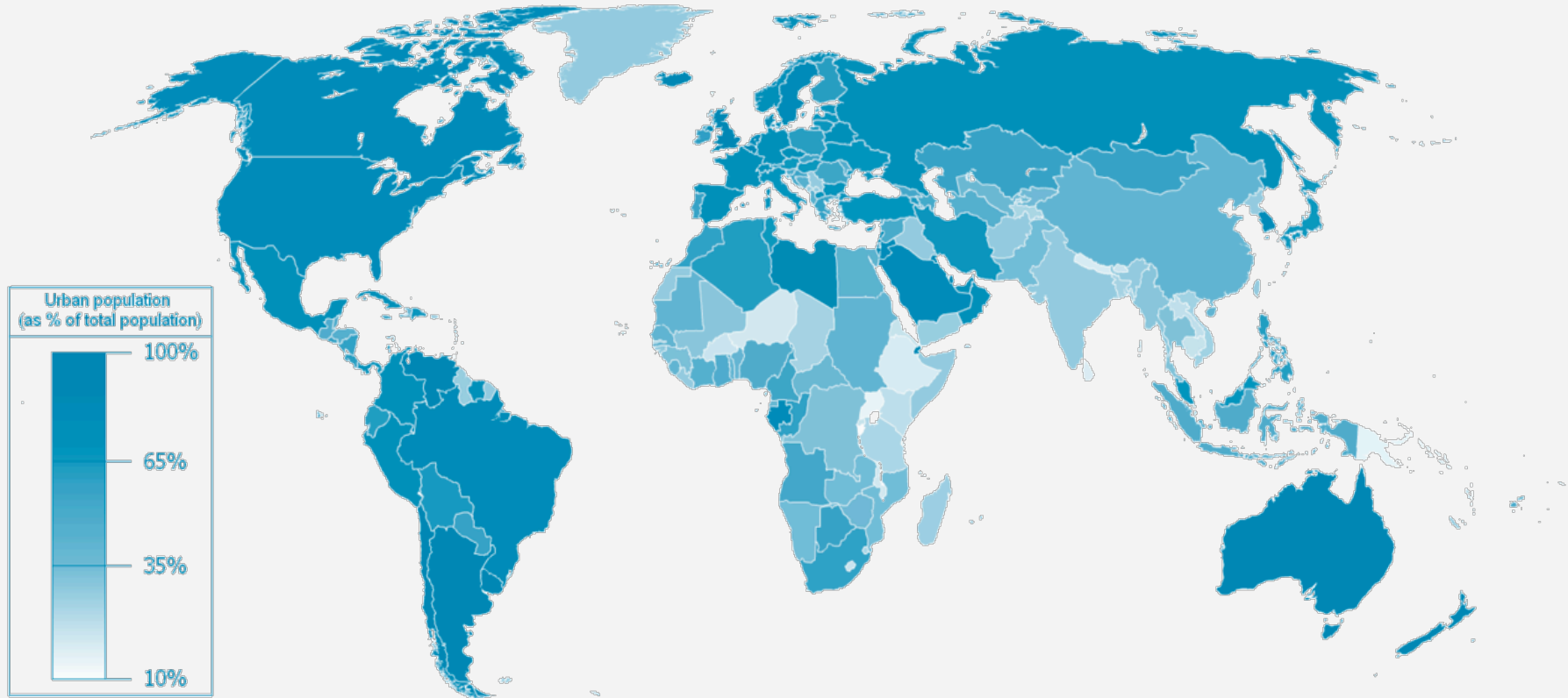


WR-2 Water for urban development

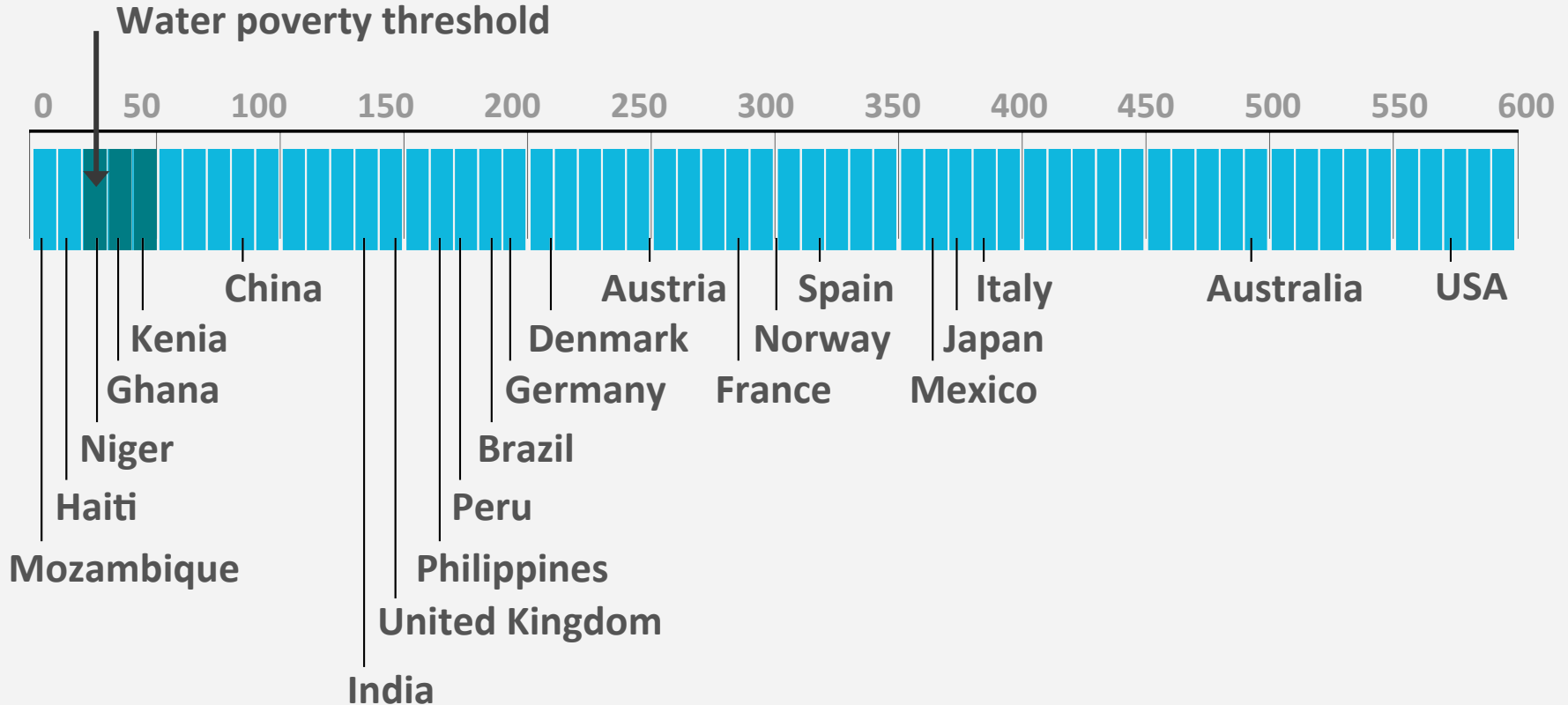
CTB3300WCx: Introduction to Water and Climate

Dr. ir. J.A.E. ten Veldhuis

>50% of world population lives in cities



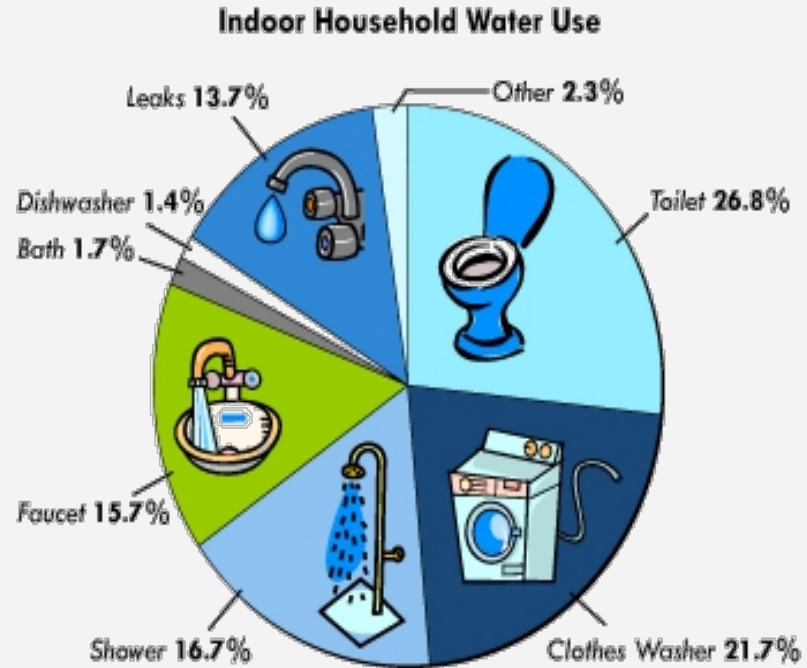
Average water use per person per day (liters)



Per capita water consumption

Domestic water consumption

- *Drinking water*
- *Bathing and showering*
- *Toilet*
- *Washing clothes and dishes*
- *Watering of garden*



Source: Awwa Research Foundation (1999)



Rotterdam



Jakarta

Rotterdam and Jakarta

- *Urban population size?*
- *Average domestic water use?*
- *Total water need?*
- *Main water source?*

Calculation: domestic water use

Rotterdam

Jakarta

Urban population

0.6 million

9.8 million

City surface area (approx.)

300 km²

700 km²

Population density

3000 / km²

15000 / km²

Avg. domestic water use

150 liters

80 liters

(per person, per day)

Total domestic water use

0.09 million m³

0.78 million m³

(per day)

Total domestic water use

33 million m³

280 million m³

(per year)

Available water sources: rainfall

Rotterdam

Jakarta

Total domestic water use
(per day)

0.09 million m³

0.78 million m³

Total domestic water use
(per year)

33 million m³

280 million m³

Average annual rainfall

850 mm

1850 mm

Available rainwater
(rainfall x surface area (m³ / year))

250 million m³ /
year

1300 million m³ /
year

Available water sources: groundwater

Rotterdam

Jakarta

Total domestic water use
(per day)

0.09 million m³

0.78 million m³

Total domestic water use
(per year)

33 million m³

280 million m³

Estimated available
groundwater resources

Not suitable

60 million m³

Available water sources: riverwater

Rotterdam

Jakarta

Total domestic water use
(per day)

0.09 million m³

0.78 million m³

Total domestic water use
(per year)

33 million m³

280 million m³

Main river

Rhine-Meuse delta

Citarum

Annual mean flow
(m³ / s)

2500 m³/s

180 m³/s

Total annual flow volume
(m³ / year)

80 billion m³

6 billion m³

Main sources for domestic water use

Rotterdam

Jakarta

Total domestic water use
(per day)

0.09 million m³

0.78 million m³

Total domestic water use
(per year)

33 million m³

280 million m³

Main source

River water

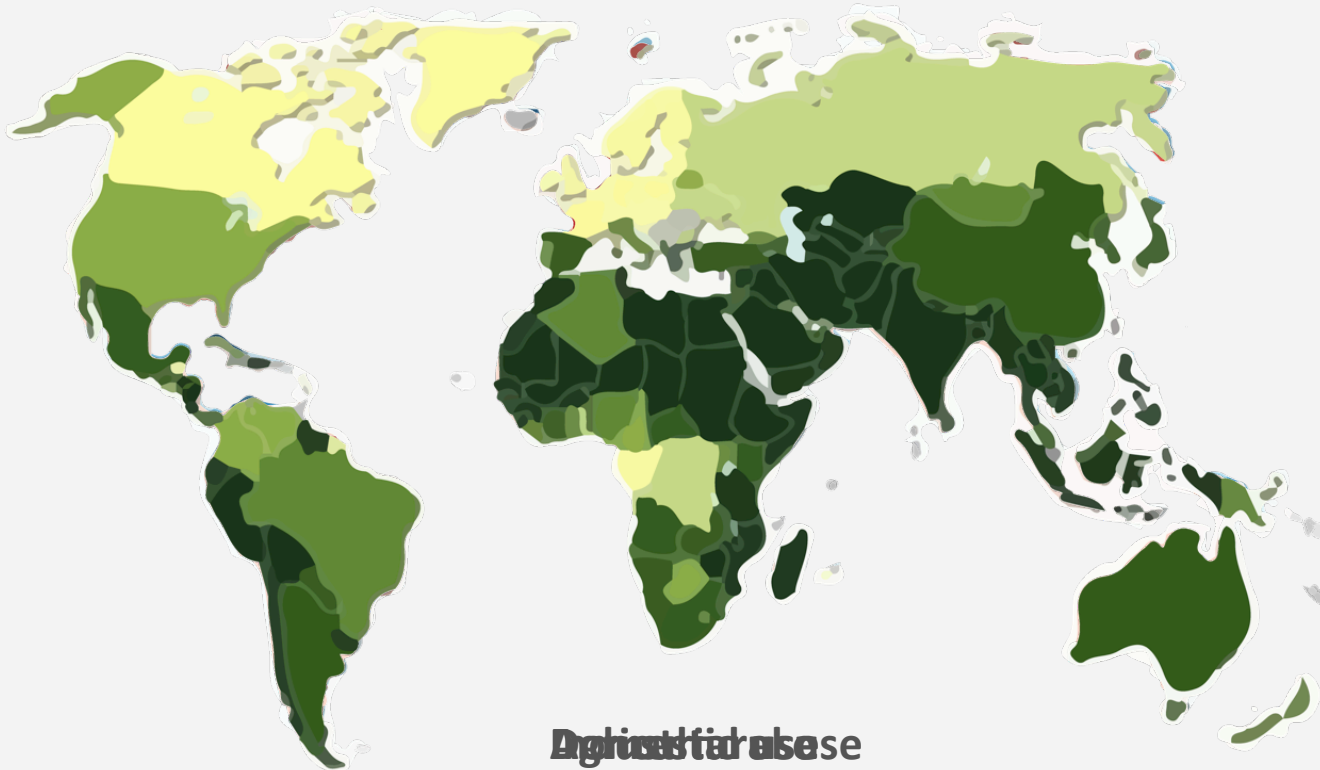
*River water,
groundwater*

**% of people connected to
central water supply system**

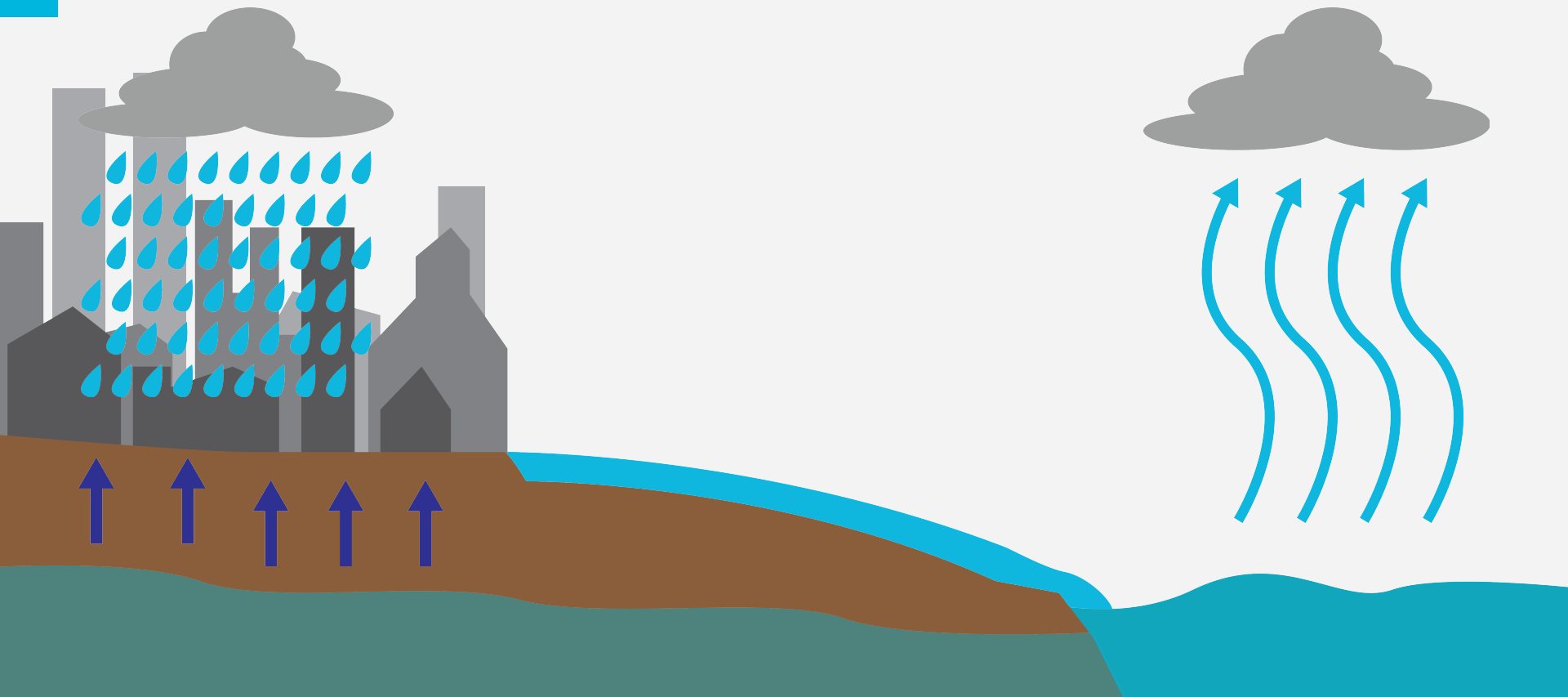
100%

30% - 60%

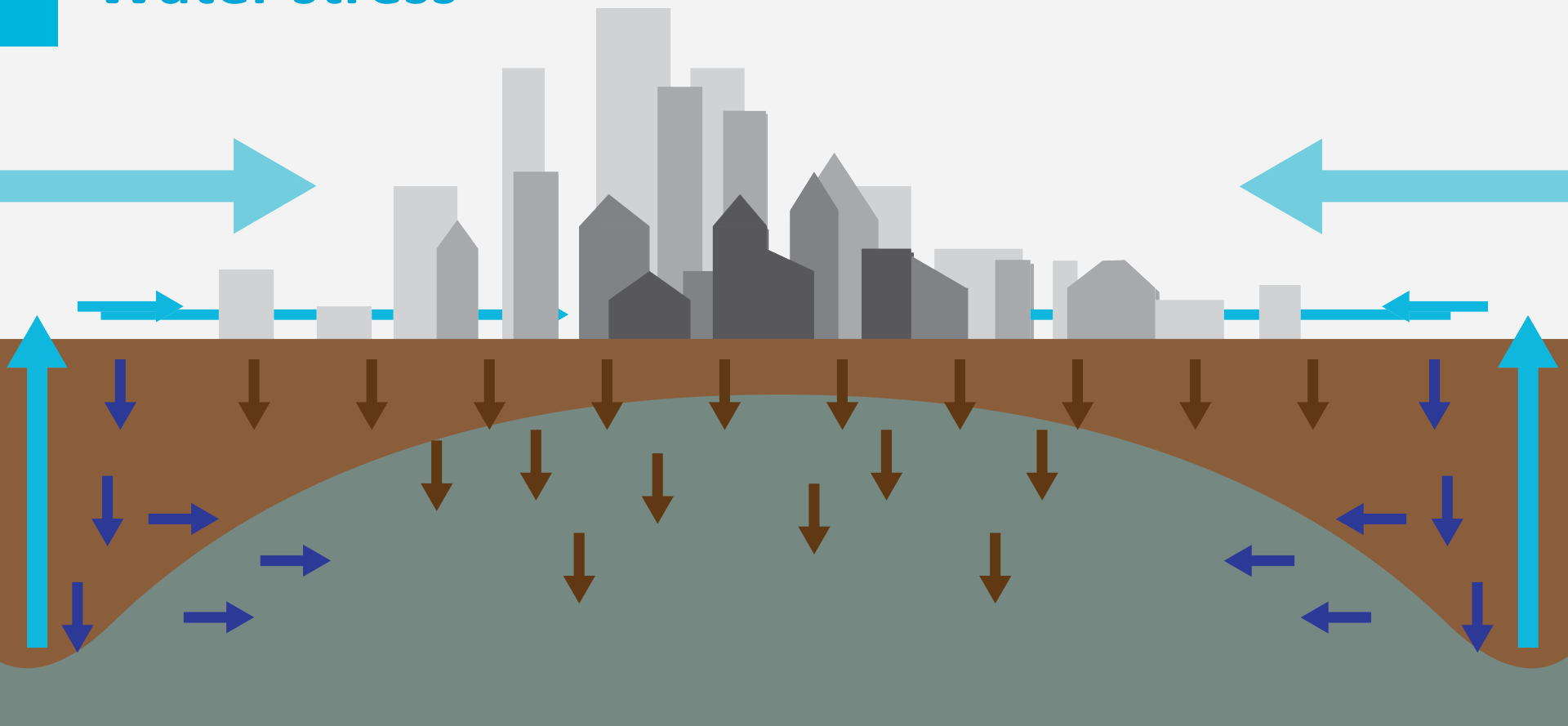
Domestic versus other water uses



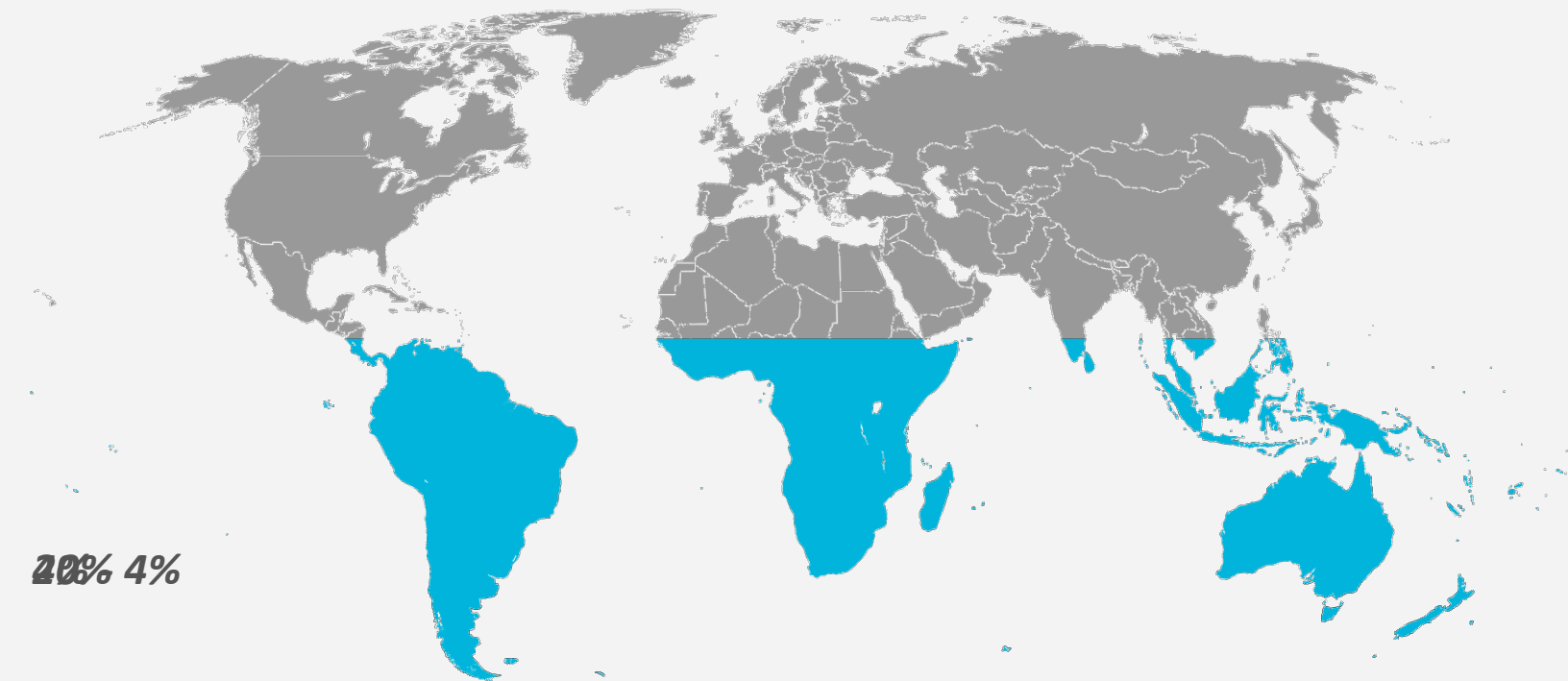
Water resources for cities



Water stress



Urban water footprint



Water infrastructure



Water infrastructure



Water for cities, sustainable solutions



WR-2 Water for urban development

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