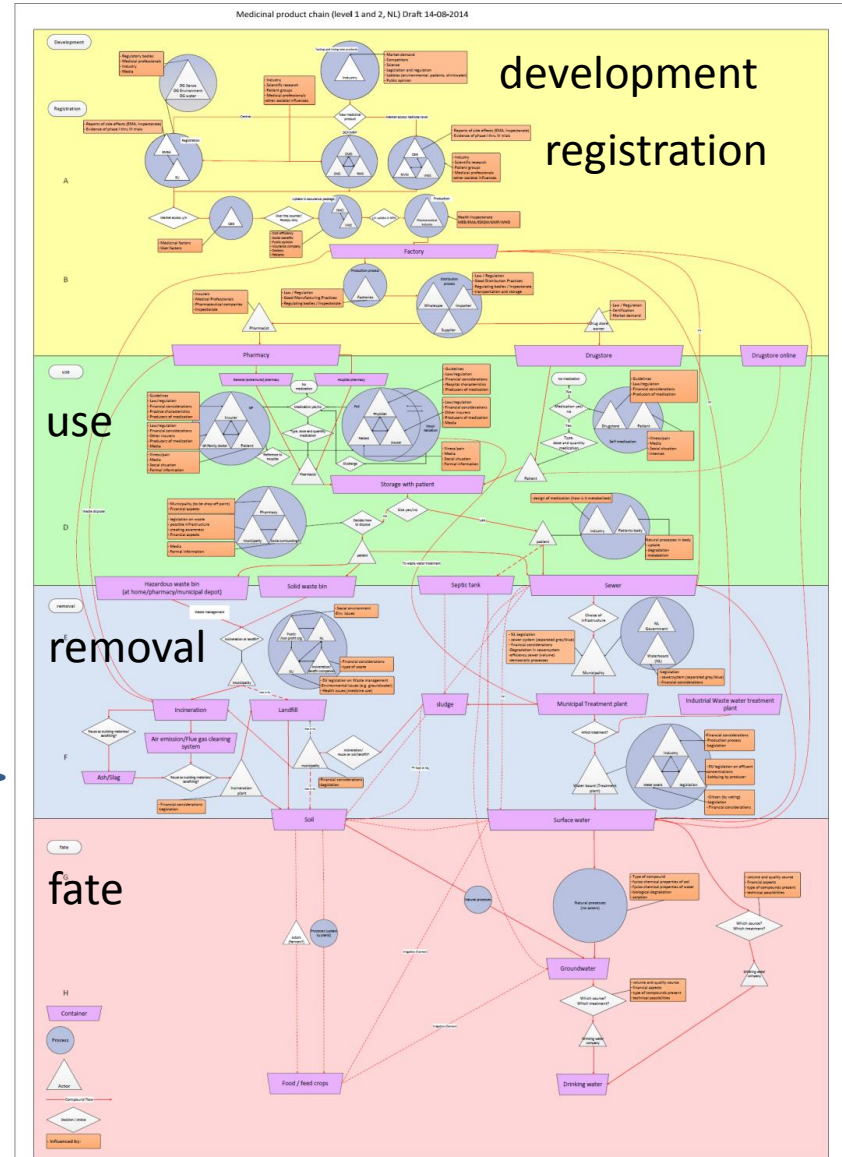
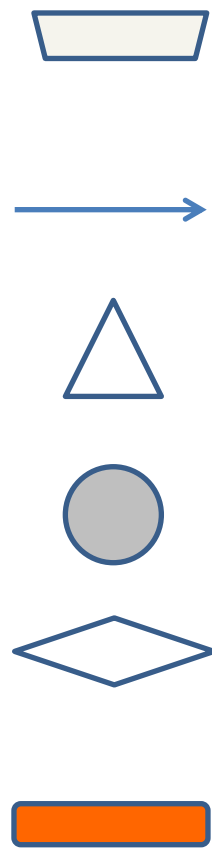
# What did we do

- Identify:
  - Reservoirs of pharmaceutical compounds 
  - Flows 
  - Actors 
  - Processes 



# Medicinal product chain

- Identification of
  - Reservoirs of pharmaceutical compounds
  - Flows
  - Actors
  - Processes
  - Decisions
  - Regulations/ incentives
- Identification of levers for change







## Levers to influence medicinal product flow:

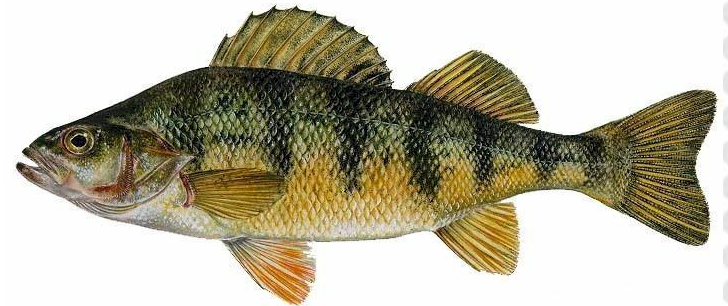
- Awareness of environmental consequences
- Awareness of health consequences
- Tools to reduce discharge:
  - Reduced use
  - Techniques to prevent discharge
  - Improvement of purification techniques

# Awareness of environmental consequences

- Awareness of environmental consequences
  - Which compounds are present in water
  - Risks of pharmaceutical residues in water for ecosystems
    - Chronic exposure
    - Unknown mixtures

e.g.

- endocrine disruptors
- spreading of resistant pathogens
- behaviour and survival of organisms



## Awareness of public health consequences

- compounds in:
    - recreation water
    - irrigation water for agriculture
    - drinking water
  - effects of:
    - chronic exposure
    - unknown mixtures
- e.g.
- endocrine disruptors
  - antibiotics (spreading of resistant pathogens)



## Tools for awareness raising

- Targeted training of doctors and pharmacists about environmental consequences of medication (as in Germany / Sweden)
- Targeted classes in the (primary) education
- Targeted actions in different age groups (e.g. games)
- Education of general public



## Change of regulation

- Role of environmental consequences in the registration process
- Regulation of “over the counter” medicines
- Pricing policy of pharmaceutical products
- Role of environmental consequences in the reimbursement policy
- Regulation of prescribing powers
- Regulation of prescribing behaviour
- Chain responsibility in the pharmaceutical industry
- Public availability of environmental information

# Prescription behaviour to reduce discharge

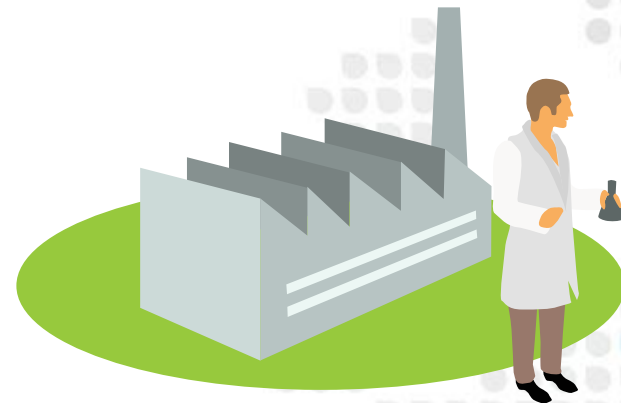
- Reduced use
  - Prescription of appropriate doses
  - Prescribe other medicines
  - Role of insurers
  - Role pharmacies
  - Adaptation of the reimbursement policy
- Adapted lifestyle
  - Important with chronic use, e.g. diabetes, heart and vascular disease, etc.
  - Employing preventive measures

## Technical tools to reduce discharge

- Adapted toilets / mobile toilets
- Urine bags
- Improvement of municipal waste water treatment plants
- Specialised waste water treatment plants at the producer site or at the hospital site
- Pharmaceutical residues in the solid waste (to incinerate)
- Return redundant pharmaceutical products to the pharmacy

## What can the producers do

- Be aware, that their products may pose a risk for ecosystems, when discharged in the environment
- Provide public information of environmental risks of pharmaceutical products
- Organise a chain responsibility pharmaceutical industry



## What can registrars / policy do

- Role of environmental consequences in the registration process
- Regulation of “over the counter” medicines
- Pricing policy
- Organisation of the reimbursement policy
- Regulation of prescribing powers



## What can the insurer do

- Take environmental risks into account, in choices concerning reimbursement of medicines
- Take environmental risks into account in the price and discount policy



## What can the pharmacy / distributor do

- Take environmental risks into account in the price and discount policy
- Advise the physician and the patient on environmental impact of pharmaceutical residue discharge
- Organise a take-back scheme



## What can the physician do

- Prescribe medicines with less environmental impact
- Advise on other measures / changes in life style
- Refrain from medically unnecessary prescribing
- Prescribe appropriate doses
- Educate himself on environmental risks of medicines



## What can the patient do

- Improve adherence behaviour to therapies
- Use tools and technological techniques to prevent introduction of pharmaceutical residues in the water, e.g. urine bags, special toilets
- Dispose of unused medicines in solid waste
- Use take back programmes organized by municipalities / pharmacies
- Wait until the body had time to recover
- Change life style / diet



## What can municipalities / water boards do

- organisation of waste disposal and treatment
- Improvement of waste treatment techniques
- stimulate the use of waste separation techniques
- organise awareness raising and educational activities



## Take home message:

Potential levers for discharge reduction are present through the whole chain



## Take home message:

- Potential levers for discharge reduction are present through the whole chain:
- E.g.
  - Producers: provide public information
  - Registrars: take environmental info into account
  - Pharmacy: advice / take back schemes
  - Physician: prescription behaviour
  - Insurer: reimbursement policy
  - Patient: responsible action in medicine use and disposal
  - Technologist: improve techniques
  - Water board / municipality:
    - organisation of waste disposal and treatment
  - Education: awareness raising

**Thank you for your attention**