

Amsterdam International Water Web

4 April 2023

*„Aspects of drought on drinking water supply  
in the Rhine river basin and  
solutions for river basin management“*

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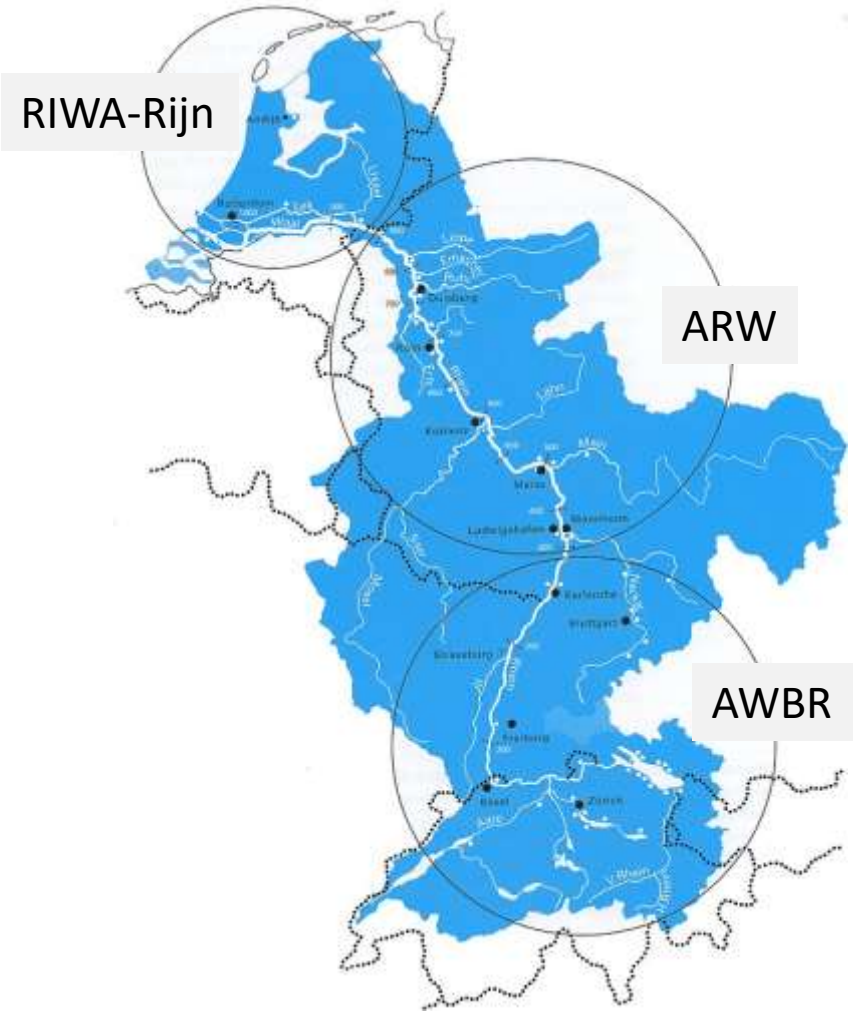


Moselle, Koblenz, 11 August 2022

- 1) Introduction
- 2) Aspects of drought on drinking water supply in the Rhine river basin
- 3) Solutions at river basin level to increase resilience: land use supporting water retention

1. Introduction

IAWR

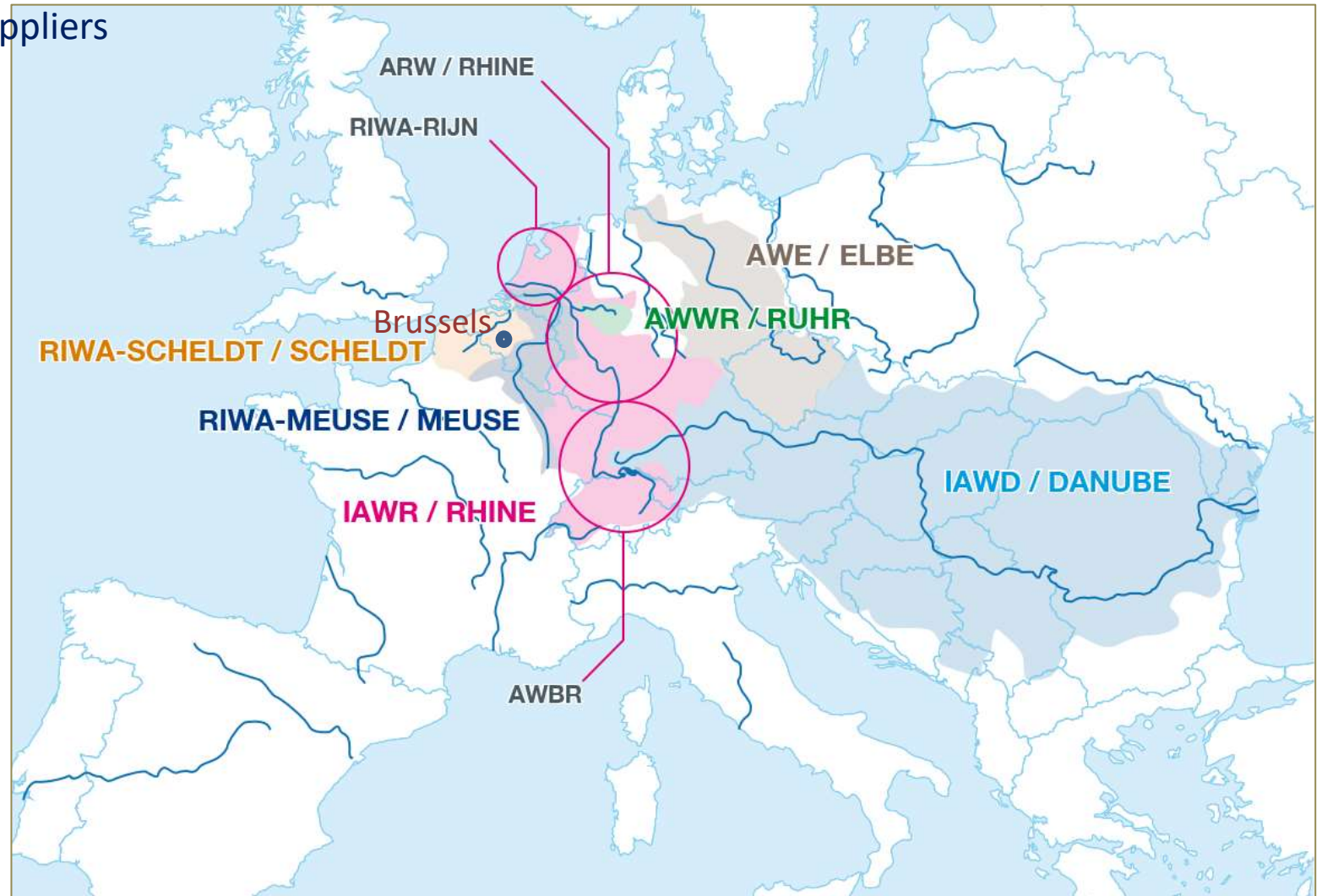


## 1. Introduction

- [ERM Coalition](#): 170 drinking water suppliers
- 2020 [Europ. River Memorandum](#)
- **Goal: Protection of drinking water resources**



- River basins: Rhine, Danube, Elbe, Meuse, Scheldt
- 188m in river basins, in 18 States
- [2022 Europ. Groundwater Memor.](#)



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## 2. Aspects of drought on drinking water supply in the Rhine river basin

### New risks and challenges

- **! Deterioration of water quality just because of decreasing water quantity !**  
(e.g. concentrations triple if same load of pollutants is discharged into 1/3 amount of water)  
→ micropollutants, salt (→ Oder disaster 2022)
- Salt water intrusion (chloride > 150 mg/L): IJsselmeer, upstream of mouth of Lek, Haringvliet and groundwater
- Low water pressure due to high demand in remote areas
- Increased pipe bursts in dried-out soils
- Rising temperature in water network
- (Temporary) Shortages in water availability  
vs. growing (peak) demand (DE, BDEW)
- Conflicts with other users



<https://www.bdeu.de/service/daten-und-grafiken/entwicklung-des-personenbezogenen-wassergebrauches/>

## 2. Aspects of drought on drinking water supply in the Rhine river basin

### Measures taken/planned:

- DE: Interconnecting systems, long distance pipelines
- NL: Freshwater storage („[regenton](#)“) in IJsselmeer (with comprehensive chloride monitoring)
- Partial opening of (upstream) Hagestein weir in Lek to reduce chloride intrusion (conflict with shipping)
- Closing of downstream weir (Haringvliet sluices – conflict with migratory fish)
- Reduce water losses
- New sources of drinking water / increased capacity / artificial groundwater recharge / desalination
- Restricting water use ...

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### 3. Solutions at river basin level to increase resilience: land use supporting water retention

**Infiltration** is **137 %** higher in **organic farming** compared to conventional farming (Metastudy [Thünen Report 65](#))

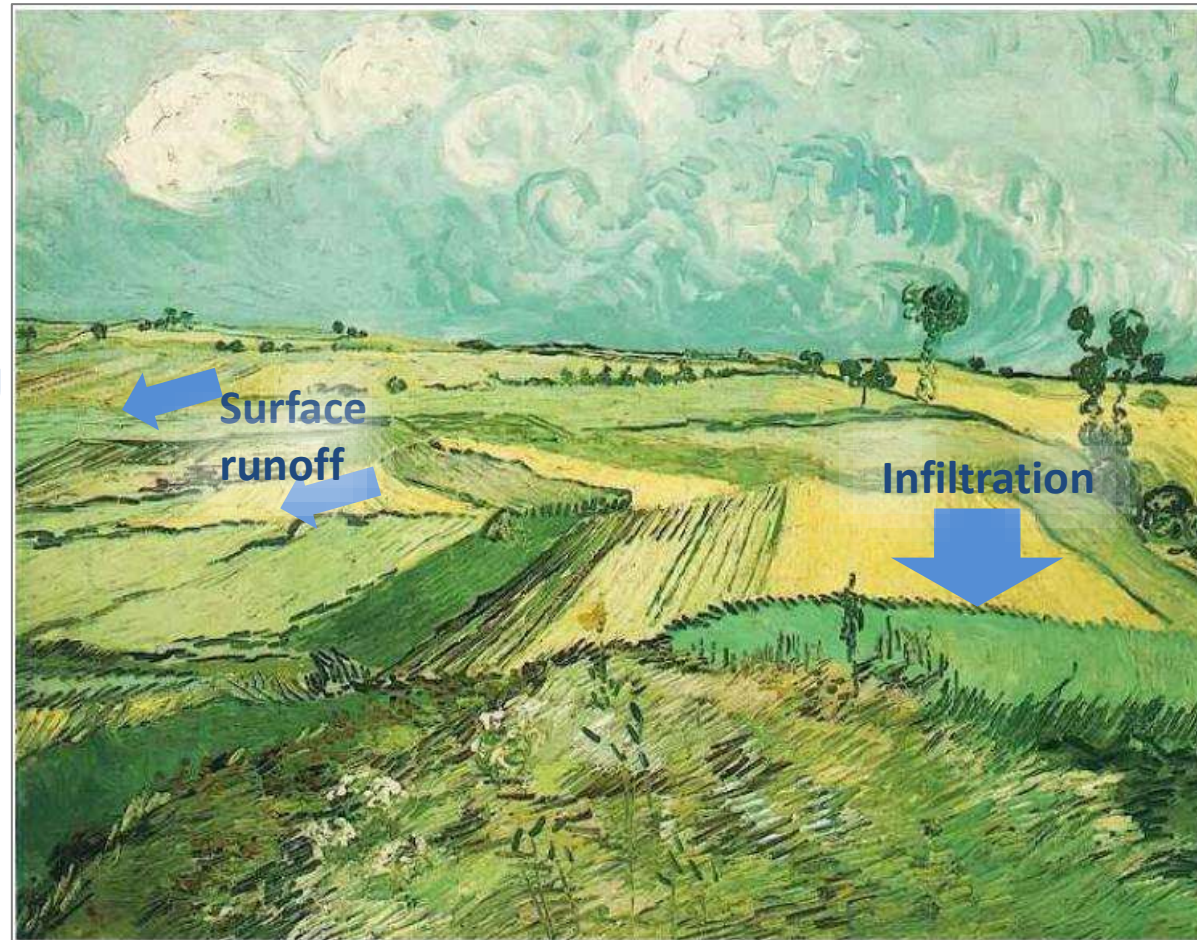
Conventional farming

💧 **Surface runoff**

increases:

- Floods 💧 💧
- Soil erosion

→ Need for  
Irrigation



Vincent van Gogh, „Wheatfield at Auvers under Clouded Sky“, painting at Auvers-sur-Oise, July 1890, Carnegie Museum of Art Pittsburgh, Pennsylvania, United States of America, F: 781, JH: 2102  
<https://www.vangoghgallery.com/catalog/Painting/754/Wheat-Fields-at-Auvers-Under-Clouded-Sky.html>

Surface  
runoff

Infiltration

Organic farming:

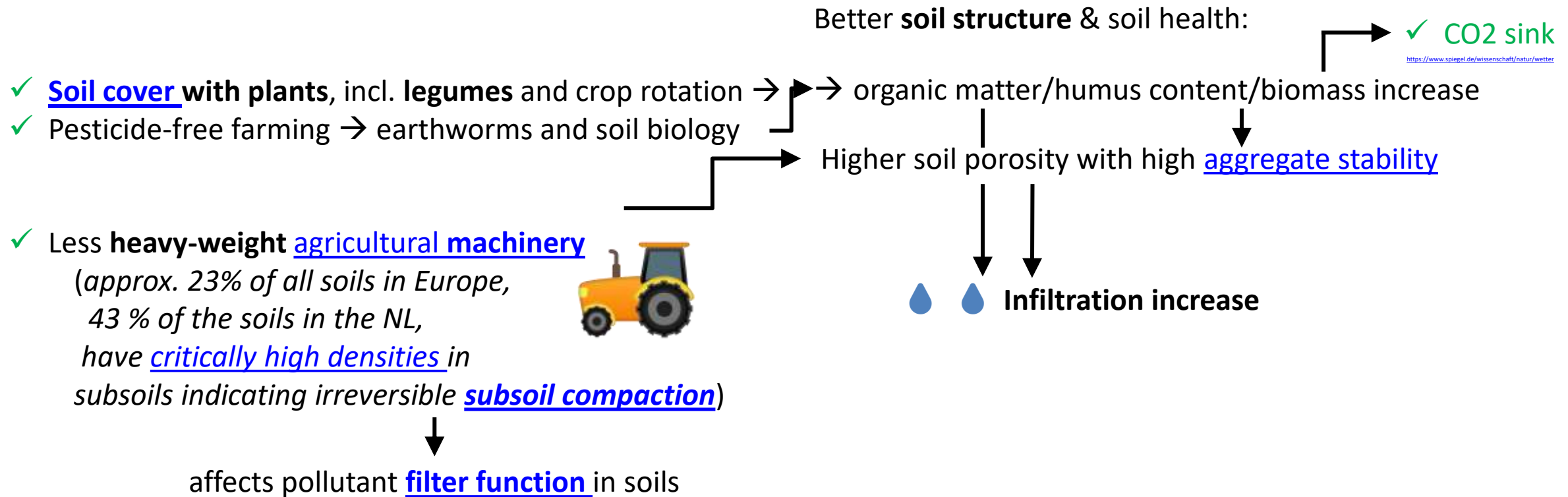
💧 **water retention:**

💧 **Infiltration** 137 % higher  
increases

- Soil water 💧
- Plant-available water 💧 (less  
conflicts with agriculture)
- Groundwater recharge 💧
- **Base flow in rivers** 💧  
**during drought**

### 3. Solutions at river basin level to increase resilience: land use supporting water retention

Which reasons are given that infiltration higher in organic farming compared to conventional farming ?



! In models, soil structure is part of (constant) parameters, thus, changes in soil structure are not reflected in outcome. !



### 3. Solutions at river basin level to increase resilience: land use supporting water retention

**Keyline structures!** → increased water retention & reduced climate change + impacts !



[Keyline Design \(wasser-retention.de\)](http://wasser-retention.de)



Study: "Restoration of the marshes in the valleys of the middle mountains of the Rhine basin for flood and drought risk reduction - 'the sponges approach'"

UDATA 2017 for WWF NL and Wetlands International NL

→ Natural water storage in groundwater = base flow of rivers in drought

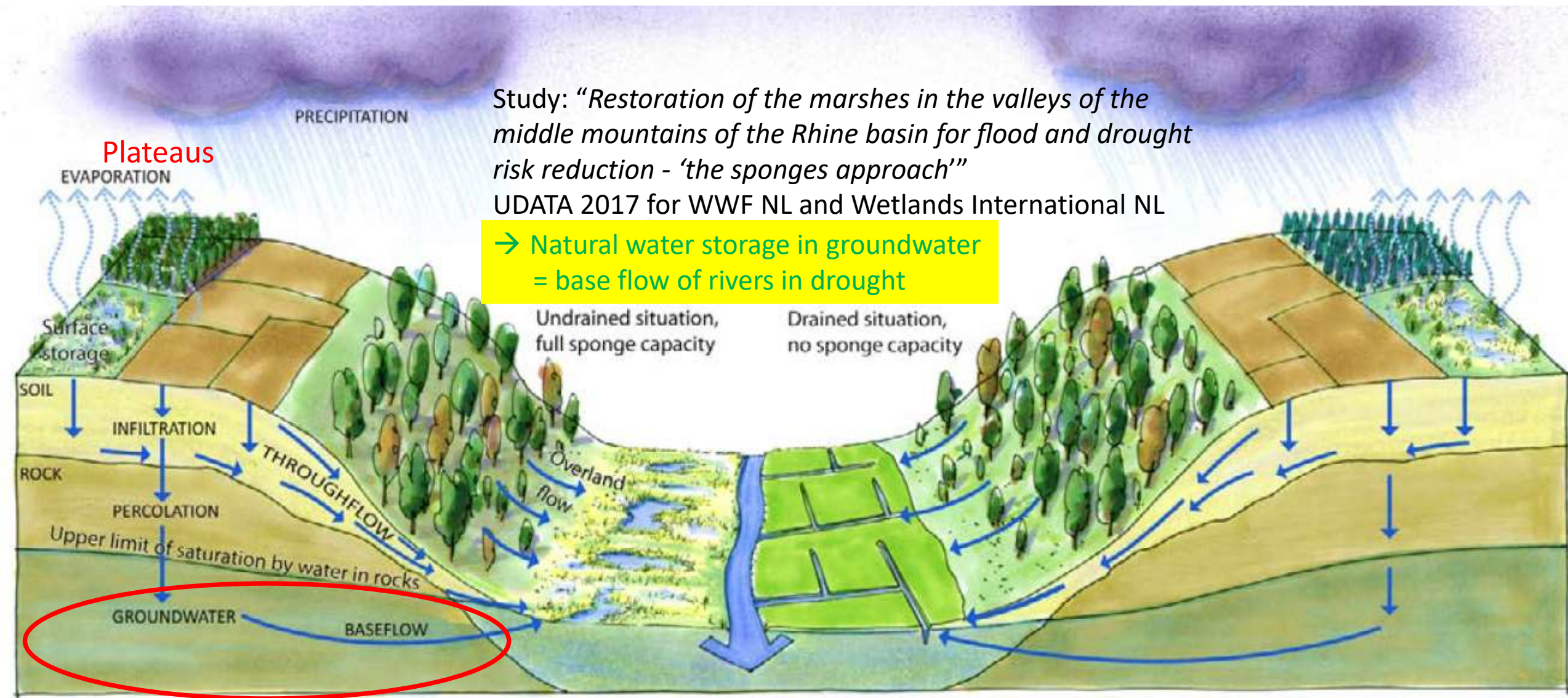
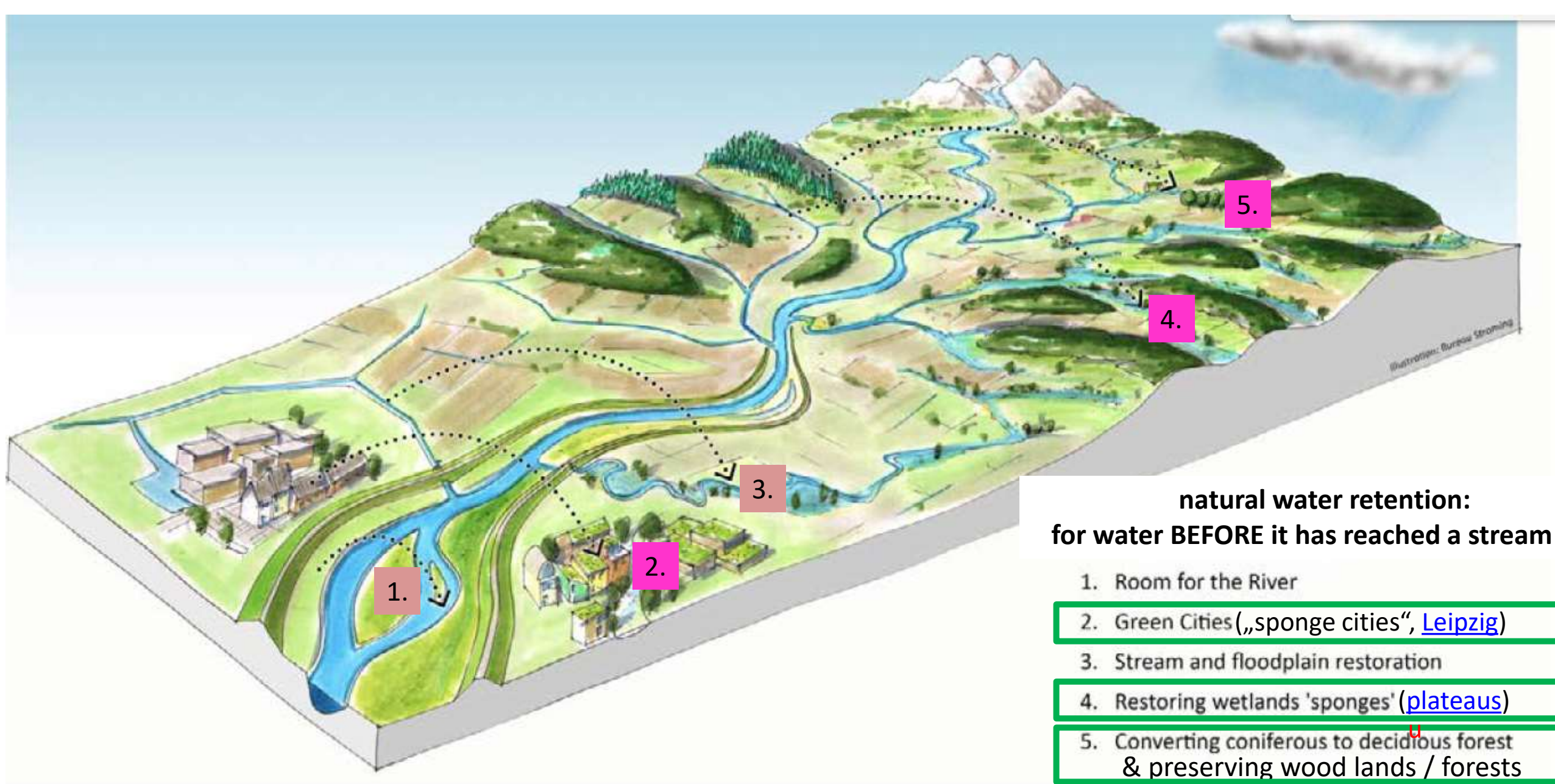


Figure 4. The role of drainage at the foot of the slope. On the right hand side, the valley is drained by means of channels, on the left hand side, the undrained situation.

[https://www.stroming.nl/sites/default/files/2017-12/20171114\\_sponges\\_read\\_3.pdf](https://www.stroming.nl/sites/default/files/2017-12/20171114_sponges_read_3.pdf)





**natural water retention:  
for water BEFORE it has reached a stream**

1. Room for the River
2. Green Cities („sponge cities“, [Leipzig](#))
3. Stream and floodplain restoration
4. Restoring wetlands 'sponges' ([plateaus](#))
5. Converting coniferous to deciduous forest  
& preserving wood lands / forests

[https://www.strooming.nl/sites/default/files/2017-12/20171114\\_sponges\\_read\\_3.pdf](https://www.strooming.nl/sites/default/files/2017-12/20171114_sponges_read_3.pdf)



# Nature-based solutions

**natural water retention:  
for water BEFORE it has reached a stream**  
**Tools for natural water management**

1. Room for the River
2. Green Cities („sponge cities“, [Leipzig](#))
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### 3. Solutions at river basin level to increase resilience: land use supporting water retention

Forest management irrespective of water management: Water drainage in forests



Prof. Ibisch, in Webinar of MEP J. Paulus, 21 March 2023, <https://www.youtube.com/watch?v=O0ChWXSgHM4>



### 3. Solutions at river basin level to increase resilience: land use supporting water retention

Preserving wood lands



<https://www.rnd.de/wissen/bmel-waldschaden-in-deutschland-grosser-als-angenommen-4KMSNSSW4EN4JVK444YSPTGMVM.html>

➡ Speeding up the transformation of agriculture, forestry and urban planning, restoration of wetlands as Nature-based Solutions → water, climate, biodiversity!

“The first thing rain washes away is the memory of the drought.”

***THANK YOU VERY MUCH***