



**WATER**

# Prayer – Psalm 104



<sup>1</sup>Praise the LORD, my soul!

O LORD, my God, how great you are!

<sup>5</sup>You have set the earth firmly on its foundations,  
and it will never be moved.

<sup>6</sup>You placed the ocean over it like a robe,  
and the water covered the mountains.

<sup>7</sup>When you rebuked the waters, they fled;  
they rushed away when they heard your shout of command.

<sup>8</sup>They flowed over the mountains and into the valleys,  
to the place you had made for them.

## Prayer – Psalm 104

<sup>9</sup>You set a boundary they can never pass,  
to keep them from covering the earth again.

<sup>10</sup>You make springs flow in the valleys,  
and rivers run between the hills.

<sup>11</sup>They provide water for the wild animals;  
there the wild donkeys quench their thirst.

<sup>12</sup>In the trees near by,  
the birds make their nests and sing.

<sup>13</sup>From the sky you send rain on the hills,  
and the earth is filled with your blessings.

<sup>35</sup>Praise the LORD, my soul!      Amen.



# Water – what does the Bible say?

## Gift from God

- Creator of sea, rivers, rain – water is precious
- Giver & Sustainer of life – water is vital



## Sign of God's Power & Authority

- Sent the flood (Noah) – to judge
- Parted the Red Sea (Moses) – to save

## Symbolic of our need for God

- Quenches our thirst – longing for God
- Refreshes our soul – peace with God

# **Water – what does the Bible say?**

## **Baptism – a witness to faith in Christ**

- Under the water – cleansed from our old way of life
- Out of the water – raised to a new way of life

## **Symbolic of the Holy Spirit**

- ‘Streams of water’ (John 7:38) – abundant life
- ‘Spring of water’ (John 4:14) – eternal life

## **Daily cleansing**

- Body – outer washing
- Soul – inner washing

# Water – what does the Bible say?

## Water can harm (as well as bless)

- Disease – waterborne ‘plagues’
- Pollution – ‘bitter’ water



## Evidence of God’s kingdom (now)

- Justice – sharing safe water (↓ exploitation)
- Responsibility – caring for water (↓ pollution)



## Promise of God’s kingdom (future)

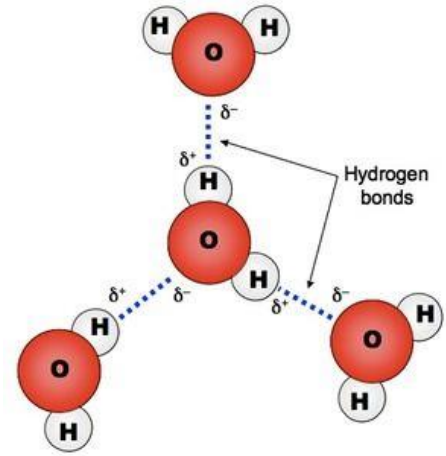
- ‘no more sea’ (Rev 21:1) – no unrest or danger
- ‘river of life’ (Rev 22:1) – fruit & healing



# Properties of water – 3 S's

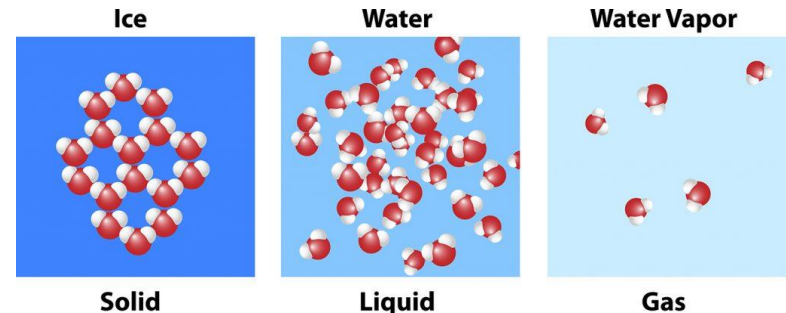
## Structure

- 2 small hydrogen atoms (positive)
- 1 large oxygen atom (negative)
- charge differential → molecule bonding, stability



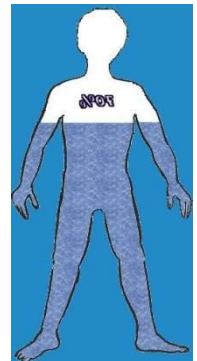
## States

- solid – less dense than liquid (floats)
- liquid – 0°-100° at normal pressure
- gas – water vapour, steam



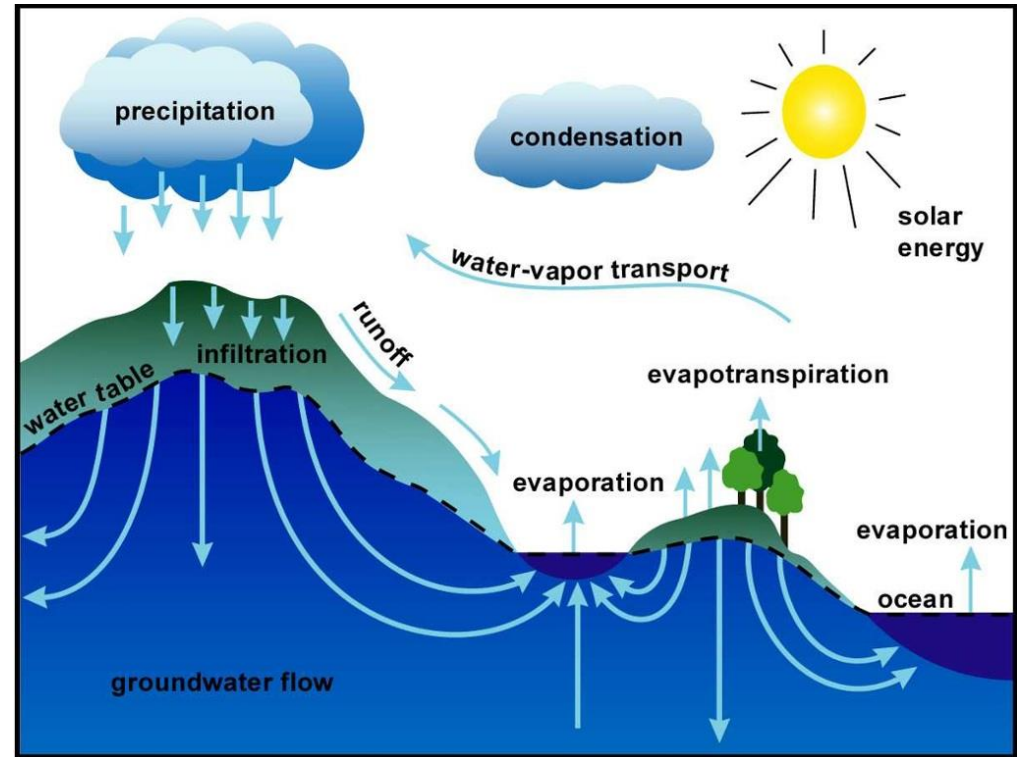
## Solvent

- dissolves almost everything – “universal solvent”
- enables transport of essential substances between cells
- maintains the structure of living cells (70% of human body)



# Hydrological (Water) Cycle

- **Evaporation**
  - solar energy → vapour
- **Condensation**
  - vapour cools → droplets
- **Precipitation**
  - rain, hail, snow
- **Run-off**
  - surface → rivers, lakes
- **Percolation**
  - ground → springs, aquifers
- **Transpiration**
  - from trees, plants



Hydrological Cycle =  
God's global water  
re-cycling system



# Global Water Reserves

71% of earth's surface area covered by water

**Oceans, Seas (salt)      96.54%**

- *“water, water everywhere ...”*

**Ice, Snow                      1.74%**

- ice caps, glaciers, permanent snow

**Groundwater                 1.69%**

- fresh & saline

**Surface (lakes, rivers)    0.03%**



## Psalm 33:7

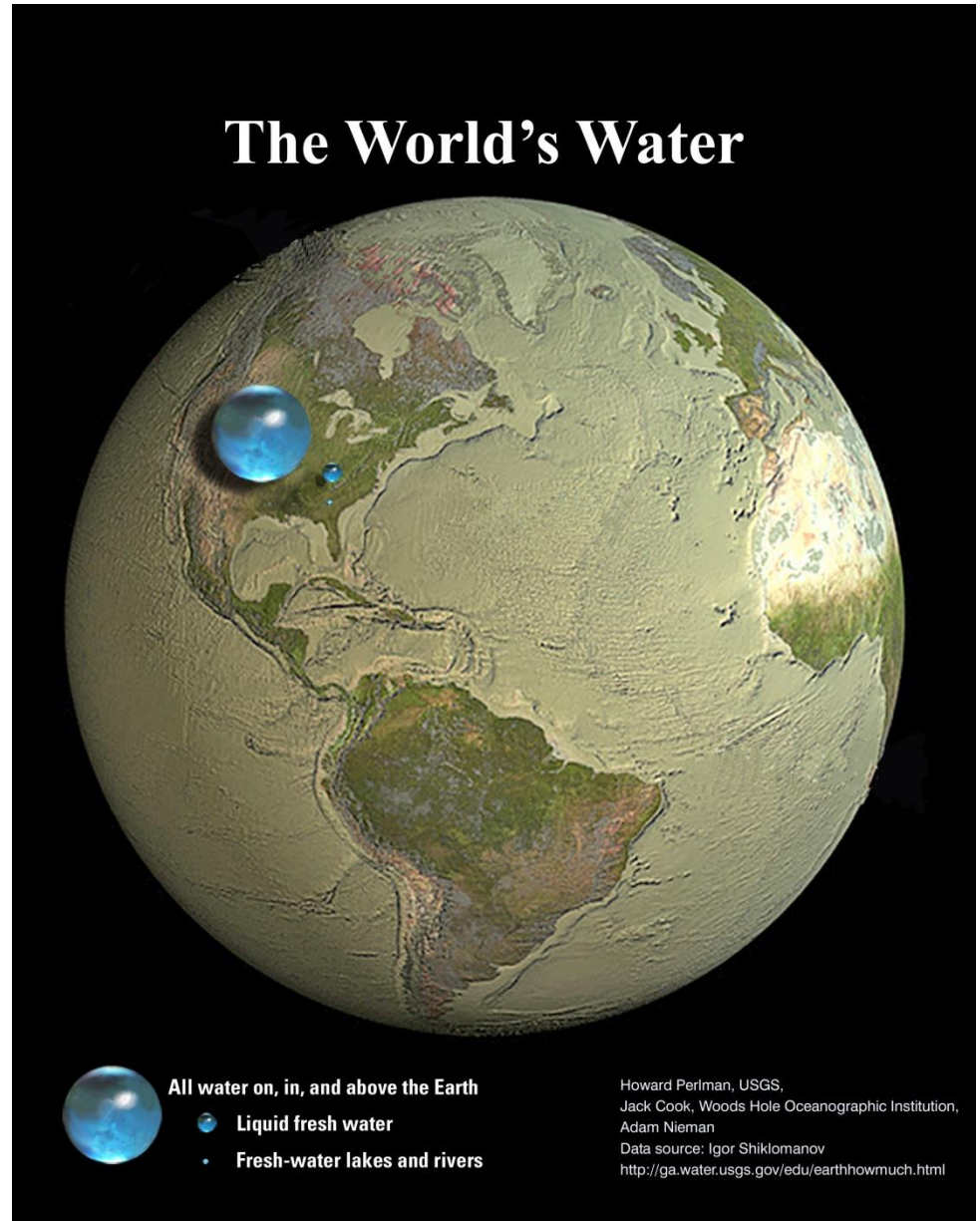
He gathers the waters of the sea into jars; he puts the deep into storehouses. Let all the earth fear the Lord.

(fresh water = 2.5%  
total global water)

### % of fresh water:

- **Ice, snow**           **68.70%**
- **Groundwater**   **30.50%**
- **Permafrost**       **0.41%**
- **Lakes**             **0.26%**
- **Soil moisture**   **0.05%**
- **Atmosphere**     **0.04%**
- **Wetlands**        **0.03%**
- **Rivers**            **0.006%**
- **Biological**       **0.003%**

(fresh water lakes & rivers =  
0.013% of total global water)



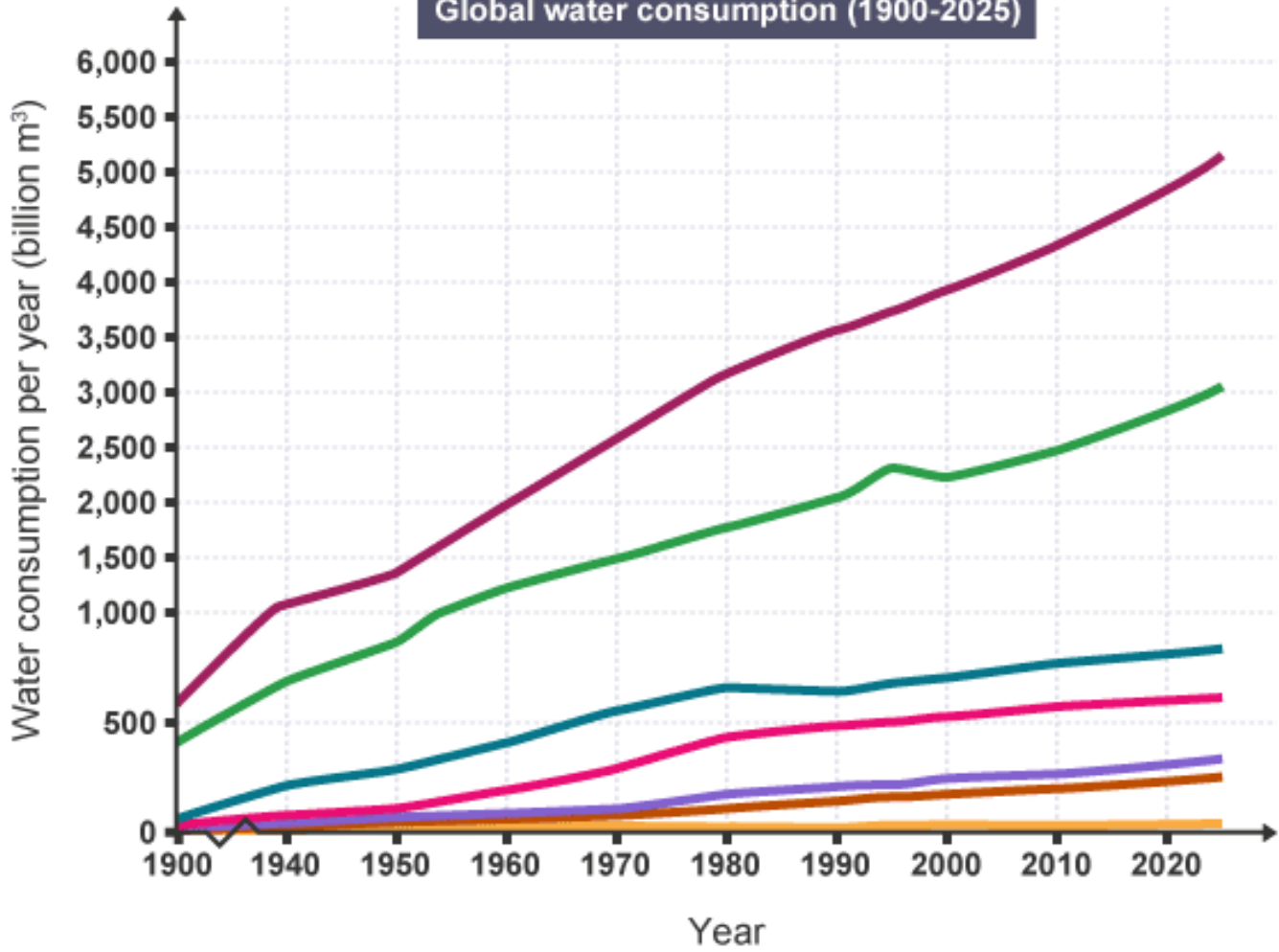
# Effects of Climate Change on Water

- Water cycle is less predictable, climate more volatile
- Water availability & quality less reliable
- Many water management processes are high energy users
- The world is becoming:
  - Hotter → ↑ plant evaporation, ↑ need for irrigation
  - Stormier → ↑ rain, wind, flooding, ↓ food security
  - Wetter → rising sea levels affect fresh water resources
  - Drier → crop failure, ↓ food security, desertification
  - Polluted → ↑ dissolved nutrients, algal blooms, fish kills

# Water is a finite resource

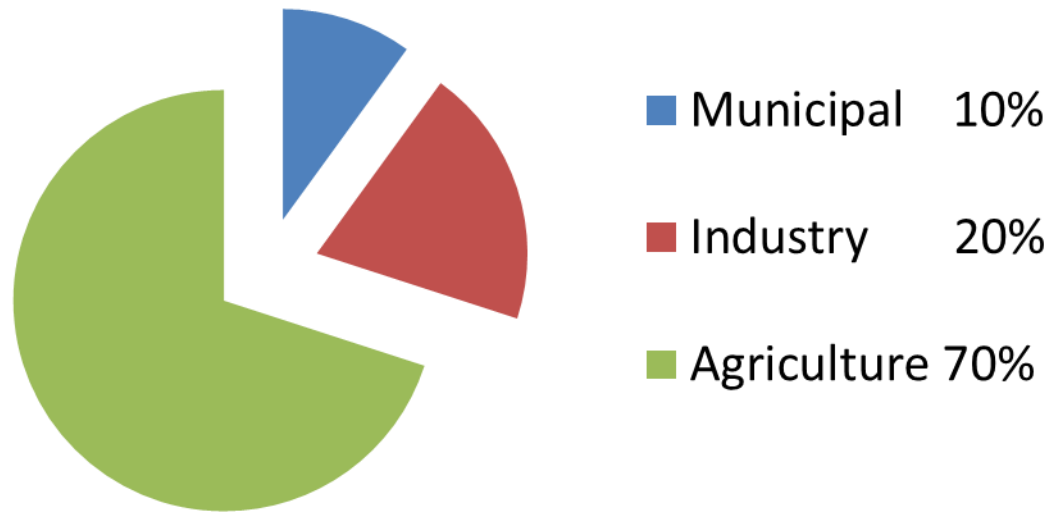
- quantity of fresh water is approx. the same as it was in Jesus' time
- population 1<sup>st</sup> century = 250 million; 21<sup>st</sup> century = 8 billion
- population growth in 20<sup>th</sup> century = x 3.5 (1.7 to 6.1 billion)
- human water use in 20<sup>th</sup> century = x 6
- most large populations & cities are near water
- many more water-hungry processes
  - agriculture (growing more food)
  - industry (making more stuff)
  - municipal (running more devices) (domestic & public services)

Global water consumption (1900-2025)



- World
- Asia
- North America
- Europe
- Africa
- South America
- Australia & Oceania

## Global Fresh Water Use



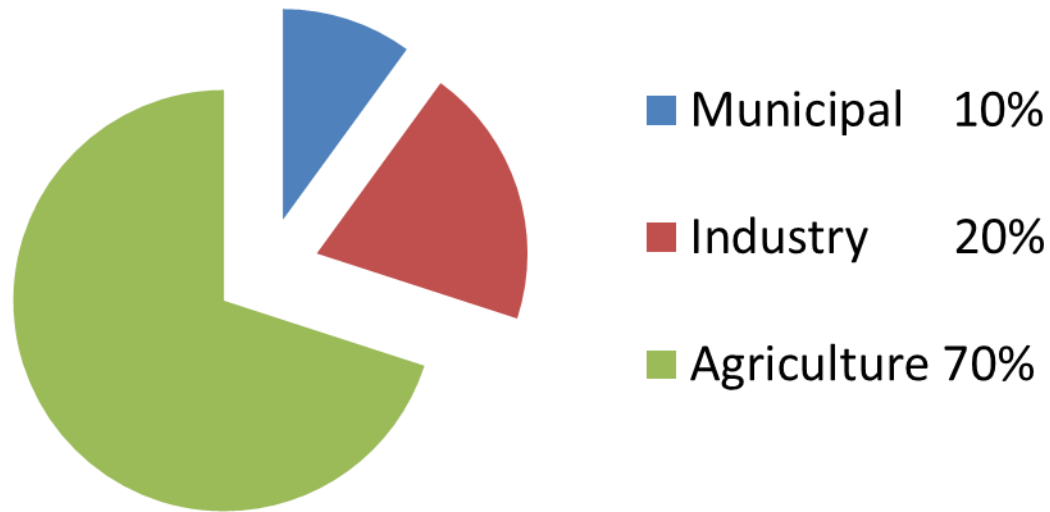
**Q. How much water does it take to make 1 pair of blue denim jeans?**

A. ?

**Q. How much water does it take to make a laptop computer?**

A. ?

## Global Fresh Water Use



Q. How much water does it take to make 1 pair of blue denim jeans?

A. **2,000 gallons = 16,000 pints = 9,000 litres = 90 average baths**

Q. How much water does it take to make a laptop computer?

A. **50,000 gallons = 400,000 pints = 230,000 litres = 2,300 average baths**



## ENVIRONMENT

# Water, water everywhere

Everyday items take gallons of water to produce and laptops require the most, using more than 400,000 pints each, a study has found. The amount of water used to produce one laptop could keep a person well hydrated for almost 115,000 days, according to Utility Bidder.

The amount of water used in the production of everyday items (in gallons)

### LAPTOP COMPUTER



**50,193**

This is equivalent to 401,544 pints, and as people are recommended to drink 3.5 pints a day, the water could keep someone alive for roughly four lifetimes.

### CAR



**39,000**

The second biggest water consumer is a car, which is produced using 10,000 fewer gallons than a laptop.

### SMARTPHONE



### PAIR OF LEATHER SHOES



### SET OF FOUR CAR TYRES



### BLUE JEANS



### CAN OF DOG/CAT FOOD



### POUND OF BEEF



### COTTON T-SHIRT



### QUARTER POUNDER



### DOZEN EGGS



### CHOCOLATE BAR





# Water Utilisation & Resilience

- **Rain-water harvesting**

- **Rivers**

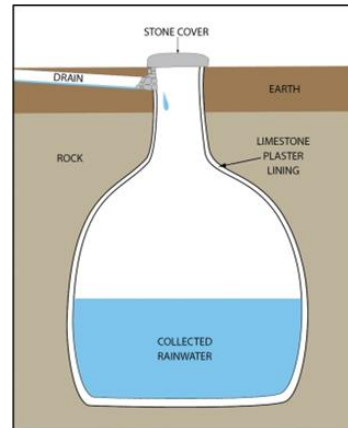
- **Natural lakes**

- **Groundwater, aquifers**

- Unregulated in many countries
- Extraction > natural replenishment
- Over-extraction may lead to ground subsidence

- **Reservoirs**

- Total: 570 in UK – Largest: 1. Rutland Water 2. Kielder Water
- No new reservoirs since 1991 (Carsington Derbyshire)
- Population: 1991 = 57.4 million, 2022 = 67.5 million (↑17.6%)



600 BC



2020 AD

# Water Utilisation & Resilience

## Dams

- Humans have become very effective in controlling rivers
- 1950 – 5,000 large dams globally, 2020 – 58,000 large dams
- Millions of small dams & impoundments

## Pros

- Hydropower generation, water supply, irrigation, flood control
- Irrigation from dams supports 15 % of global food production
- Hydropower contributes 24% global electricity production
- Hydropower contributes 70% renewable energy production

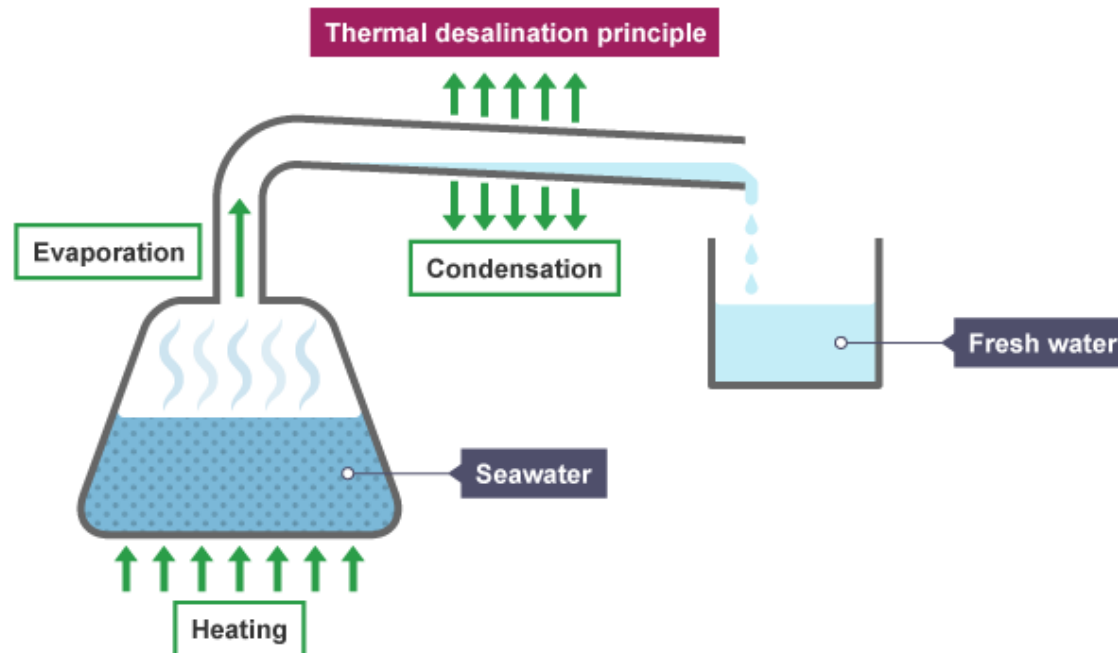
## Cons

- Downstream effects: ↓ water, ↓ fish, ↓ wildlife, ↓ sediment
- Small risk of dam failure – large-scale loss of life & property
- Socio-economic change; Regional / International conflict

# Water Utilisation & Resilience

## Desalination (removal of salt from sea water)

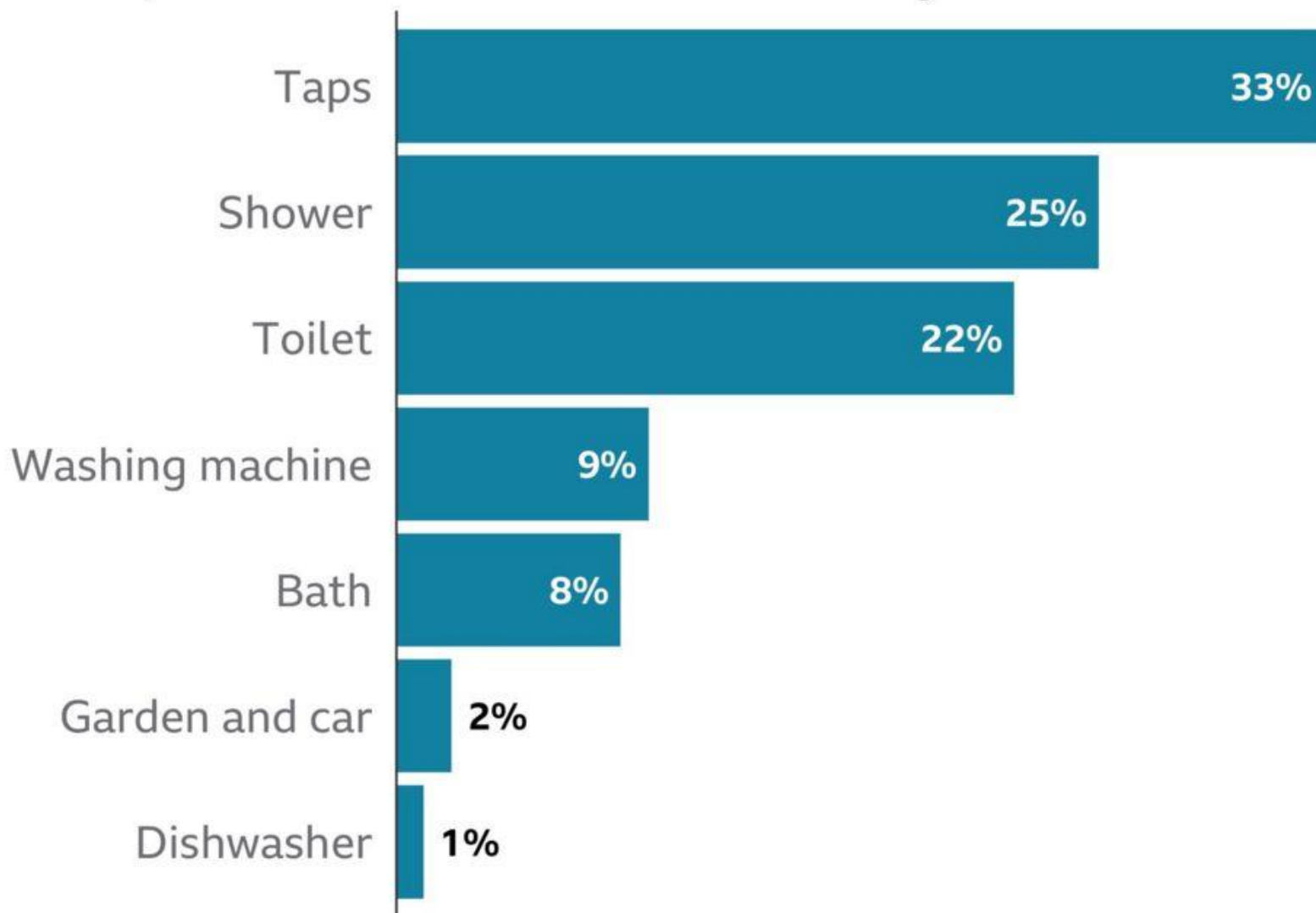
- 2019 – 16,000 desalination plants globally
- 2050 – 30-40,000 predicted
- expensive, need energy +, most use fossil fuels, bad for climate
- common in Middle East – arid, near coastline, oil rich, wealthy





# What does water get used for in the home?

Total per household: 349 litres on average



Source: Energy Saving Trust

# Ways to save water at home



## Shorter showers

On average, a shower uses 10 litres a minute



## Turn off taps

A running tap can use six litres every minute



## Fully load appliances

Filling washing machines and dishwashers can save up to 4,000 litres a year



## Fix leaks

A leaking toilet wastes 400 litres a day on average

# Tips to save water

## Kitchen

- Prepare vegetables in a bowl – water plants with waste
- Full load in washing machine – newer models more efficient
- Only boil what is needed – save water, energy & money
- Steam vegetables – retains more natural nutrients

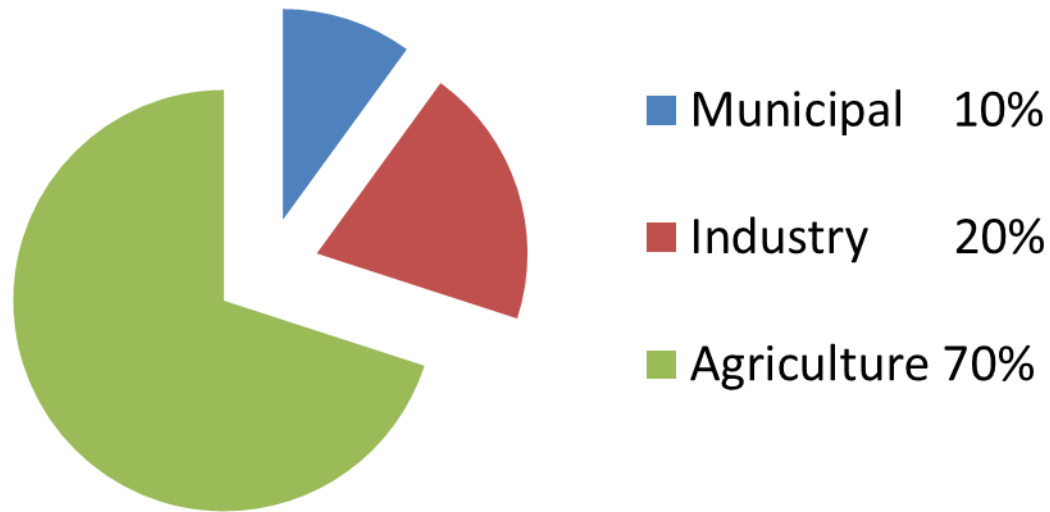
## Bathroom

- Turn off tap when cleaning teeth – saves 9 litres per minute
- Shower rather than bath – shower 50 litres, bath 100 litres
- Adjust toilet cistern, dual flush – saves 1-3 litres per flush
- Check plumbing regularly – fix dripping taps, leaks

## Garden

- Watering-can not hosepipe – hosepipe uses 500+ litres/hour
- Collect rain water in butts – better for plants

# Global Fresh Water Use



## Agriculture

- uses 70% of global freshwater from rivers, lakes, aquifers
- irrigation & pumping uses 6% of global electricity

## Solutions

- improve soil/water management, target irrigation
- improve resilience to mitigate climate fluctuations



# Chemical Contamination of Water

## Agriculture

- fertilisers – nitrates, phosphates
- pesticides – insecticides, herbicides, fungicides

## Industry

- metals – mercury, lead, cadmium, nickel
- organic – synthetic “forever” compounds (PFAs, PCBs)

## Municipal

- sewage sludge – spread on soil → leach into rivers & aquifers
- waste water – detergents, micro-plastics

## Marine

- garbage – plastics, food waste
- oil, fuels – accidental & deliberate spills

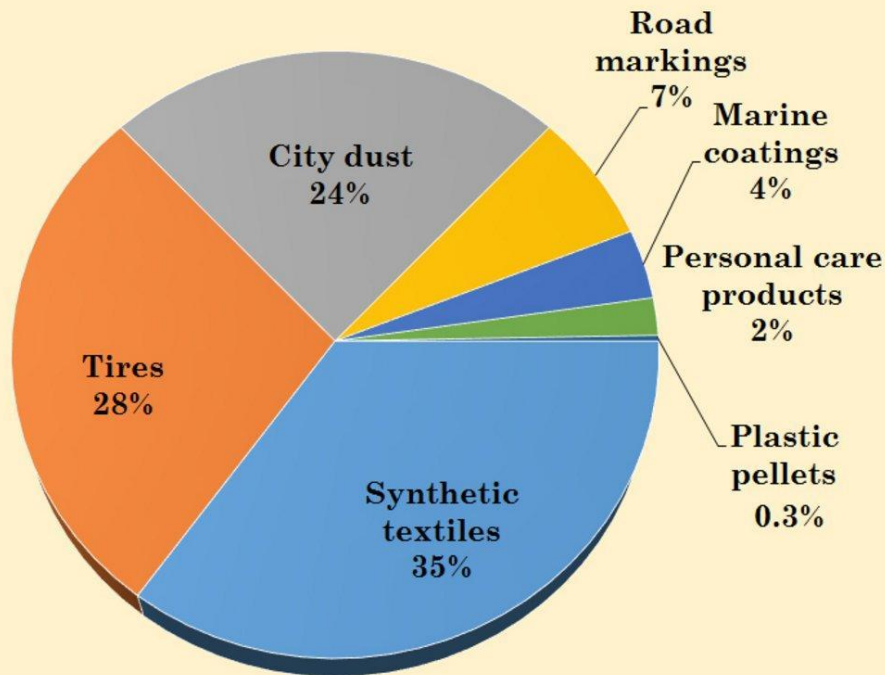
# Primary Microplastics

Primary Microplastics found:

Top of Mt Everest

Bottom of Mariana Trench

## Where do microplastics come from?



## Source of Ocean Microplastics

Synthetic textiles	35%
Car tyres	28%
City dust	24%
Road markings	7%
Marine coatings	3.7%
Personal care products	2%
Plastic pellets	0.3%

## Estimated no. of fibres released laundering washing load of 6kg

Polyester-cotton	137,951
Polyester	496,030
Acrylic	<u>728,789</u>
Total =	1,362,770

# Microbial Contamination of Water (globally)

## Bacteria

- Typhoid - fever → delirium
- Cholera - 'rice-water' stools → rapid death
- Giardia - 'eggy burps'
- Dysentery - (salmonella) diarrhoea ++
- E.Coli - rare dangerous strains
- Leptospirosis - (Weil's disease) – flu-like illness

## Viruses

- Rotavirus - common in children
- Hepatitis A - jaundice, pale stools
- Polio - flu-like illness, rarely paralysis

## Parasites

- Schistosomiasis - (bilharzia) chronic symptoms

# Effects of contaminated water

- Every minute a new-born dies from infection caused by lack of clean water - 500,000 per year (UNICEF)
- Diarrhoea caused by dirty water and poor toilets kills a child every 2 minutes (Institute for Health Metrics)
- Globally 443 million school days are lost every year due to water related illness (Human Development Report)
- Billions of hours are lost in economic opportunity
- Every £1 pound invested in water and toilets returns an average of £4 in increased productivity (WHO)

# WaSH



Wa = Water

S = Sanitation

H = Hygiene



*Breaking free from poverty is impossible without **WaSH***



# WaSH = Water, Sanitation, Hygiene

## Drinking Water

- 6 billion (75% of global population) have safe drinking water
  - located on premises, available when needed
- 2 billion people drink contaminated water
  - microbes & chemicals
- > 2 billion people live in water-stressed countries
  - Central Africa, Middle East
- Projected world population in 2050 = 10 billion
  - 50% will live in water-stressed countries
- 1 in 4 cities worldwide experiences water insecurity
  - urban water demand is projected to increase by 60% by 2050

# WaSH = Water, Sanitation, Hygiene

## Sanitation

- 3.8 billion do not have a safely managed sanitation service
- 50% household waste globally is discharged without safe treatment
- 1.7 billion do not have basic sanitation e.g. toilet, latrine
- 0.5 billion defaecate in the open e.g. gutters, bushes, rivers
- 10% of global population consume food irrigated by untreated waste water
- Women – lack of privacy, night time attacks, sexual harassment, menstrual hygiene

# WaSH = Water, Sanitation, Hygiene

## Hygiene

- Dependant on provision of clean water
  - no point washing in filthy water!
- Hand washing after toilet, before food preparation
  - prevents 50% of diarrhoeal illness and death
- Girls sent to fetch water, often long distances
  - reduced school attendance
- Education – not just knowledge about soap and water!
  - work with communities, identify barriers, change behaviours
- Promoting good hygiene is one of the most cost effective health interventions  
(World Bank)



# What is Tearfund doing?

- **Working with Communities**
  - training in and ownership of WaSH services
  - ongoing technical & managerial support
- **Working with Local Governments**
  - influencing, advocacy, policy development
  - accountability of service providers
- **Tearfund impact**
  - Yemen – 50,000 people → clean water, water filters, toilets
  - Burkina Faso – 152,000 people → clean water & sanitation
  - Brazil – 1,700 inhabitants of riverside villages → clean water

## **Thirst**

- You, God, are my God, earnestly I seek you; I thirst for you, my whole being longs for you, in a dry and parched land where there is no water (Psalm 63:1)

## **Invitation**

- Come, all you who are thirsty, come to the waters; and you who have no money, come (Isaiah 55:1)
- The Spirit and the bride say, “Come!” Let the one who hears say, “Come!” And let the one who is thirsty come, and the one who desires the water of life drink freely (Rev 22:17 )

## **Promise**

- I will pour water on the thirsty land, and streams on the dry ground; I will pour out my Spirit on your offspring (Isaiah 44:3)
- I am the Alpha and the Omega, the Beginning and the End. To the thirsty I will give water without cost from the spring of the water of life (Rev 21:6)

## **Holy Spirit**

- “Very truly I tell you, no one can enter the kingdom of God unless they are born of water and the Spirit (John 3:5)
- Let anyone who is thirsty come to me and drink. Whoever believes in me, as Scripture has said (Isaiah 58:11), rivers of living water will flow from within them. By this he meant the Spirit (John 7:37-39)
- Whoever drinks the water I give them will never thirst (John 4:14)

## **Justice & Responsibility**

- My people have committed two evils: They have forsaken Me, the fountain of living water, and they have dug cisterns for themselves, broken cisterns that cannot hold water (Jeremiah 2:13)
- If anyone gives even a cup of cold water to one of these little ones who is my disciple, truly I tell you, that person will certainly not lose their reward (Matthew 10:42)
- Let justice roll on like a river, righteousness like a never-failing stream! (Amos 5:24)

# Key Points ..... Questions?



- God is good – water is His gift, vital for plant & animal life
- Climate change → water cycle volatility → floods, droughts
- Fresh water is a finite resource – store it and use it wisely
- Water pollution from chemicals and plastics lasts for many years
- Breaking free from poverty is impossible without WaSH
- Good governance is needed for provision of safe water & sanitation
- International cooperation is key – pray for world leaders