FONDAZIONE PER LO SVILUPPO SOSTENIBILE
Sustainable Development Foundation

Green economy and blue cities

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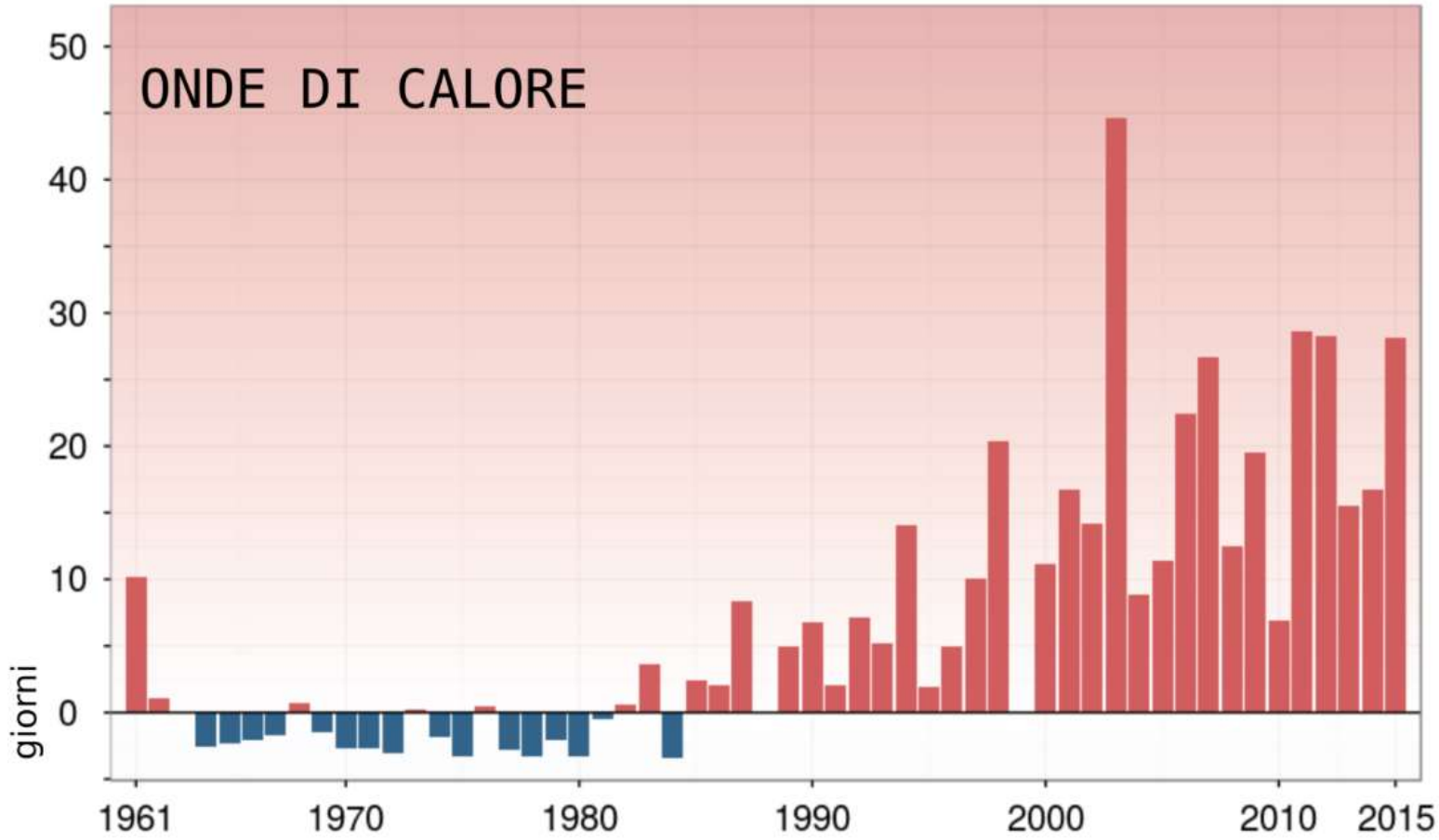
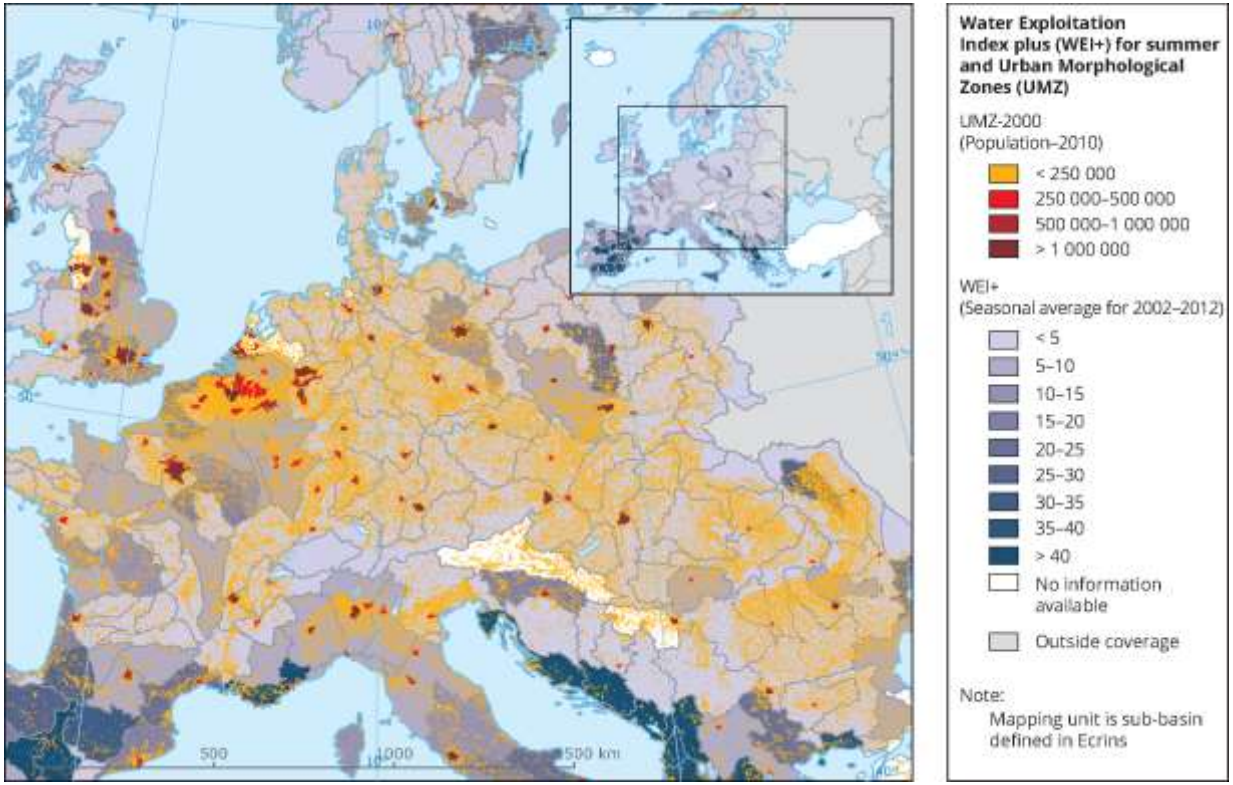
CLIMATE CHANGE and WATER

Yearly number of days with severe heat waves in Italy.
(Source: ISPRA)



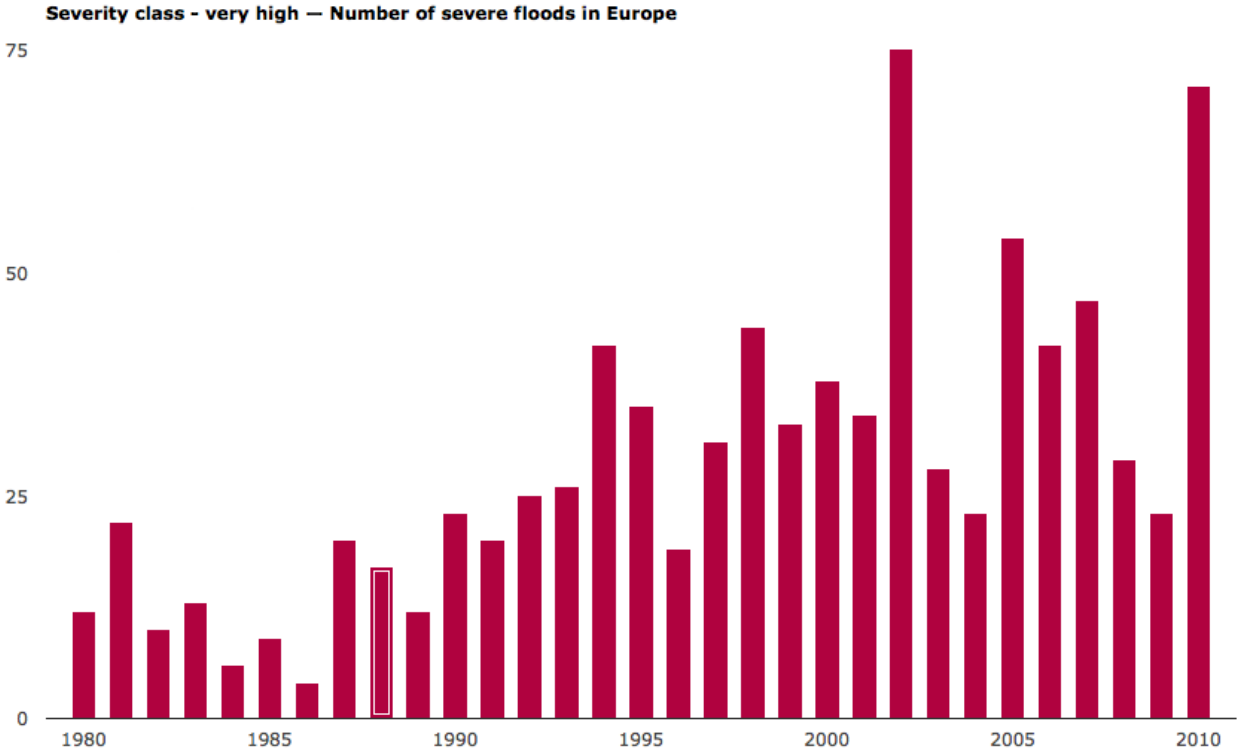
CLIMATE CHANGE and WATER

There was a 24 % decrease in renewable water resources per capita across Europe between 1960 and 2010, particularly in southern Europe. Around 40 % of the inhabitants in the Mediterranean region lived under water stress conditions in the summer of 2014. Groundwater resources and rivers continue to be affected by overexploitation in many parts of Europe, especially in the western and eastern European basins.



CLIMATE CHANGE and WATER

Almost 1.500 floods have been reported for Europe since 1980, of which more than half have occurred since 2000. Global warming is projected to intensify the hydrological cycle and increase the occurrence and frequency of flood events in large parts of Europe. Pluvial floods and flash floods, which are triggered by intense local precipitation events, are likely to become more frequent throughout Europe.

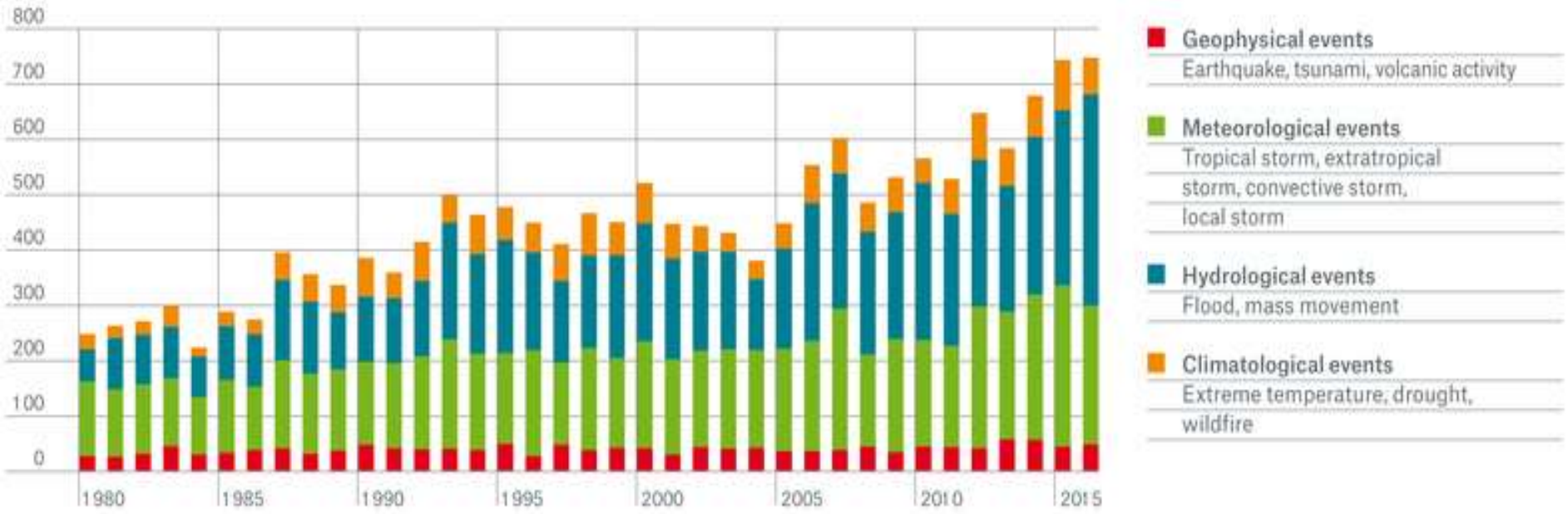


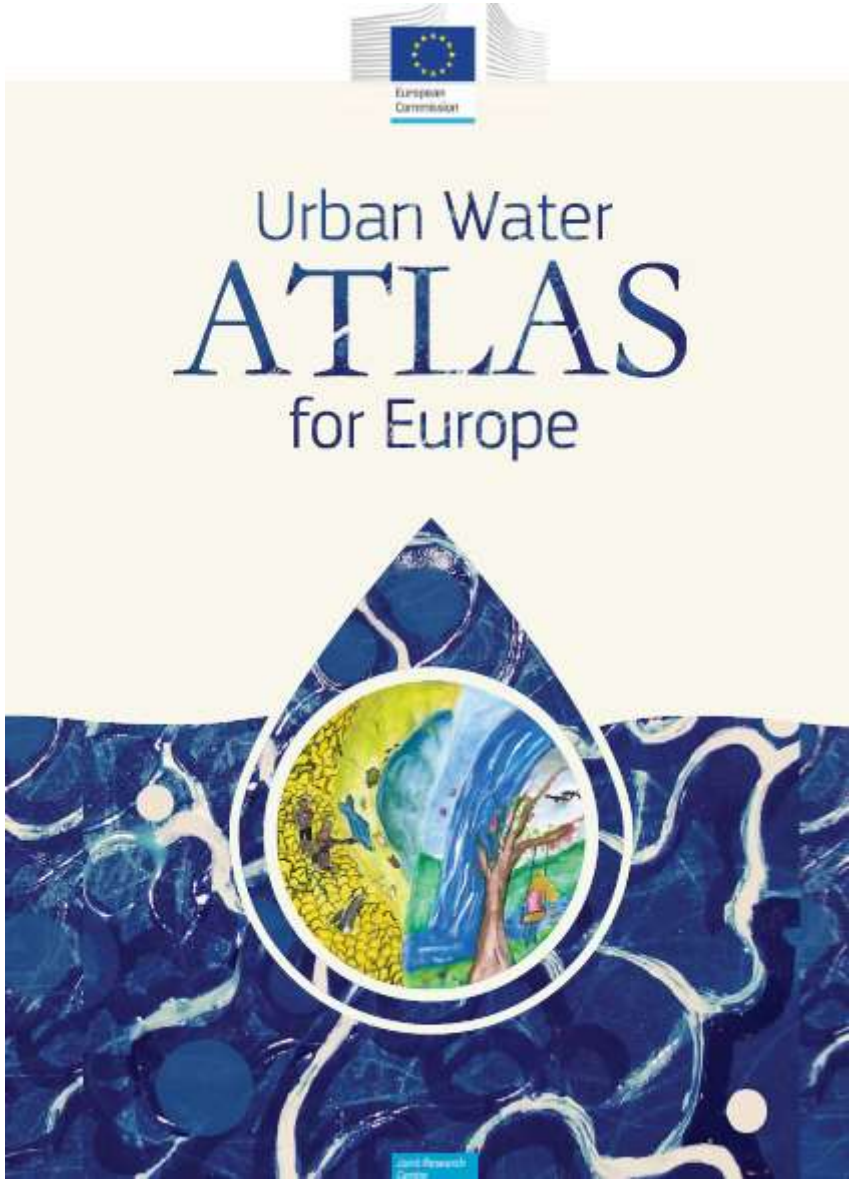
CLIMATE CHANGE and WATER

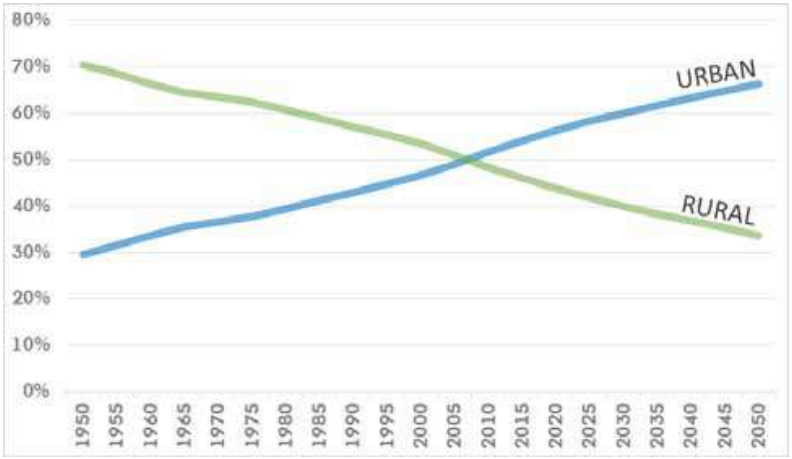
Munich Re's NatCatSERVICE recorded around 1,900 loss events in 2016. The number of hydrological events increased from 39% to 50%; in other words river flooding, flash floods and mass movement accounted for half of all relevant events worldwide in the past year.

Number of loss events 1980-2016 .

(Source: Munich RE)




European Commission
Urban Water
ATLAS
for Europe


80%
70%
60%
50%
40%
30%
20%
10%
0%
URBAN
RURAL
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050

25 INDICATORS

- Secondary WWT
- Tertiary WWT
- Groundwater Quality
- Solid Waste Collected
- Solid Waste Recycled
- Solid Waste Energy Recovered
- Access to Drinking Water
- Access to Sanitation
- Drinking Water Quality
- Nutrient Recovery
- Energy Recovery
- Sewage Sludge Recycling
- WWT Energy Efficiency
- Average Age Sewer
- Operation Cost Recovery
- Water System Leakages
- Stormwater Separation
- Green Space
- Climate Adaptation
- Drinking Water Consumption
- Climate Robust Buildings
- Management and Action Plans
- Public Participation
- Water Efficiency Measures
- Attractiveness

BLUE CITY INDEX: AMSTERDAM

AMSTERDAM

CITY BLUEPRINT©

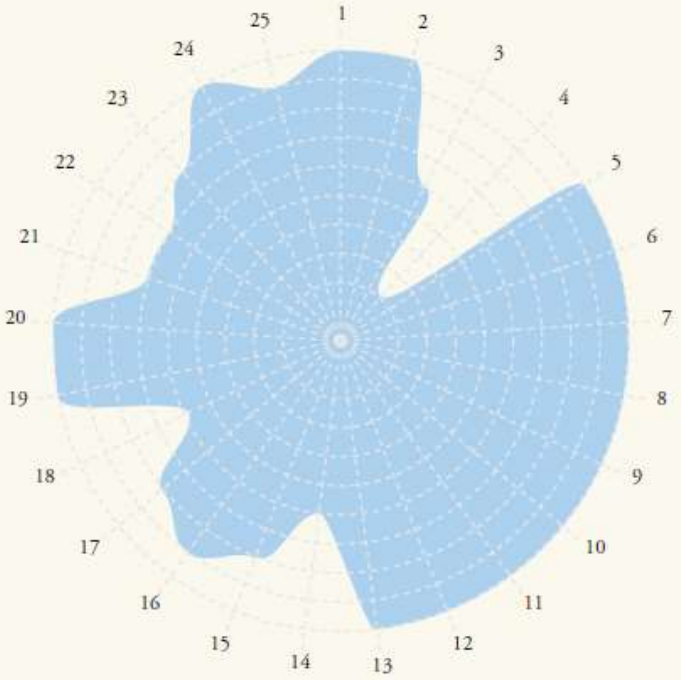
Amsterdam is a leading city, especially with regard to wastewater treatment and climate change adaptation. However, there is room for improvement, for example in reducing solid waste production.

The BCI (Blue City Index) **is 8.3**

The range of the scores varies from 0 (centre of the circle) to 10 (periphery of the circle).

The Blue City Index is **8.3**

derivative reproduction from original CITY BLUEPRINT (TM)



Nr.	Indicator	Score
1	Secondary WWT	9.9
2	Tertiary WWT	9.8
3	Groundwater Quality	5.1
4	Solid Waste Collected	1.6
5	Solid Waste Recycled	9.8
5	Solid Waste Energy Recovered	9.7
7	Access to Drinking Water	10.0
8	Access to Sanitation	10.0
9	Drinking Water Quality	10.0
10	Nutrient Recovery	9.9
11	Energy Recovery	9.9
12	Sewage Sludge Recycling	9.9
13	WWT Energy Efficiency	10.0
14	Average Age Sewer	5.4
15	Operation Cost Recovery	8.5
16	Water System Leakages	8.9
17	Stormwater Separation	8.3
18	Green Space	5.9
19	Climate Adaptation	10.0
20	Drinking Water Consumption	9.8
21	Climate Robust Buildings	7.0
22	Management and Action Plans	7.0
23	Public Participation	8.1
24	Water Efficiency Measures	10.0
25	Attractiveness	9.0

BLUE CITY INDEX: AMSTERDAM

WATER BASICS

Amsterdam lies two metres below sea level. The surrounding land is flat, being formed of large polders (low-lying land protected by dykes). A manmade forest, Amsterdamse Bos, is situated south-west of the city. Amsterdam is connected to the North Sea through the long North Sea Canal, and is itself home to more than one hundred kilometres of canals, most of which are navigable.

Annual average rainfall (mm)	810
Daily average air temperature (°C)	10.0
% of blue and green area	34.9
% of soil sealed	45.4
% flooded by 1-m sea level-rise	94.2
% flooded by 1-m river level-rise	69.7

THE NETHERLANDS

PROJECTED

DRINKING WATER

Amsterdam's drinking water originates from lowland surface water (88%) and groundwater (12%), achieving 100% population coverage. The per capita water consumption of 50 m^3 per person per year, is among the lowest in Europe. The quality of supplied water is excellent. The water supply network totals 3 098 km, with an average age of 26 years. The number of pipe failures is very low (0.839 per 100 km) as are the water losses (5.4%).

% of drinking water samples complying with drinking water regulation	100
% urban population with access to potable drinking water	100
% leakage rate water distribution system	5.4
Drinking water consumption (m^3/cap/year)	49.6
Drinking water consumption (litres/cap/day)	138

WASTEWATER

Amsterdam has both combined sewers and separate sanitary sewers and stormwater sewers. The wastewater energy costs are €1.1 million per year, including energy recovery from wastewater, but with no nutrient recovery. A national law forbids the application of sewage sludge in agriculture due to heavy metals and other persistent pollutants, so all sludge is thermally treated.

% population connected to at least secondary wastewater treatment	99.3
% population connected to tertiary wastewater treatment	98.1
% wastewater treated with nutrient-recovering techniques	100
% wastewater treated with energy-recovering techniques	100
Average age of sewer (years)	28
% sewer with separated stormwater and sanitary water	82.9

Hipster Bike on Bridge.
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DROUGHT STATUS: 2012 - 2015

- Number of stress incidents related to drought
- Number of normal events
- Partial recovery after

BLUE CITY INDEX: GENOVA

GENOA

CITY BLUEPRINT©

Genoa has an advanced wastewater treatment system, low levels of drinking-water consumption and largely separates stormwater. Solid waste treatment, infrastructure refurbishment and climate change adaptation plans need further attention.

The BCI (Blue City Index) **is 4.9**

The range of the scores varies from
0 (centre of the circle) to
10 (periphery of the circle).

The Blue City Index is **4.9**

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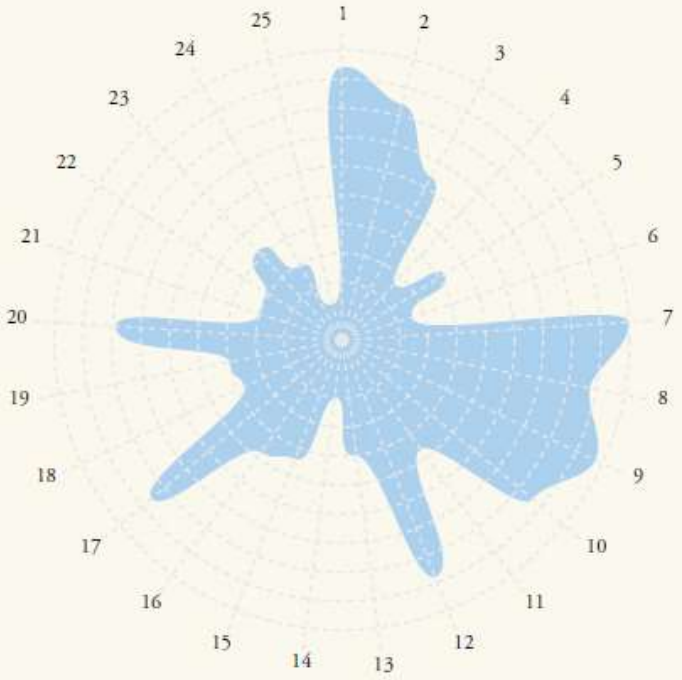

Nr.	Indicator	Score
1	Secondary WWT	9.4
2	Tertiary WWT	8.4
3	Groundwater Quality	5.5
4	Solid Waste Collected	2.7
5	Solid Waste Recycled	4.1
6	Solid Waste Energy Recovered	2.6
7	Access to Drinking Water	10.0
8	Access to Sanitation	8.9
9	Drinking Water Quality	9.8
10	Nutrient Recovery	8.7
11	Energy Recovery	4.7
12	Sewage Sludge Recycling	8.8
13	WWT Energy Efficiency	4.0
14	Average Age Sewer	2.0
15	Operation Cost Recovery	4.3
16	Water System Leakages	4.8
17	Stormwater Separation	8.7
18	Green Space	3.8
19	Climate Adaptation	4.0
20	Drinking Water Consumption	8.0
21	Climate Robust Buildings	3.0
22	Management and Action Plans	3.0
23	Public Participation	4.2
24	Water Efficiency Measures	3.0
25	Attractiveness	1.0

BLUE CITY INDEX: GENOVA

WATER BASICS

Genoa is challenged with observed changes in climate-driven events: long periods without rain and an increased frequency of flash floods. Genoa and the Liguria region experienced many flooding events in the past ten years.

The water system was designed for more stable climate conditions and less advanced urban development, and is suitable for contemporary conditions and increased variability.

Annual average rainfall (mm)	1 072
Daily average air temperature (°C)	15.6
% of blue and green area	28.2
% of soil sealed	53.9
% flooded by 1-m sea-level rise	0.0
% flooded by 1-m river-level rise	23.5

ITALY

PROJECTED FLOOD RISK

DRINKING WATER

Genoa obtains its drinking water from multiple sources, the most important being surface water from the surrounding hills, such as the Brugneto basin. Other important sources are from groundwater.

The drinking water is considered to be of medium to high quality. It requires little treatment, except in the historic centre of the city where the quality is at greater risk due to the age of the infrastructure.

% of drinking water samples complying with drinking water regulation	98
% urban population with access to potable drinking water	100
% leakage rate water distribution system	25.9
Drinking water consumption (m^3/cap/year)	89.6
Drinking water consumption (litres/cap/day)	249

WASTEWATER

Genoa's 1 027-km-long sewer system comprises a total of nine wastewater treatment plants, with eight on the coast. The entire system is controlled remotely with a network of sensors and monitoring mechanisms. As in many older urban areas, it has mostly a combined wastewater system (mixing sewage and stormwater run-off), which puts greater pressures on treatment plants after heavy rains. Some rainwater is discharged directly into the sea.

% population connected to at least secondary wastewater treatment	94.0
% population connected to tertiary wastewater treatment	84.0
% wastewater that is treated with nutrient-recovering techniques	93.0
% wastewater that is treated with energy-recovering techniques	50.0
Average age sewer (years)	50
% sewer with separated stormwater and sanitary water	87.1

View of Genoa, port city in northern Italy.
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DROUGHT STATUS: 2012 - 2015

- Number of stress incidents related to drought
- Number of normal events
- Partial recovery after a drought episode

Thanks very much!

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