



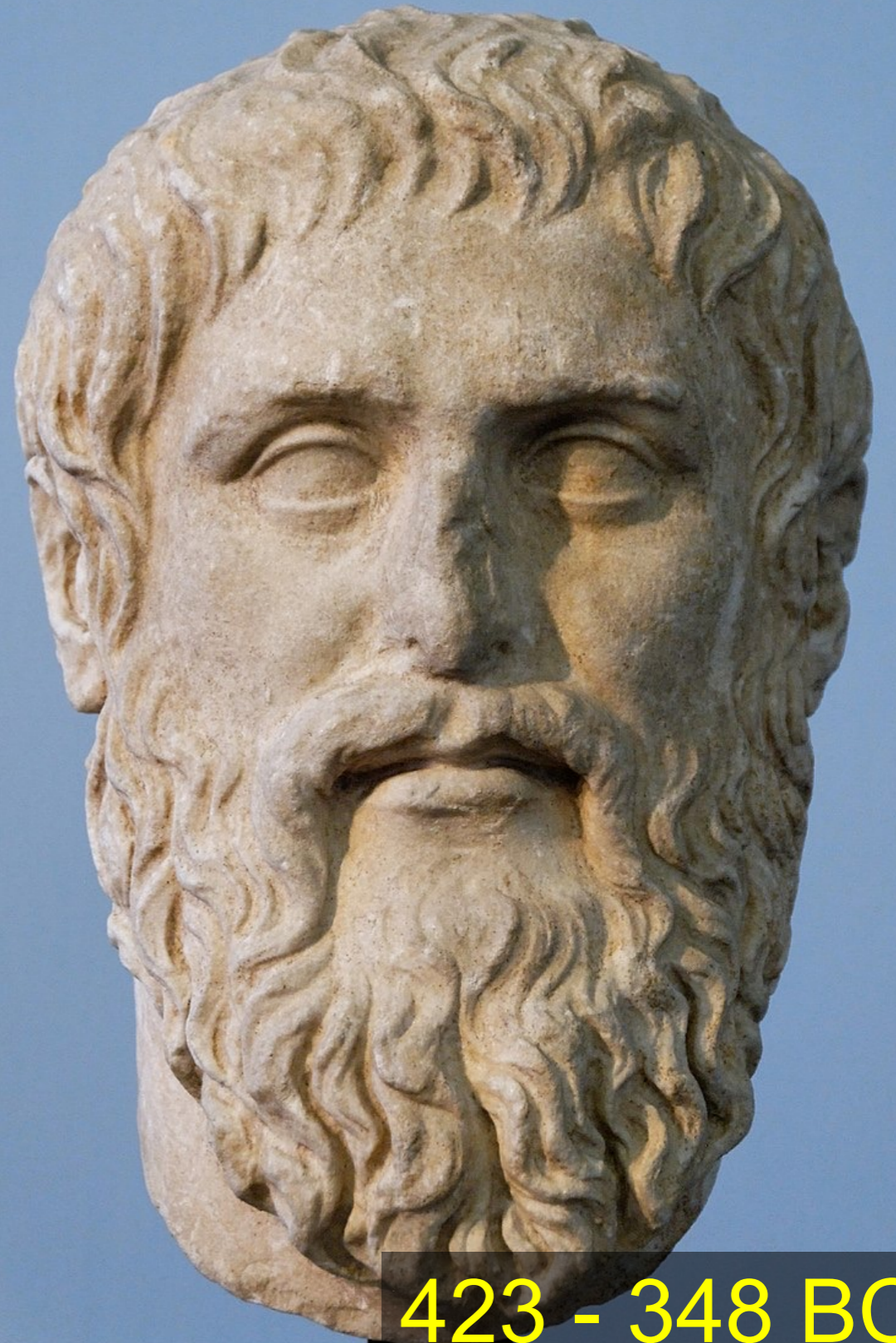
# RESTORING DEMAGED FORESTS

Michal Kravčík, Slovakia

# PLATO:

„FROM THE RAIN,  
WHICH NOW  
QUICKLY DRAINS  
FROM THE BARE  
GROUND INTO  
THE SEA,  
SHE ONCE  
PROSPERED”

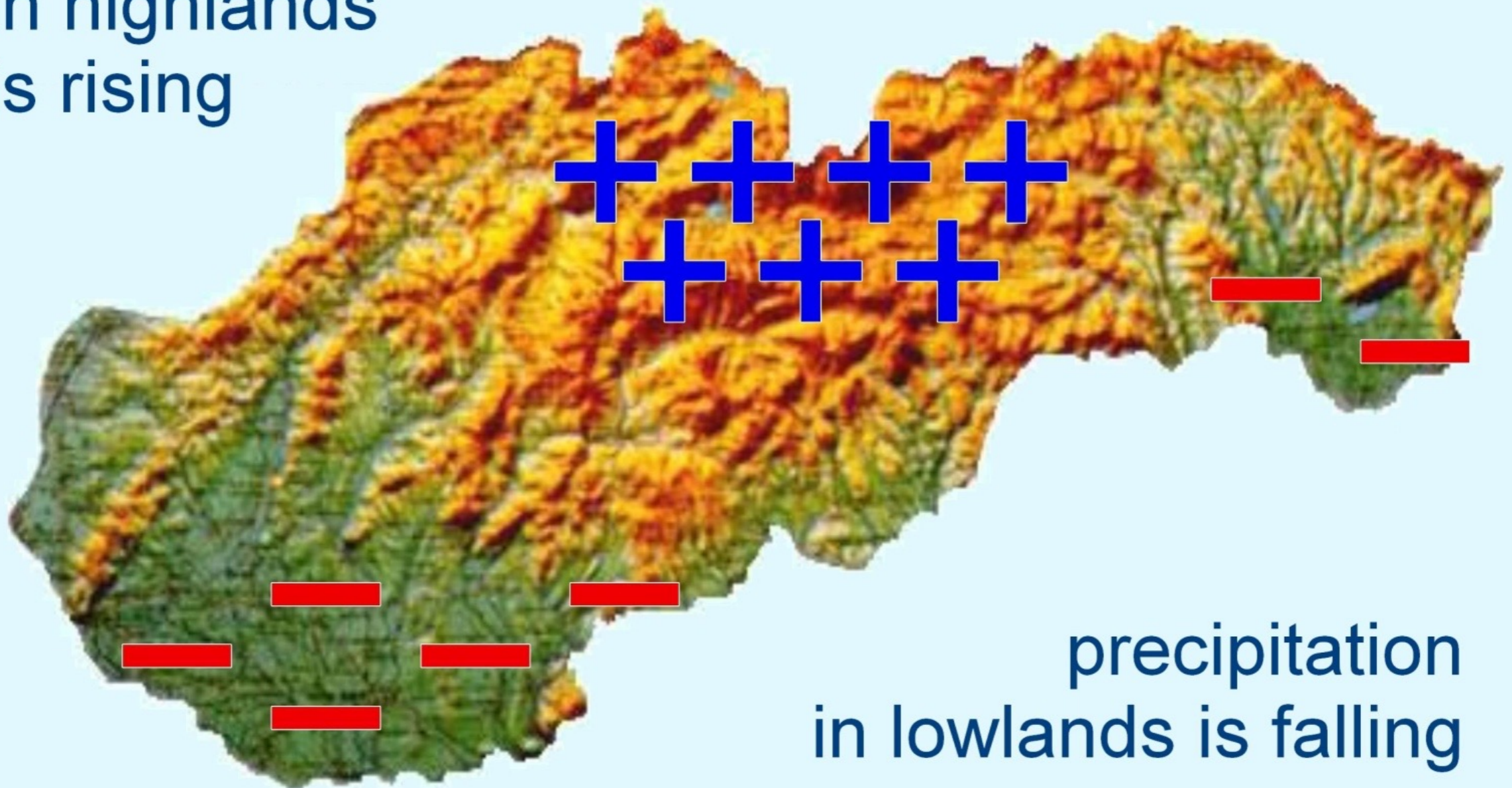
PLATO CONSIDERED  
WATER, ALONG WITH  
EARTH, FIRE AND AIR,  
TO BE ONE OF THE  
BUILDING BLOCKS  
OF UNIVERSE.



423 - 348 BC

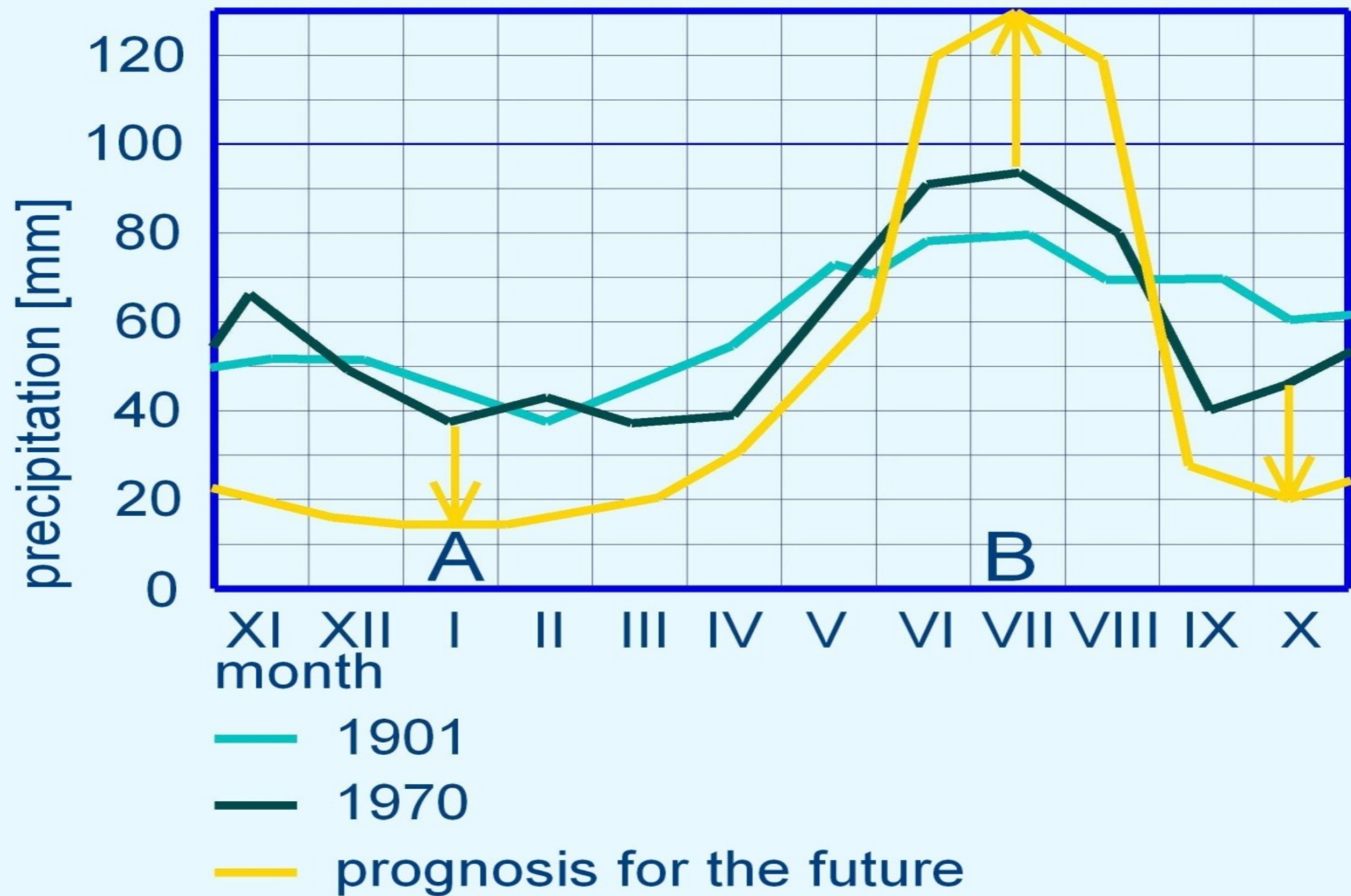
# SPACE CHANGE THE RAIN IN SLOVAKIA

precipitation  
in highlands  
is rising

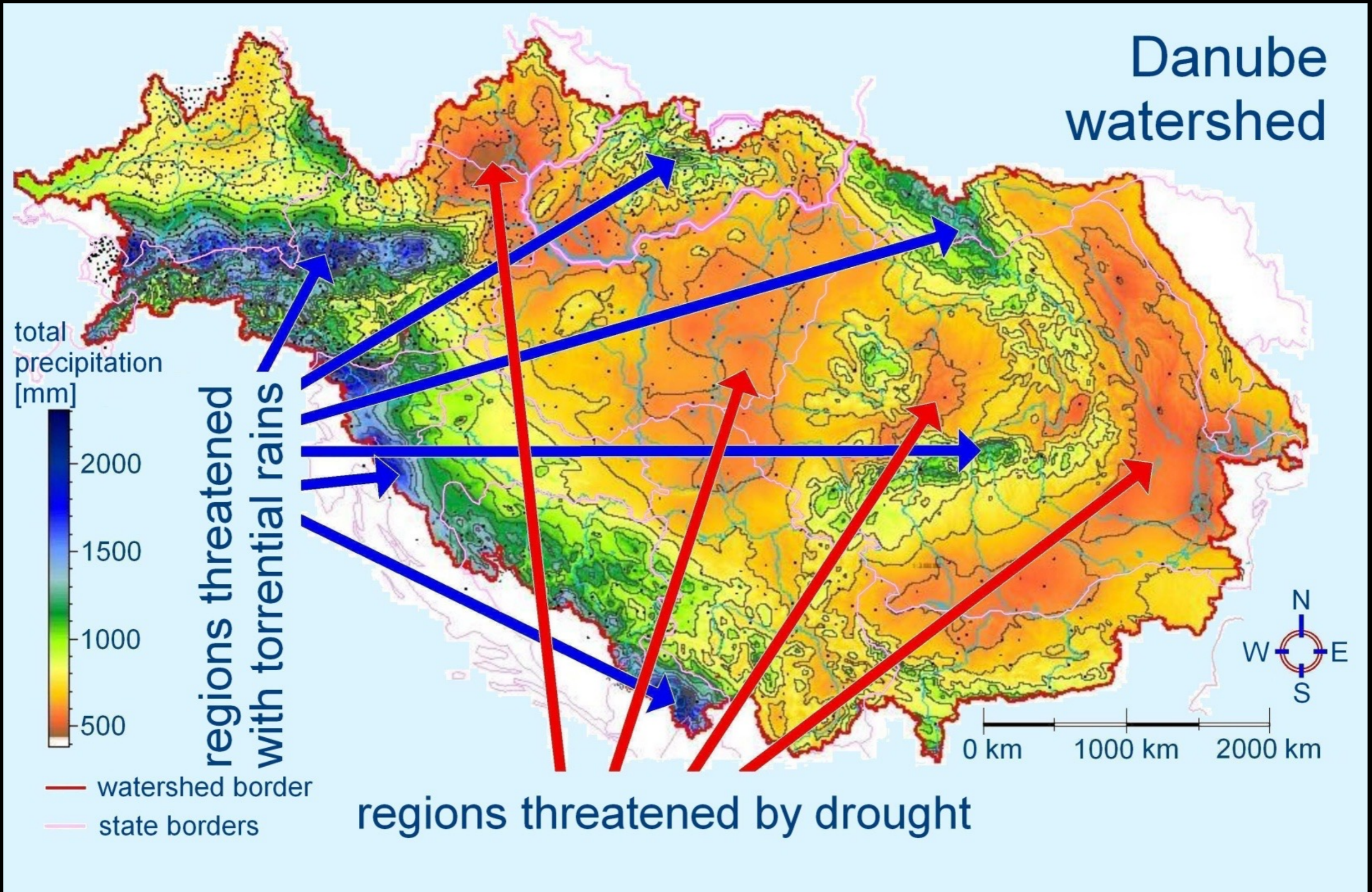


precipitation  
in lowlands is falling

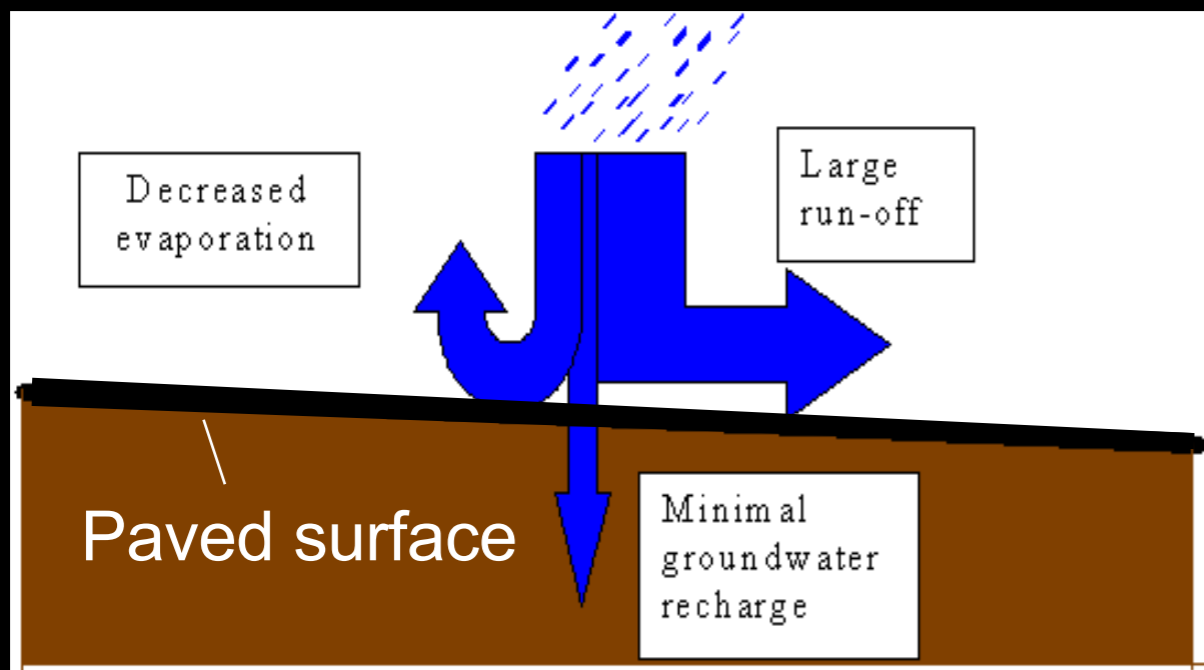
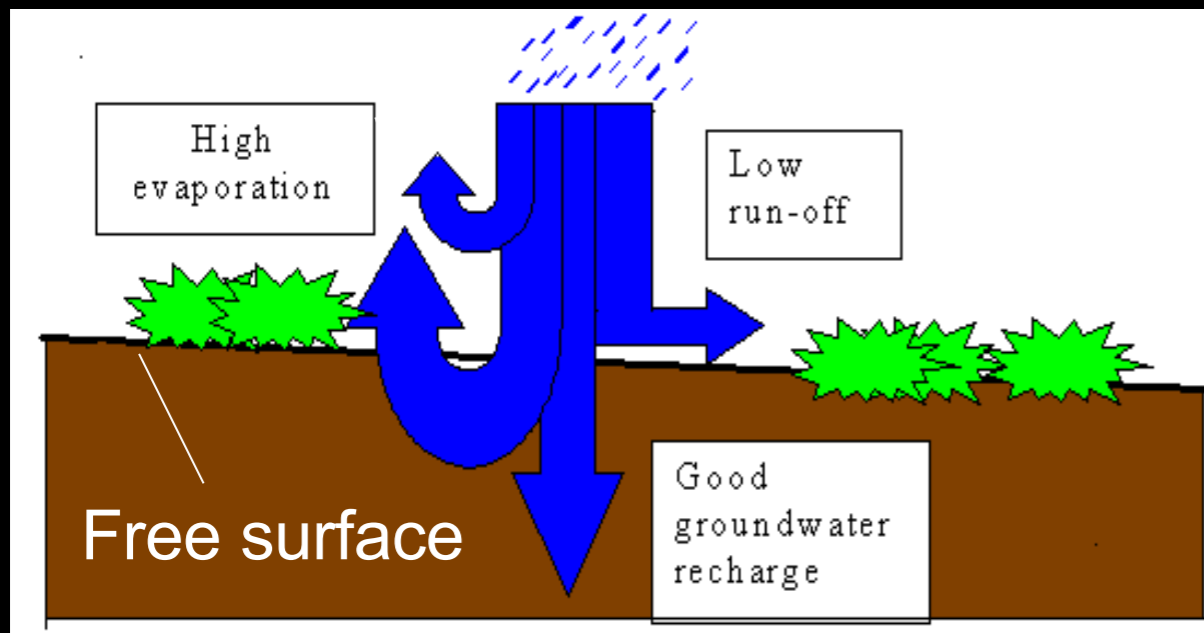
# PRECIPITATION TRENDS IN SLOVAKIA



# PRECIPITATION IN MOUNTAINS AND LOWLANDS – DANUBE WATERSHED



# IMPACT OF DEFORESTATION, AGRICULTURE AND URBANIZATION:



- **infiltration and evaporation decrease**
- **runoff increases**
- **about 60 billion m<sup>3</sup> of rainwater canalized from municipalities of Europe annually**
- **approx. 37.000 billion m<sup>3</sup> water was lost from continents last century**

# Water for the Recovery of the Climate

A New Water Paradigm

- humanity accelerates the runoff from land
- more solar energy is transformed into sensible heat
- draining of a land can be reversed through comprehensive conservation of rainwater
- renewal of small water cycle over land can temper extreme weather events and ensure a growth in water reserves
- [www.waterparadigm.org](http://www.waterparadigm.org)

M. Kravčík, J. Pokorný, J. Kohutiar,  
M. Kováč, E. Tóth

THE WORD PARADIGM  
ORIGINATES FROM GREEK  
AND MEANS PATTERN,  
MODEL, EXAMPLE



## Old water paradigm

- rainwater is an inconvenience, needs to be quickly removed

## New water paradigm

- rainwater is an asset that needs to be retained (especially in soil/plants)

[www.waterparadigm.org](http://www.waterparadigm.org)

## Old water paradigm

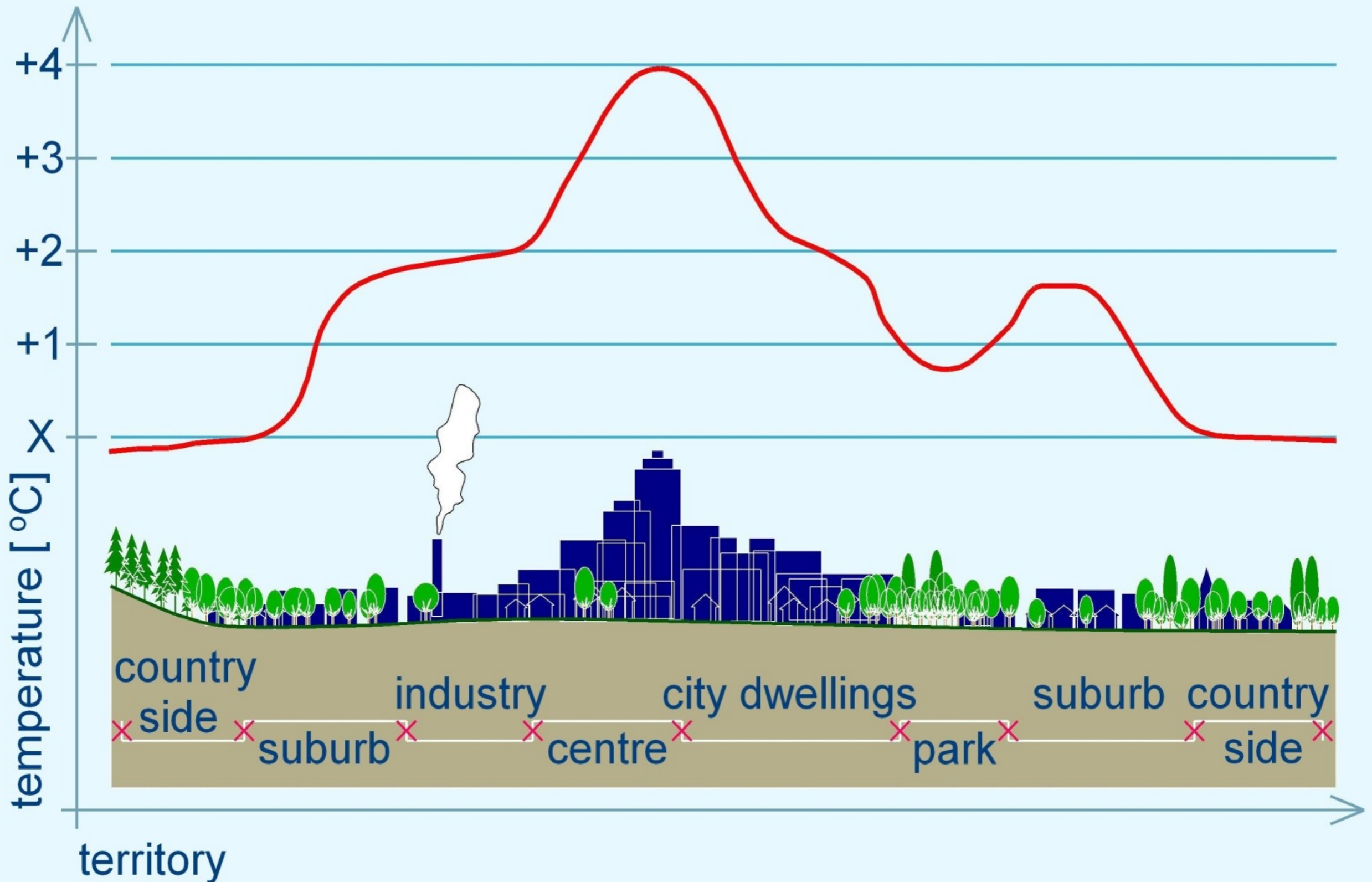
- soil sealing has minimal impact on the water cycle

## New water paradigm

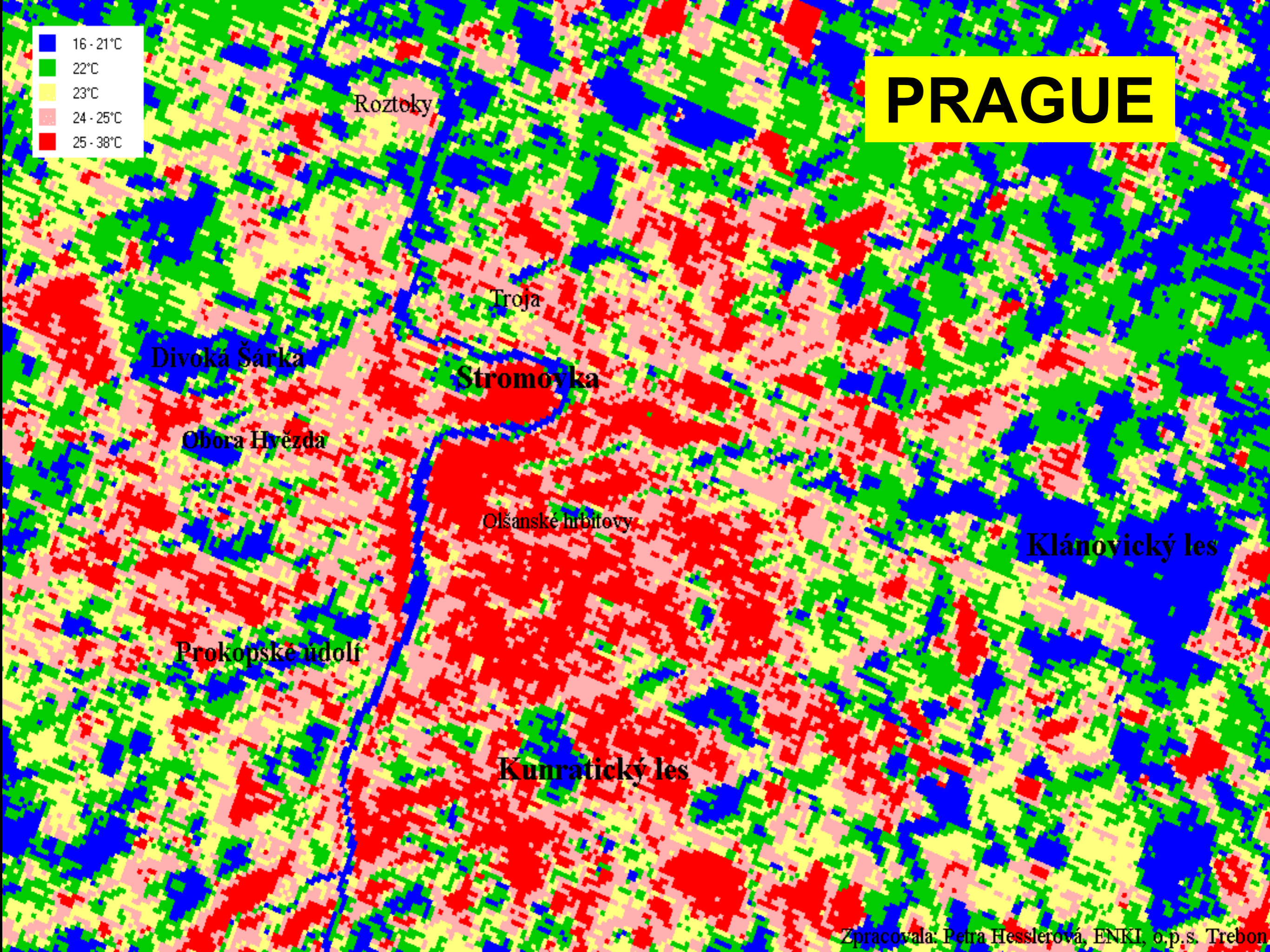
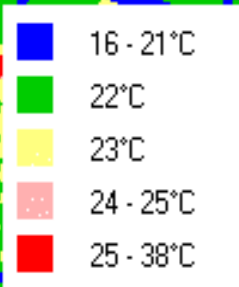
- soil sealing has a fundamental impact on the water cycle

[www.waterparadigm.org](http://www.waterparadigm.org)

# HOT CLIMATIC UMBRELLA OF A CITY



# PRAGUE



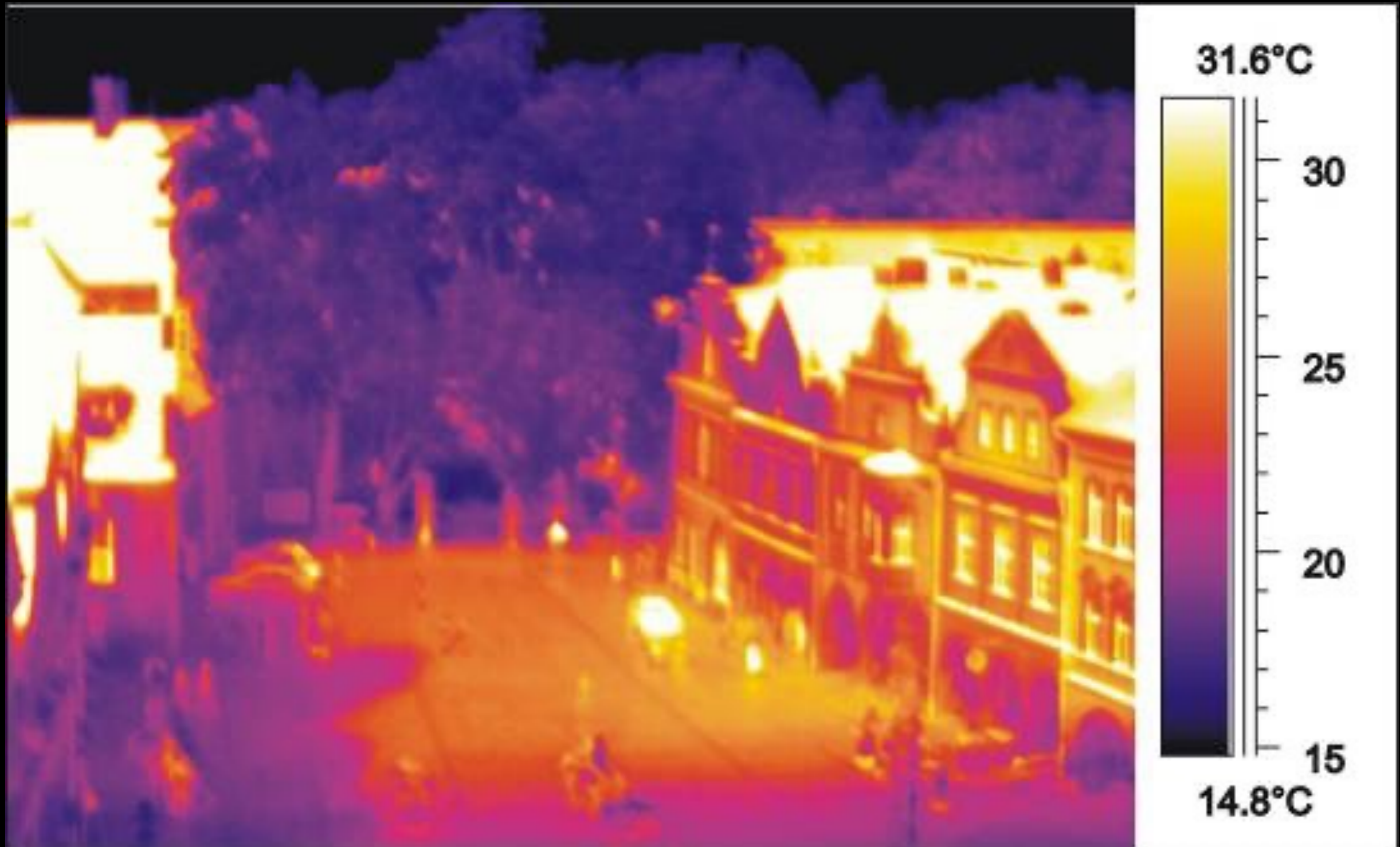
# HEAT ISLANDS



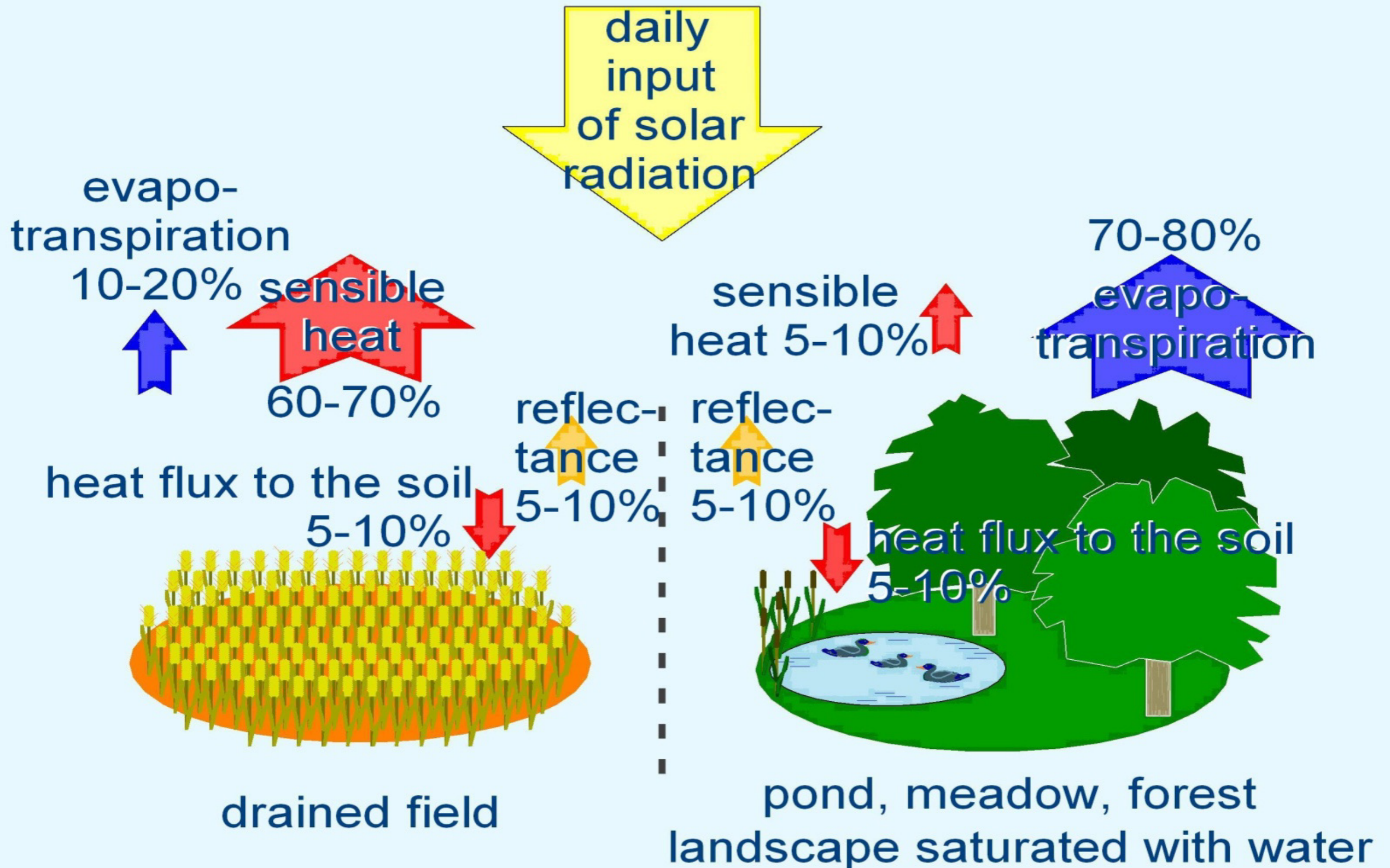
# HEAT ISLAND



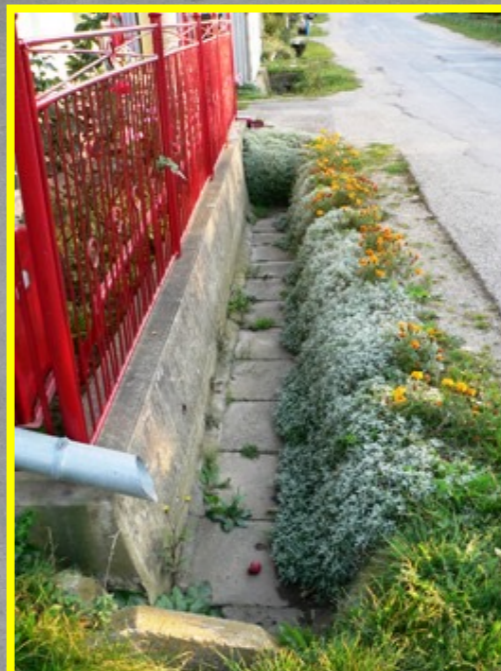
# PHOTO OF A CITY TAKEN WITH A THERMAL CAMERA



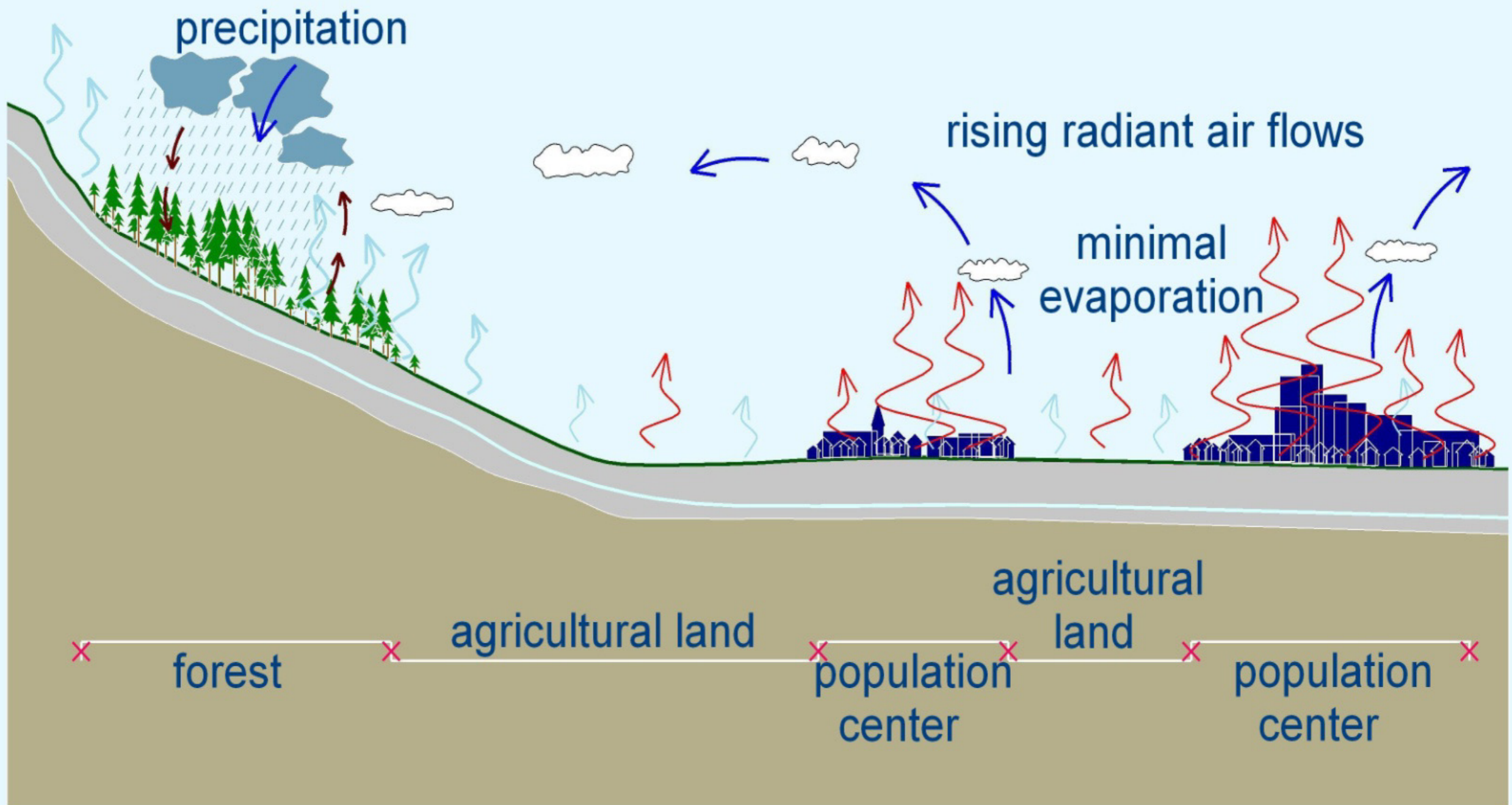
# DISTRIBUTION OF SOLAR ENERGY



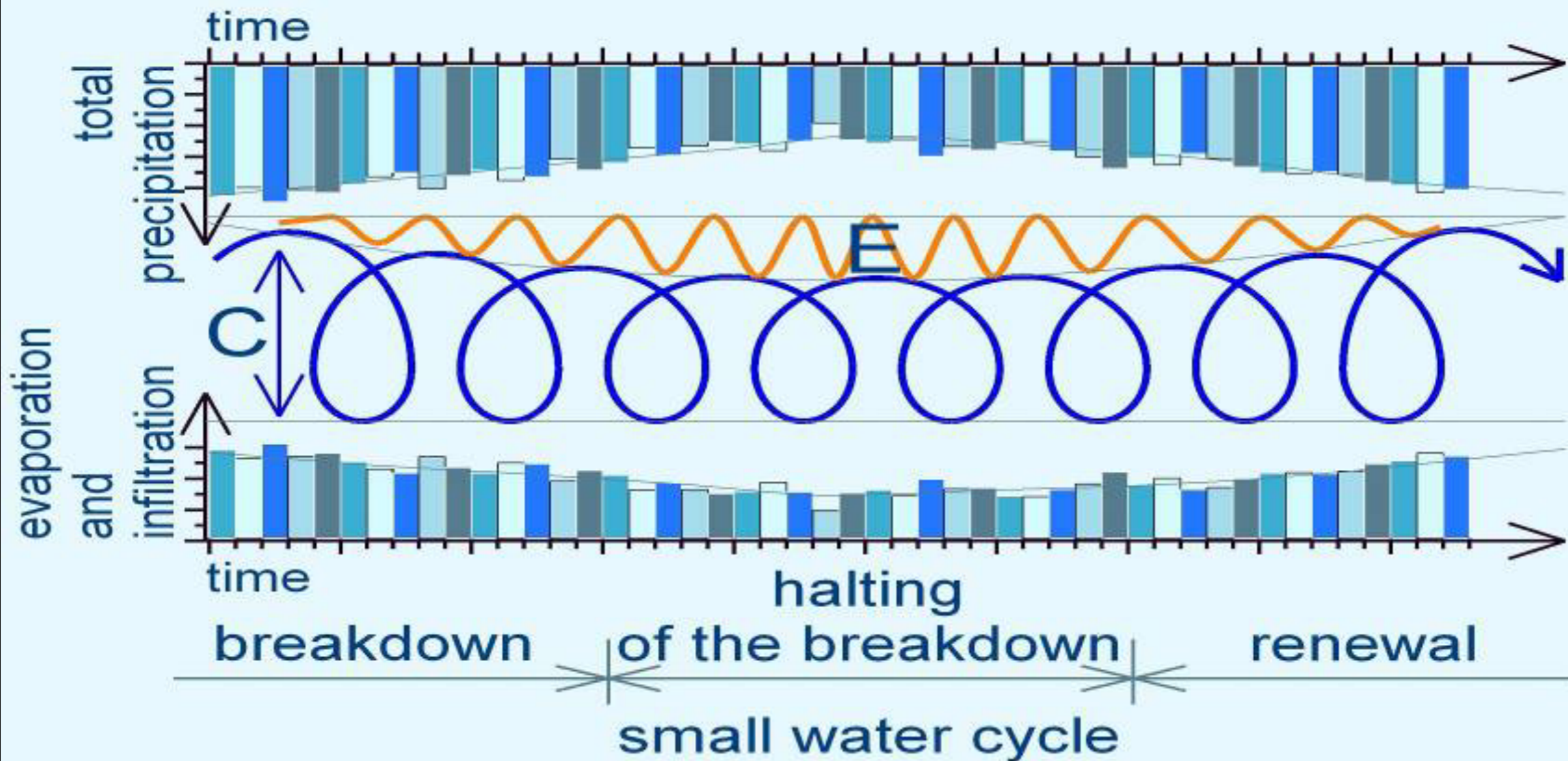




# IMPACTS ON WEATHER / CLIMATE



# DESTRUCTION AND RENEWAL OF SHORT WATER CYCLE



- C** - diagram of the circulation of water on land
- E** - diagram of extreme weather events

# EXAMPLE IN SLOVAKIA

AFTER HEAVY STORM IN TATRA NATIONAL PARK (19.11.2004)



# EXAMPLE IN SLOVAKIA

AFTER FIRE IN TATRA NATIONAL PARK (30. 7. 2005)



# WHAT WERE WE DOING?

1. First step was building barriers to retain rainwater
2. Second step was planting 7 types of seedlings



# WHAT WERE WE DOING?

First step on Black forest



2006



2009



# NEW FOREST 16 YEARS AFTER WIND STORM



# BURNED FOREST AFTER 16 YEARS ...



# CHARACTERISTICS OF MONTHLY PRECIPITATION FROM THE BALTIC TO THE MEDITERRANEAN



NO RAIN



# Site design for pilot revitalization

During other torrential rains, 9150 m<sup>3</sup> of rainwater runoff from 23 ha













# Wooden check dams



PROBLEMS BEGINS FROM  
TOP

STOP KINETIC  
ENERGY AS  
SOON AS  
POSSIBLE





PROBLEMS ACCUMULATE

WHAT LOOKS  
INNOCENT  
ALONE  
IS DANGEROUS  
TOGETHER

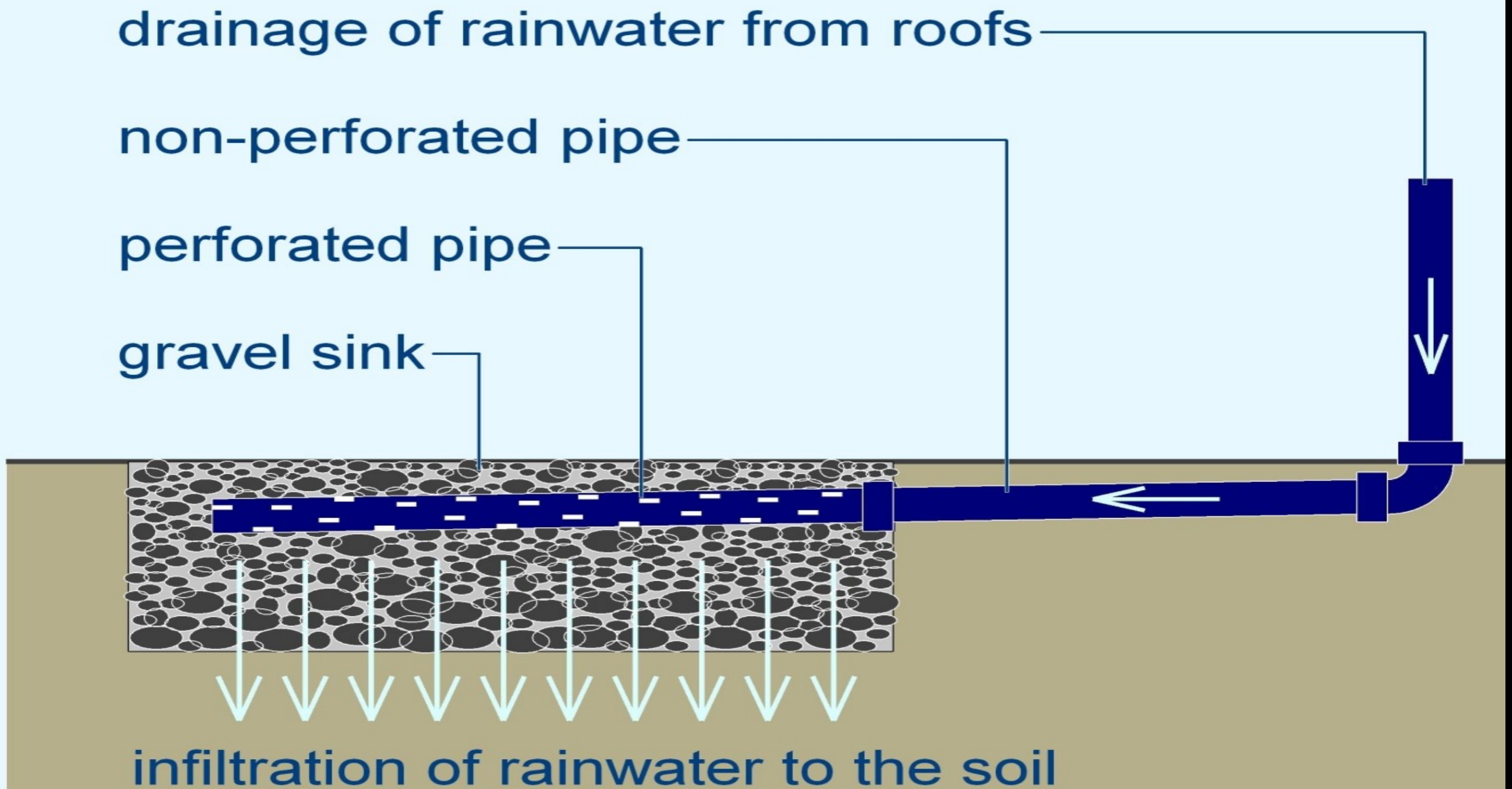
WAITING TO BE TRIGGERED BY NEXT STORM AND FLOOD STREETS OF ATHENS

# STREAMS OF MUD



EXAMPLES  
FROM  
SLOVAKIA

# RAINWATER HARVESTING FROM ROOFS IN CITIES



# Principle „Keep rainwater on the land“

## MIKROŠTRUKTÚRY NA ZACHYTÁVANIE VODY V TERÉNE

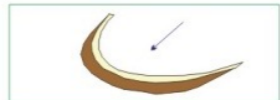
1. VRSTEVNICOVÉ HRÁDZKY



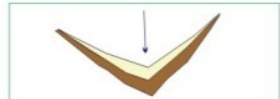
2. TERASY



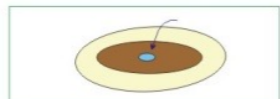
3. POLOOBLÚKOVÉ HRÁDZKY



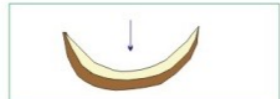
4. TROJUHOĽNÍKOVÉ HRÁDZKY



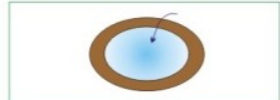
5. OČNÉ TERASY



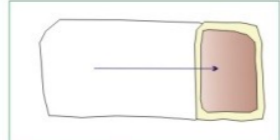
6. ŽLABOVÝ TYP MIKROPOVODÍ



7. JAMKOVÉ ŠTRUKTÚRY



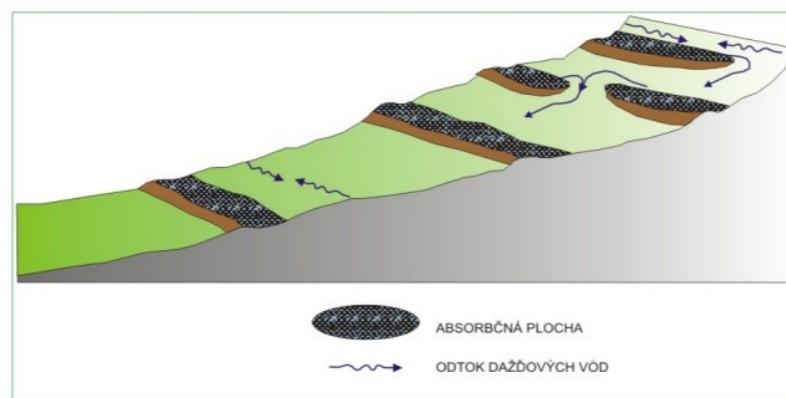
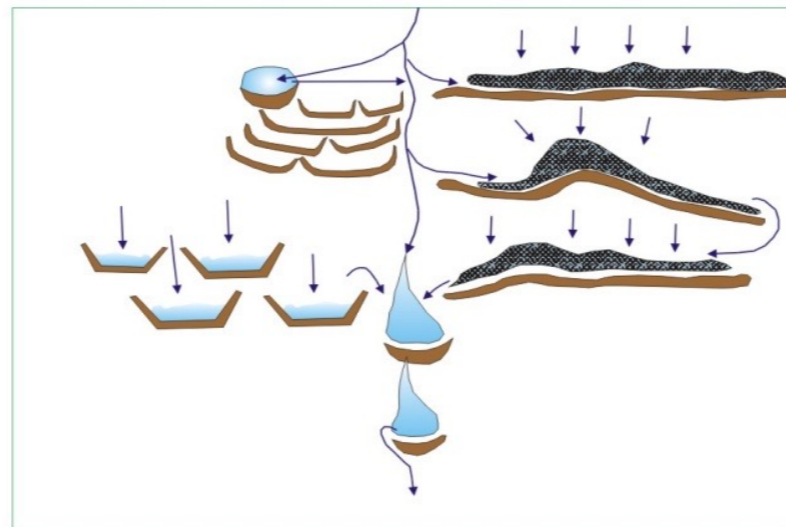
8. KAZETOVÉ ŠTRUKTÚRY MIKROPOVODÍ



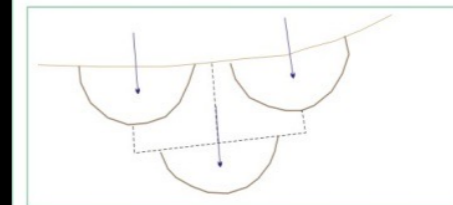
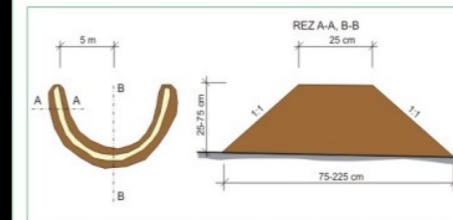
9. ŠACHOVNICOVÉ ŠTRUKTÚRY



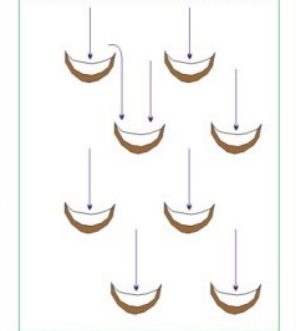
## KOMBINÁCIA RÔZNYCH TECHNÍK ZADRŽIAVANIA DAŽĎOVÝCH VÔD



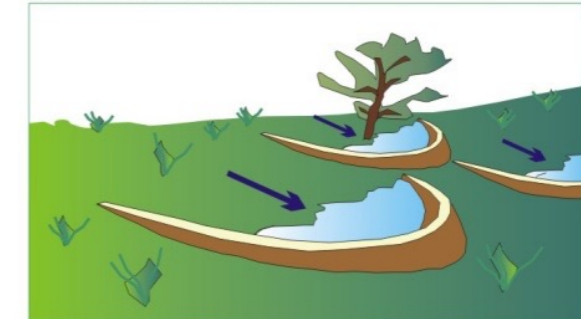
## POLOOBLÚKOVÉ HRÁDZKY



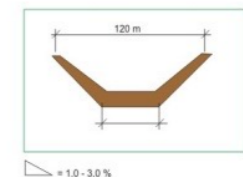
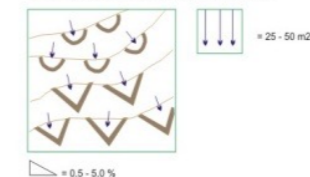
## SYSTÉM ZACHYTÁVANIA DAŽĎOVEJ VODY



## RIEŠENIE POLOOBLÚKOVÝCH HRÁDZOK



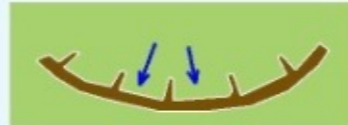
## RIEŠENIE POLOOBLÚKOVÝCH HRÁDZOK



# RAINWATER HARVESTING ON SLOPES

## Microstructures for the rainwater harvesting on land

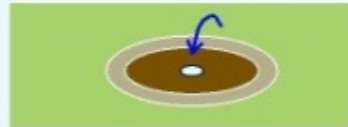
Contoured barrages



Terraces



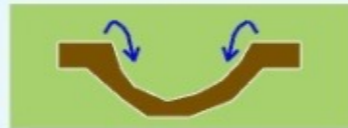
Eyebrow terraces



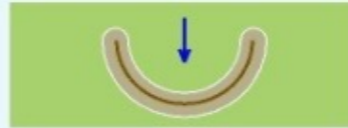
Pits



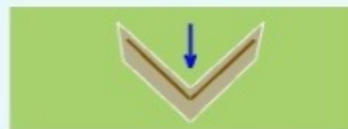
Vallerani-type microcatchments



Semicircular bunds



Triangular bunds



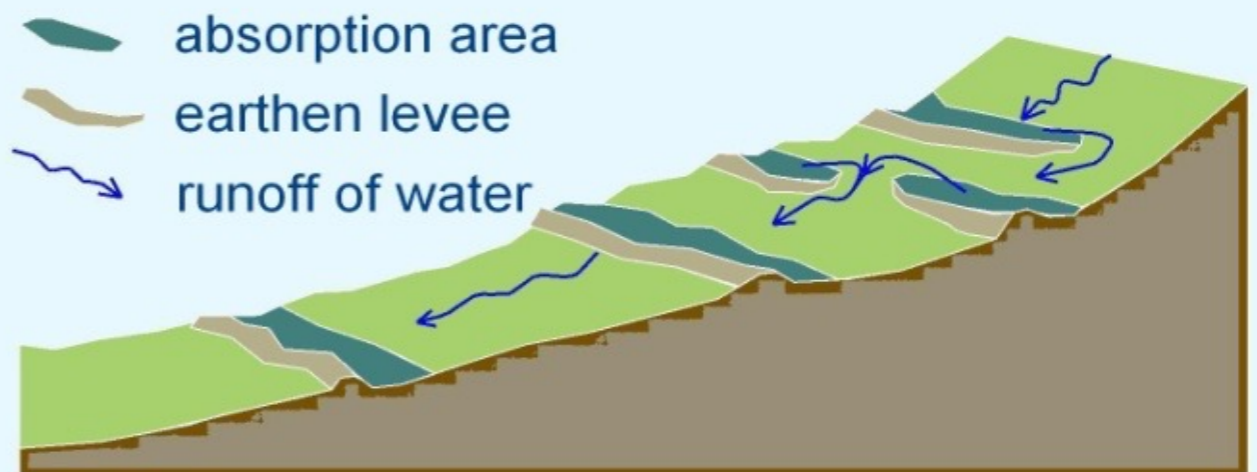
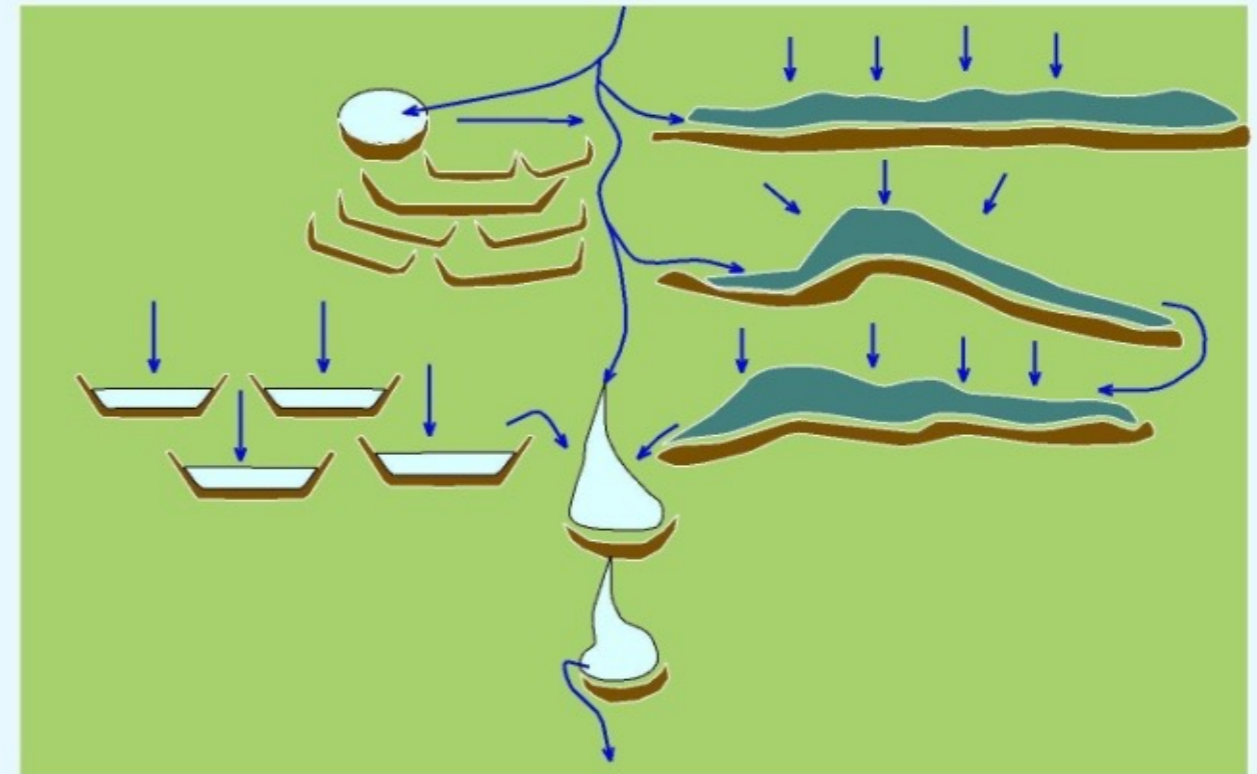
Meskat



Negarim



## Combination of different rainwater harvesting technologies





**ŤAHANOVCE**



# NIŽNÝ SLAVKOV



**Orlov**



**Pčoliné**



**Hlohovec**



**Dúbrava**



**Matysová**









**Poviná**



Snežnica









# RESTORATION PROGRAM OF KOŠICE REGION LANDSCAPE RECOVERY

