



ADAPTATION & RESILIENCE OF THE EUROPEAN BUILT ENVIRONMENT TO NEW CHALLENGES AND THREATS

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ATMOSPHERIC CARBON DIOXIDE DEPARTURES FROM THE 18TH CENTURY AVERAGE

1750

1960

2020

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ARTIC SEA ICE MINIMUM EXTENT



Source: National Snow and Ice Data Center

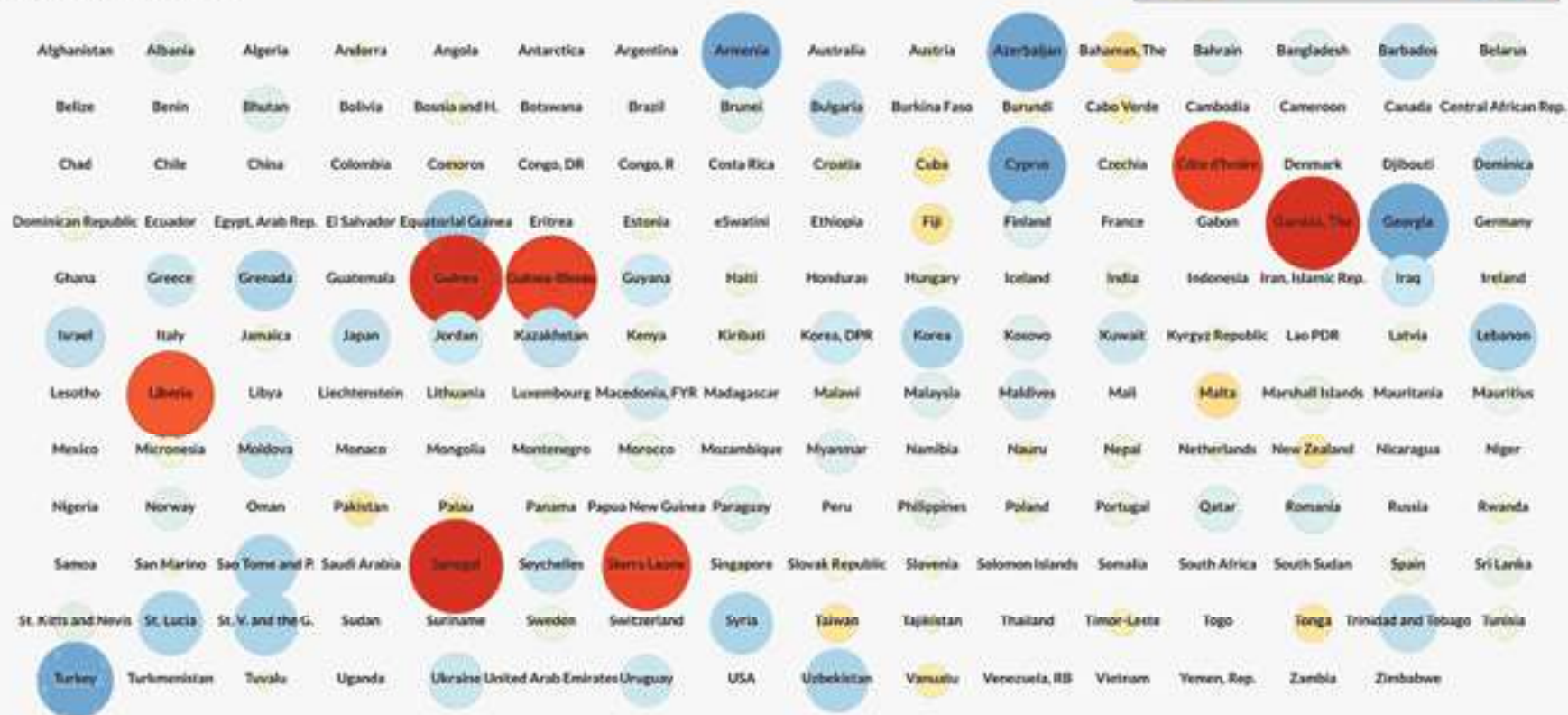
BBC

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TEMPERATURE ANOMALIES

Temperature Anomalies by Country Years 1880 - 2017

1880



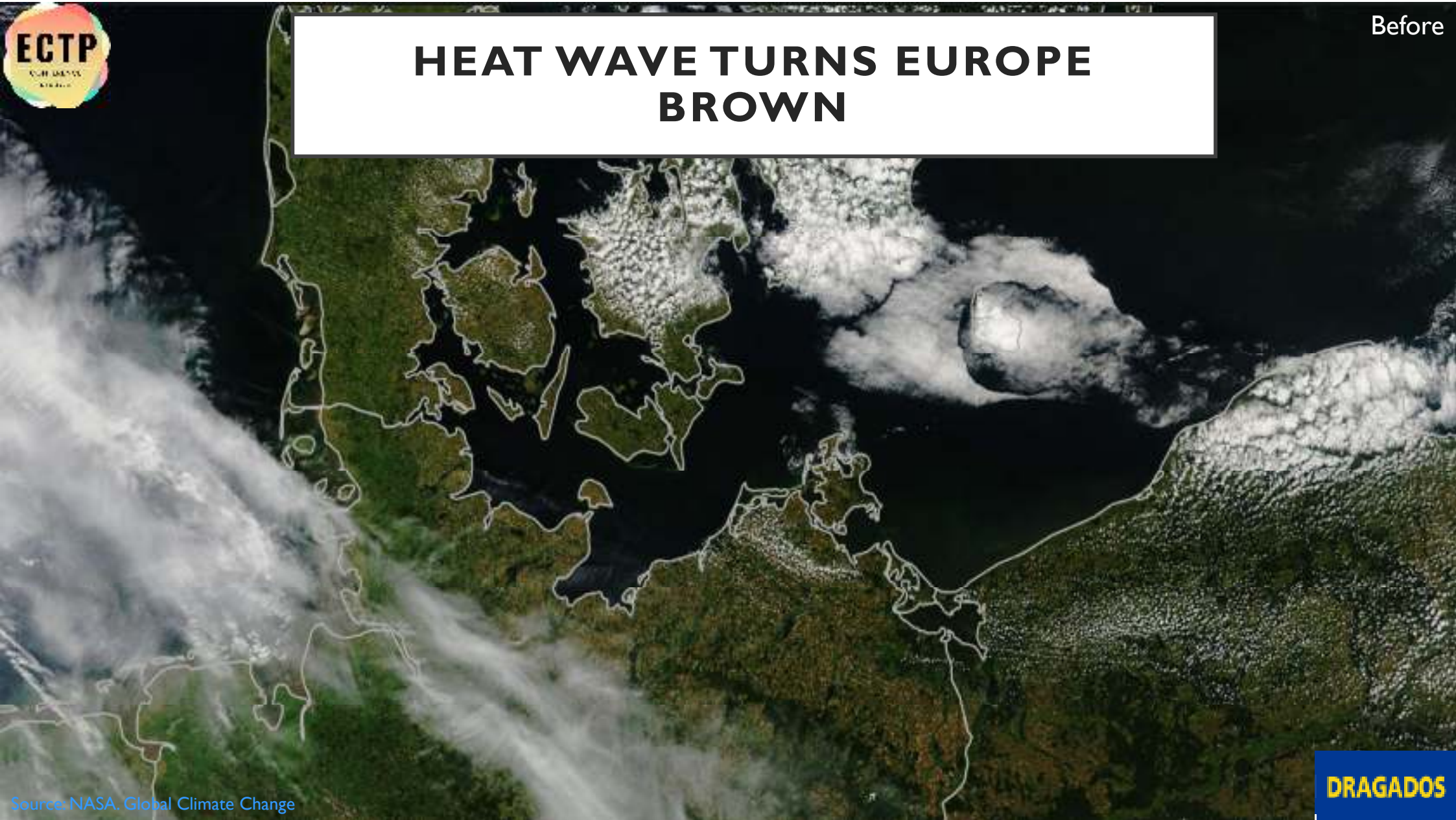
Data Source:
NASA GISS, GISTEMP Land-Ocean Temperature Index (LOTEI), ERSSTv5, 1200km smoothing
<https://data.giss.nasa.gov/gistemp/>
Average of monthly temperature anomalies, GISTEMP base period 1951-1980.

Video license: CC-BY-4.0
Antti Lipponen (@anttilip)



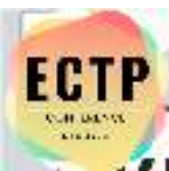
HEAT WAVE TURNS EUROPE BROWN

Before

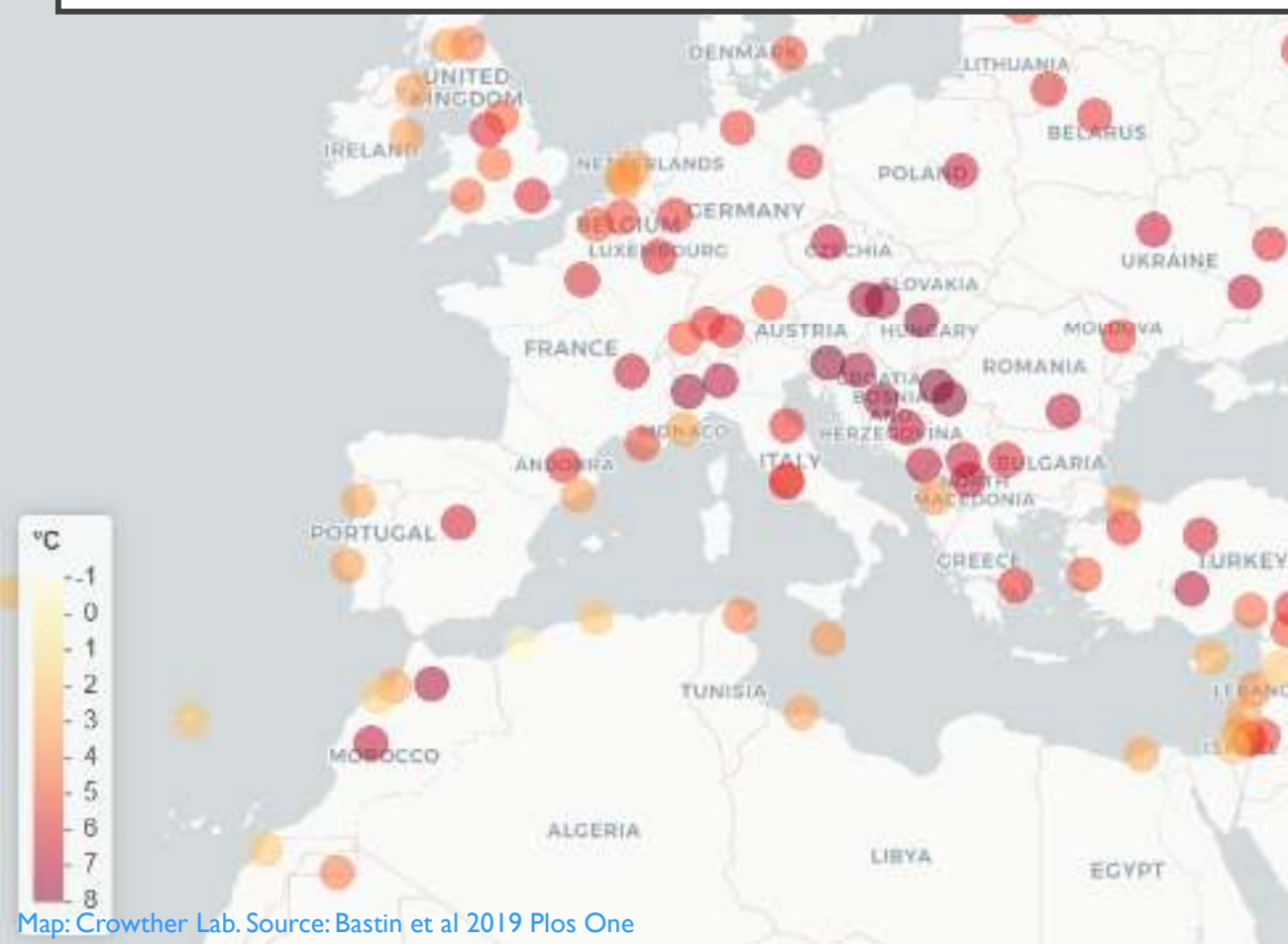


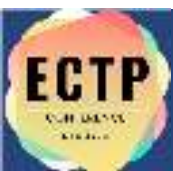
Source: NASA. Global Climate Change

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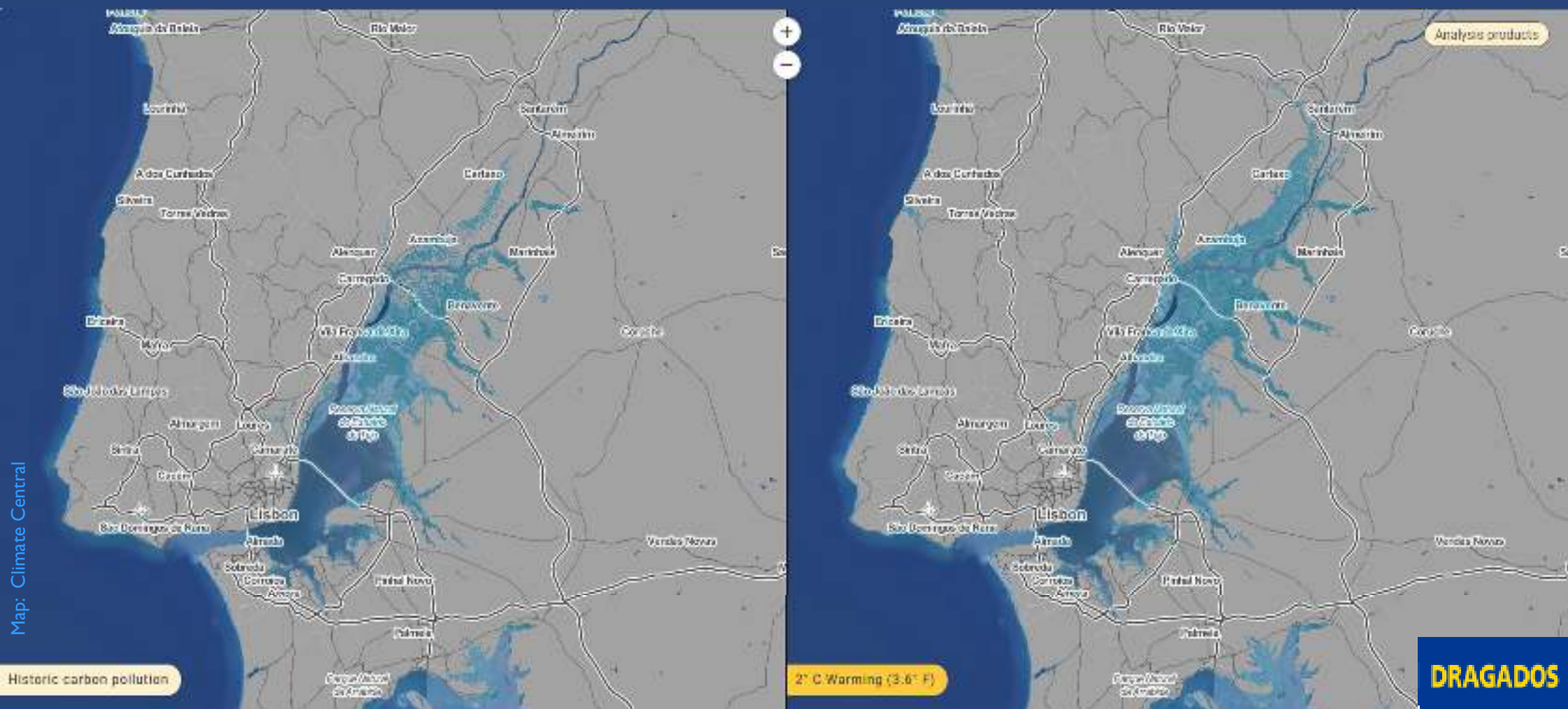


VISUALIZATING CLIMATE CHANGE: MADRID IN 2050





WHICH SEA LEVEL WILL WE LOCK-IN?





#1 source
of air pollution
is traffic.

9 in 10
people
worldwide live
in areas of
high-particle
pollution.

1/3
of C40 cities'
emissions
come from
transport.

**650
million** city
residents will
face water
scarcity in
2050.

6 million
premature
deaths per
year are due
to poor air
quality.

1.6 billion
city residents
will face
extreme heat
by 2050.

98 %
of C40 cities
have already
faced severe
climate
threats

75 %
of all energy
consumption
occurs in
cities.

**60 % of
emissions**
of C40 cities
come from
buildings and
industries

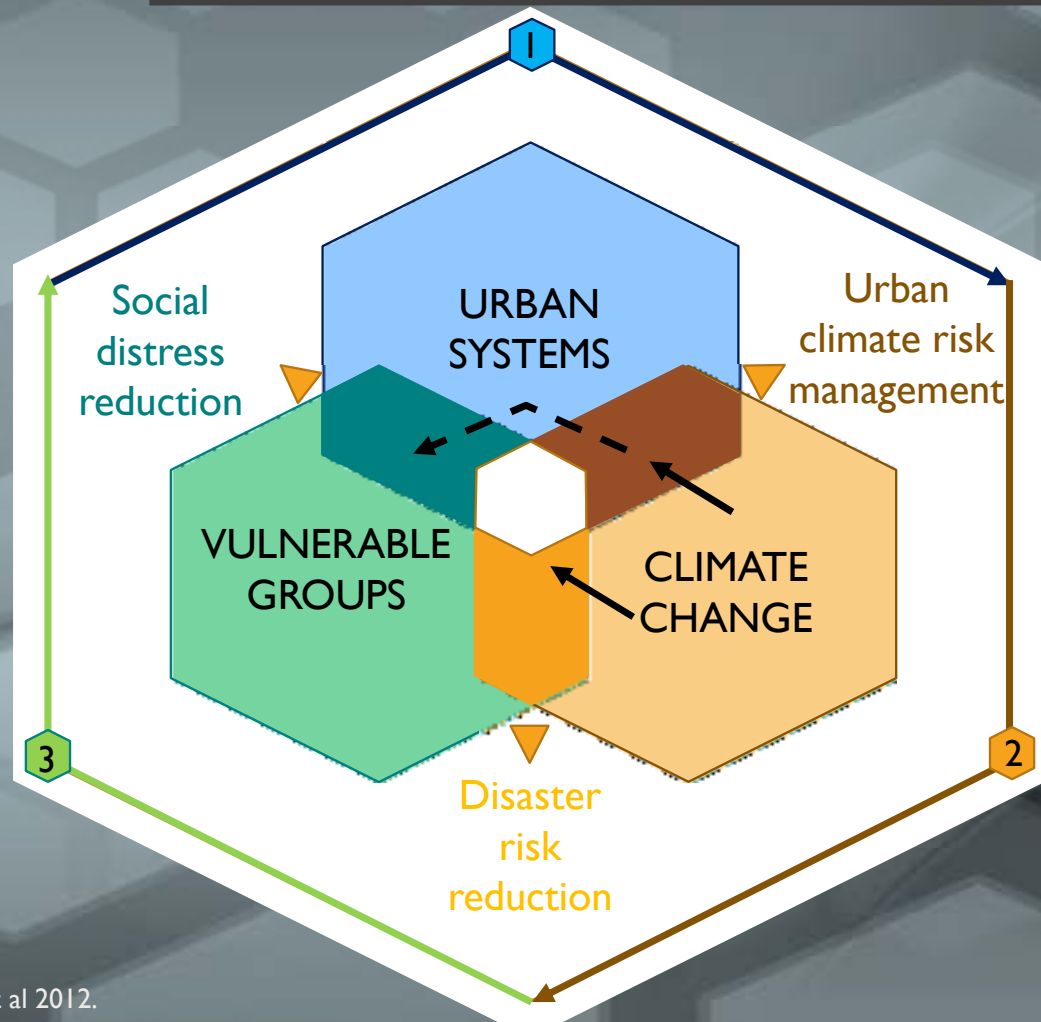
TITLE OF CITY CLIMATE RELATION



THE ROLE OF CITIES IN RELATION TO CLIMATE CHANGE

“As the majority of future humans will live in cities, it just makes sense that our solution to climate change will reside there too” ~ C40 Cities website.

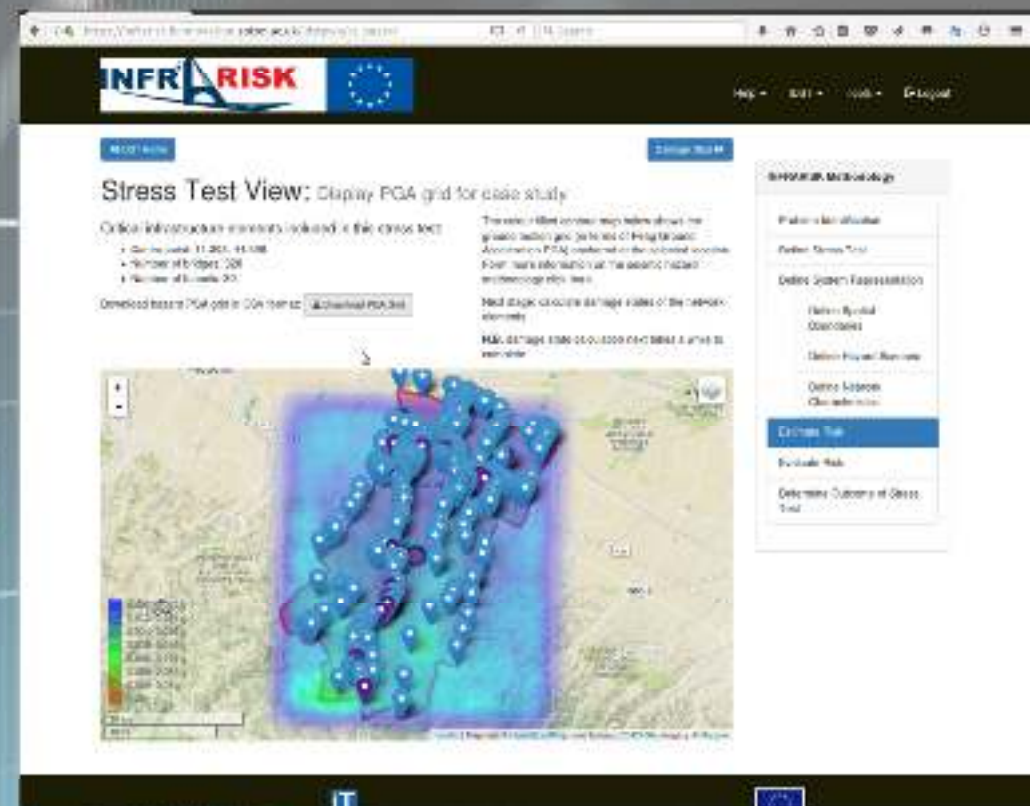
MAINTAINING ESSENTIAL URBAN FUNCTIONS



- 1 How does the city work?
- 2 Who is least able to respond to shocks and stresses?
- 3 What are the direct and indirect impacts of climate change?

Direct impact

Indirect impact





ADAPTING: WATER SQUARE IN ROTTERDAM



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ADAPTING: STORMWATER ATTENUATION TANK IN MADRID

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ABATING: BICYCLE GARAGE THE HAGUE PROVIDES 8,000 CYCLISTS WITH ROOM TO PARK IN "MUSEUM-LIKE" SPACE





The Adaptable Road

ABATING: INFRASTRUCTURE THAT REDUCES EMISSIONS

Porous, low noise surfacing, light reflecting for night time driving.

Adaptable/ removable communication channels for lane control, traffic monitoring, driver information and condition monitoring.

Pre-fabricated inter-locking, sub-base with integrated drainage, services and communications channels.

In-built sensors for traffic monitoring/control and condition monitoring.

In-built lane control/vehicle guidance.

In-built power system for electric vehicles.

Removable/self-cleaning drainage reservoirs feeding carbon capture planting.

Adaptable/removable communication/power channels for lane control, traffic monitoring, driver information and condition monitoring.

Low carbon sub-base and pavement.

Pre-fabricated inter-locking, sub-base with integrated drainage, services and communications channels.

Energy harvesting grid and storage/use of solar energy to power lighting, signs and sensors.

In-built system for replacing and adding lanes/infrastructure, eg barriers, signs and sensors.



ABATING: ADOPTING SOLUTIONS THAT REDUCE EMISSIONS

LINEAR ECONOMY

Raw Materials

Production

Use

Non-recyclable waste

REUSE ECONOMY

Raw Materials

Production

Use

Non-recyclable waste



CIRCULAR ECONOMY

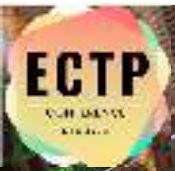
Raw Materials

Production

Use



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ABATING: ADOPTING SOLUTIONS THAT REDUCE EMISSIONS



Source: The Lancet - Integrating solutions to adapt cities for climate change

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QUESTIONS FOR TODAY

- 1) THE FUTURE BUILT ENVIRONMENT IN RESPONSE TO CLIMATE CHANGE MITIGATION AND ADAPTATION*
- 2) THE NEW USE OF THE CITY, BUILDINGS AND INFRASTRUCTURES IN THE GREEN AND DIGITAL CONTEXT*
- 3) THE ROLE OF THE CONSTRUCTION INDUSTRY TOWARDS A MORE RESILIENT, HEALTHY AND SAFE BUILT ENVIRONMENT*