Welcome to our Landscape Systems **Interactive Session**

Our topics of today:

How **WATER** & **SOIL** work on the landscape

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Which statement best describes a **landscape system?**

0 A collection of isolated infrastructures

25 A network of interdependent natural and human processes

0 A landscape character unit

7 What humans perceive in their environment

3

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Why is the territorial scale essential for understanding system interdependencies?

smaller scales are not sufficient!

because cultural and natural landscapes have geographical manifestations and components

The territorial scale is essential for understanding system interdependencies because it defines the spatial context in which social, ecological, and infrastructural systems interact, revealing how pr

The local scale is too small, because many driving forces and relations are outside the system, the national scale is a bit too large to integrate. The territory is good for governance, same landscape

Water is life. Understanding the dynamics of water tells a lot about the economic, social aspect of a place.

Because the territotial scale decides and shows how the different parts of a system function.

Because we can understand something when we know the boundaries and its more clear to understand.

connects human and ecological systems

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Why is the territorial scale essential for understanding system interdependencies?

To establish a baseline/boundary in which to compare, evaluate inputs and outputs

The territorial scale is essential because it helps us see how different systems like water, vegetation, and human activities interact across areas in which every element affects the other

territorial scales help us undestand, with more depth, how one element behaves or affects other element in a system.

to analyse the core working of system and to identify its plus and negatives

It allows more than one element to help each other if needed

The territorial scale is important because it shows how everything is connected, the soil, water, people, and buildings. What happens in one area affects others.

it provides the physical, spatial boundaries

The territorial scale shows how local and global systems connect and affect each other.

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Why is the territorial scale essential for understanding system interdependencies?

To understand the relation between urban, peri urban, rural and natural ecosystems, understand biodiversity patterns and ecological evolution over time in a larger context.

To limit the amount of factors to consider when approaching a landscape

In landscape architecture, the territorial scale is important for understanding how ecosystems, water, soil, and human use interact, as system interdependencies change with scale and influence design

It helps how system components interact across levels.

it shows the connections between diffrent parts

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Which elements belong to the **water system**?

canals human made system
water purification plant
floodplains
water cycle
seasonal flooding
urban discharge
cycle
salt
water management
sewerage
rain garden
rain river stream
water bodies
surface runoff
wetlands
wetland
ponds
rivers storms
condensation
temperature
river
riparian zones
evaporation
water storage
soil
rivers
ground water
lake
pond
water cycle has 5 parts
geography
soil moisture
surface water
rain
groundwater
well
storage
wetland system
human use
sea
pollutants
humidity
infiltration
rainfall
lake pond well
source - flow
brook
swale
permeability
aqua-culture
vegetation
reservoir
karst landscapes
precipitation
drainage networks
river rain runoff
natural and surface water
natural elements
swap
water life
aquifer
water
aquatic life
streams rivers lakes dams
river management
evapotranspiration
water harvesting systems
atmospheric water

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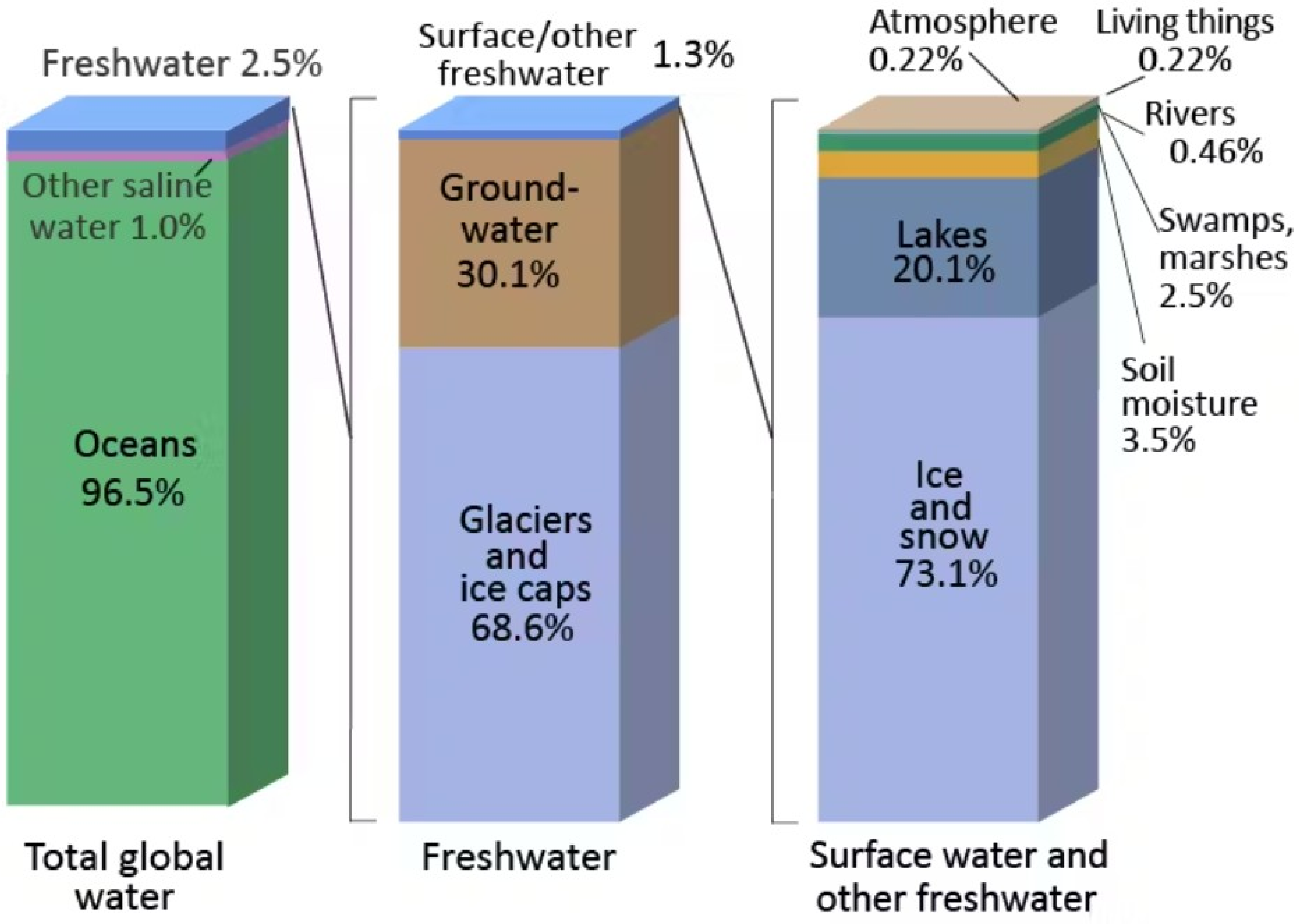
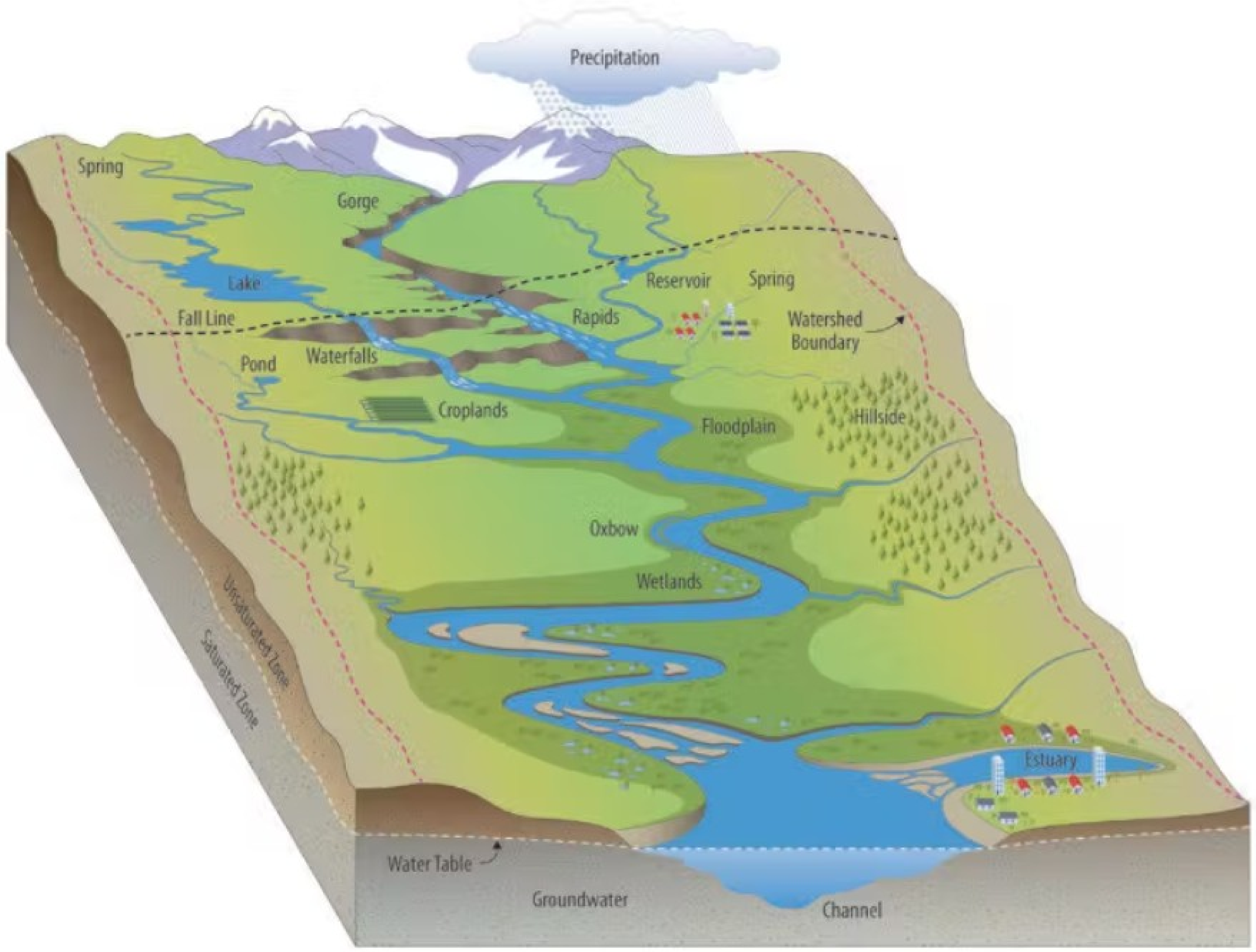
Guess the number: What is the percentage of **drinkable fresh water** out of the total water that exists on earth (100%)?

Where is Earth's Water?

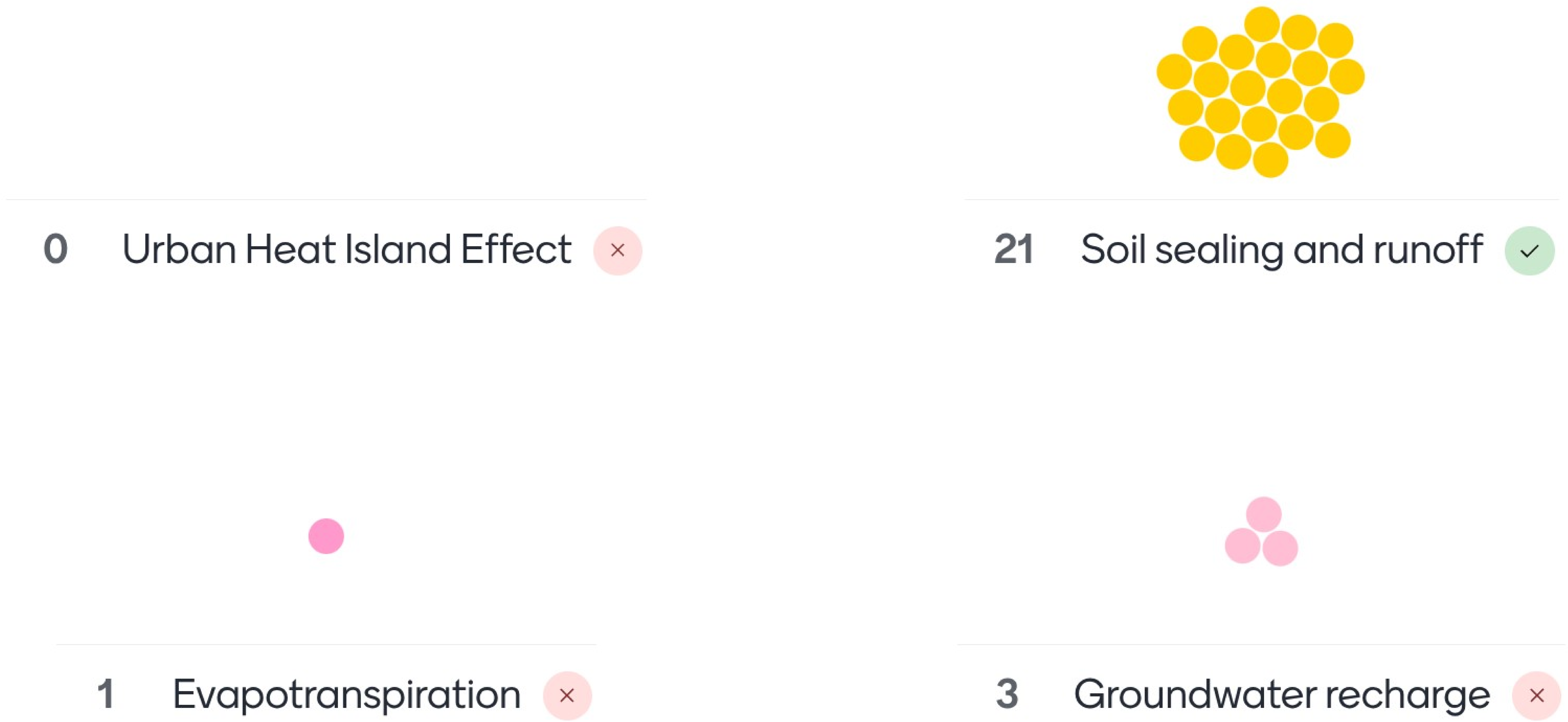


Source: Igor Shiklomanov's chapter "World fresh water resources" in Peter H. Gleick (editor), 1993, Water in Crisis: A Guide to the World's Fresh Water Resources. (Numbers are rounded).



Here we see all the main elements within a watershed (or drainage basin). Source: https://ess.science.energy.gov/watershed/

Which process most directly connects upstream land use with downstream water quality?



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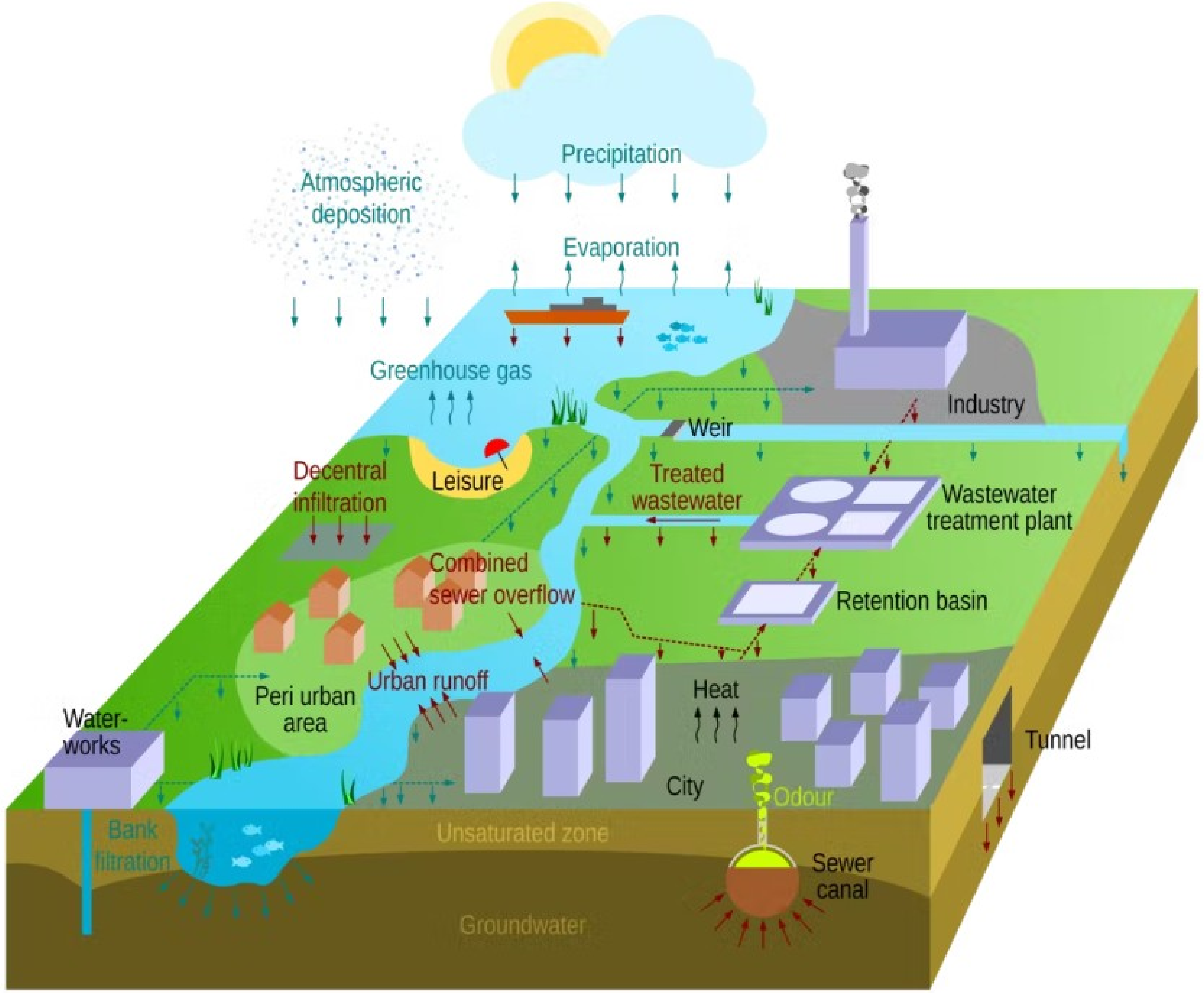

The urban water cycle, source: https://www.tu.berlin/en/uwi/research/interfaces

1

Please rank these elements by how quickly they respond to rainfall events (from fastest to slowest)

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What does this tell us about short-term versus long-term system resilience?

Need to prioritize long-term systems but support them with short-term systems

More attention is needed on ensuring the long-term sustainability on human water resources in relation to the water cycle.

System resilience is dependent upon the resilience of individual components of the water process.

That we should adapt the urban system, that should mitigate speedy runoff by roof gardens, less hard surface, rain gardens. And that we use the properties of the swamp and groundwater for mitigating.

short-term system resilience depends on managing and protecting the small amount of accessible freshwater we have, while long-term resilience requires sustaining and restoring natural processes

Fast elements support short-term resilience; slow elements support long-term resilience

short term means the system that is not flexible enough to adapt it according to environemental changings for very long time but long term is flexible enough to adapt it according to changing

Fast systems manage short-term changes, while slow systems provide long-term stability and resilience.

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What does this tell us about short-term versus long-term system resilience?

A landscape may look resilience in short term, but long term resilience requires sustainable water and soil managment,

so that we can understand how we can create resilient systems for the community, what to prioritize and what is good short-term and long-term

The weakest and most affected part of the system should be reinforced in the long run to maintain the quality of the system. But in short term there is not much to do to protect the system.

short term resilience means that the solution to the problem are effective but only temporary and can't last very long while long term resilience adapts to the conditions of the area to las of the are

It tells us that there is need to consider more actively how to regulate the flow and retention of water to ensure that the water table has a year long balance despite the seasons.

We need to planning and be more sustainable

Longterm system resilience is important because our landscapes face constant change

Short-term resilience refers to the system's ability to respond and recover quickly from sudden disturbances such as floods, droughts, or pollution events.

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What does this tell us about short-term versus long-term system resilience?

…but also short term helps systems bounce back after sudden shocks

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How many hectares of soil are sealed in Germany every day?

1 19

What functions does soil provide beyond food production?

water regulation filters

reduce floods

organic waste recycling

animal sheltering

it helps water system

habitat for biodiversity

water nutrients carbon

stability

decomposition

groundwater recharge

structure

earthen structures

ceramic production

pottery

forests

drainage

habitat

plant growth

life

carbon storage

stable ground

infiltration

habitat provision

water storage

water

food for thought

biodiversity of animal

construction

water retention

home for some animals

co2 sequestration

fuel

nutrient storage

control the water flow

prevents erosion

nutrient cycling

life cycle chain

nitrogen fixing

water filtration

supports biodiversity

water catchment

20

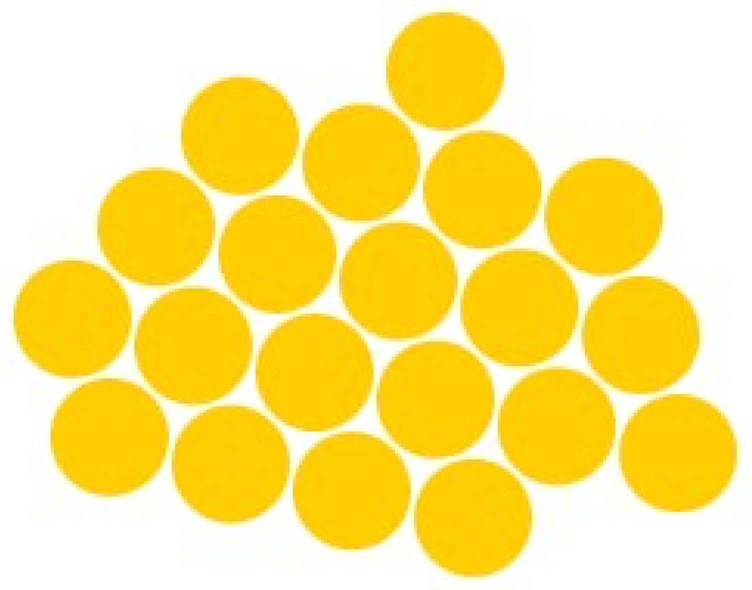
Primary soil functions are:

- sustaining terrestrial biodiversity of habitat, species, and genes;
- storing, filtering, and transmitting water
- biomass production for food, fuel, fiber, and timber
- mass transformation of nutrients and their plant-available storage
- decompose and recycle waste
- carbon storage
- providing a physical support for built structures
- provide a cultural landscape for human activities, health, and well-being

Blum, 2005; Banwart, 2019

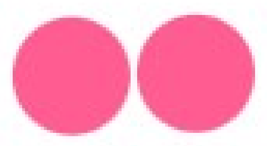
Which of the following best describes the term **infiltration** ?

3 The process by which water evaporates from soil or water surfaces into the atmosphere



20 The process by which water soaks into the soil from the ground surface

0 The movement of water from rivers and streams into the ocean



2 The process of water being absorbed by plant roots and released

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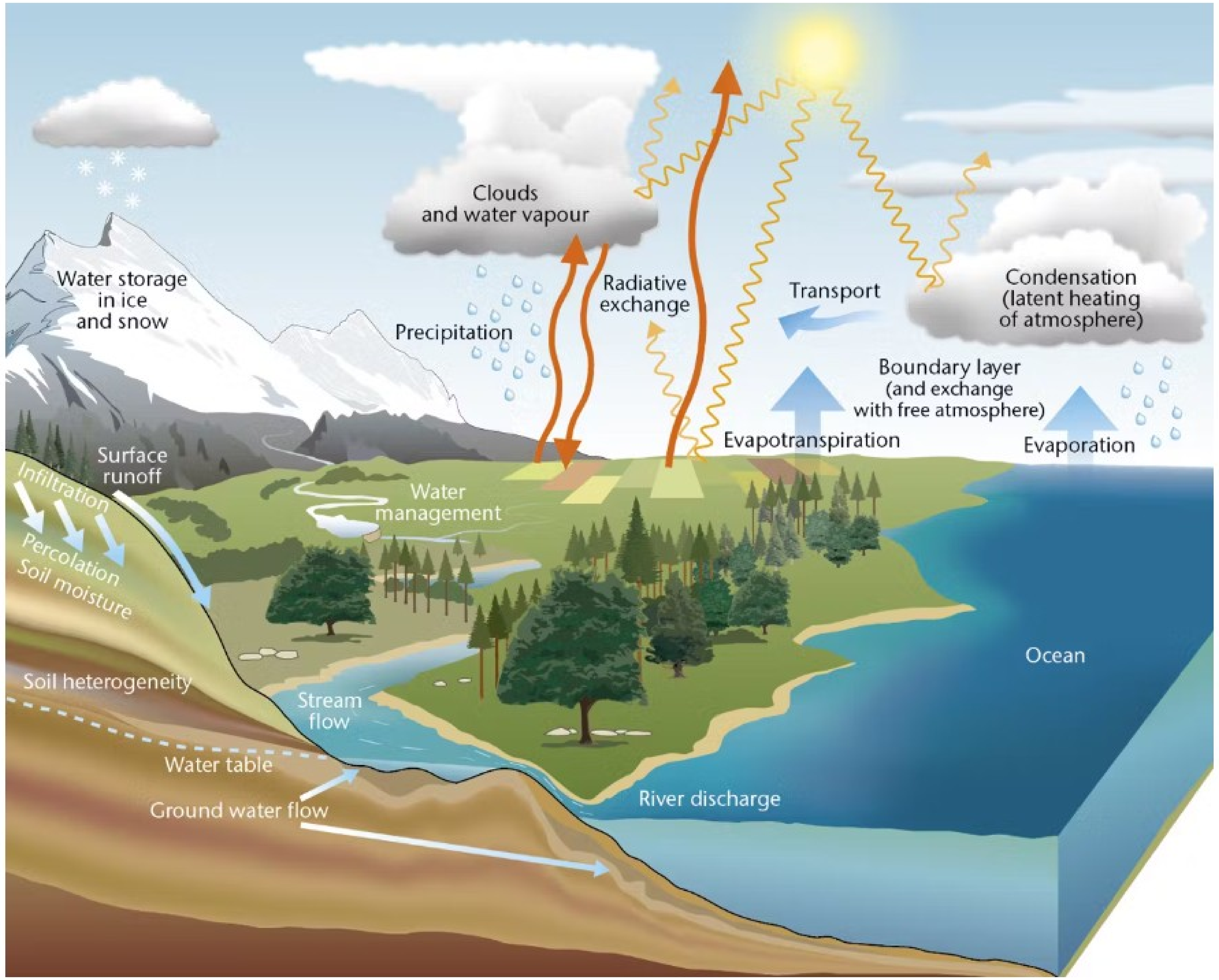

The water cycle, source: https://weather.metoffice.gov.uk

Which of the following interventions is most likely to **improve soil infiltration** and **reduce surface runoff**?

5 Replacing grass areas with gravel paths

22 Installing permeable pavement combined with surrounding vegetation

3 Compacting soil to prevent erosion

1 Directing rainwater into concrete channels

2

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Which other measures come to your mind in order to improve soil infiltration and reduce surface runoff?

- remove pavement
- Rain gardens
- sponge city systems
- Swales
- install rain gardens
- Create planting beds that are 0.2m lower than the road so runoff goes to the planting beds
- afforestation
- Using cover crops, adding organic matter, creating swales, and reducing soil compaction can improve infiltration and reduce surface runoff.

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Which other measures come to your mind in order to improve soil infiltration and reduce surface runoff?

Plant cover, mulching, contour farming, permeable surfaces, soil aeration, rain gardens, reduced tillage, adding organic matter, swales, check dams

slow down the runoff, so it can infiltrate, for instance by roof gardens

improve soil structure through planting trees and encouraging soil fauna biodiversity

by planting plants/groundcovers which could help slow down the water runoff that gives time for water to infiltrate the soil

Designing in cosnsideration of existing slope on site, Rain water Harvesting, Land Protection Policies in RIver Basin.

We need to decrease built form

to increase green spaces

add manure, compost any organic matter to the soil green infrastructure solutions

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Which other measures come to your mind in order to improve soil infiltration and reduce surface runoff?

reroute roof runoff water to small infiltration systems in gardens

Make open/permeable soil/ground cover more fashionable in an urban context, including integrating such practices more as part of corporate aesthetics.

alot of vegetation , no deforestation , balance between grey and green, maximize the permeable material

Reduce built up areas like concrete parking lots and replacing them with more permeable options like gravel or grass that is resilient to pressure.

Using permeable surfaces: replacing asphalt or concrete with permeable pavements or gravel paths. Implement Adding organic matter: compost or mulch improves soil structure and water retention.

Change/Control the waterflow (by changing the waterways, steeps and ...) Use better material for asphalt or new types of asphalt

Replace asphalt or concrete with permeable pavements

Semi-permeable surfaces should also be preferred on hard surfaces.

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Which other measures come to your mind in order to improve soil infiltration and reduce surface runoff?

.the idea of sponge city can improve soil infiltration and reduce surface runoff, restoring/increasing the amount of pervious surfaces while supporting biodiversity and circular water use.

Improving soil infiltration and reducing surface runoff can be achieved through practices like cover cropping, mulching, reduced tillage, contour farming, and installing rain gardens or permeable surf

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Now: **breakout sessions** on the MIRO board for 45 minutes.

Protocol for the breakout sessions:

- 5 minutes: introduce yourselves: approx 1-2 moderators and 5-6 examples
- One by one: Present your system maps (2-3 minutes each)
- Everyone leaves an oral and written comment on everybody else's maps
- We meet again in the plenary at 17 20 CEST

Questions to ask:

- Is the representation readable?
- Are territorial and systemic dimensions linked in the representation?
- Are enough system elements mentioned?
- Are cause-effect relationships explicit and clear?
- Are relationships between water and soil systems explained?