

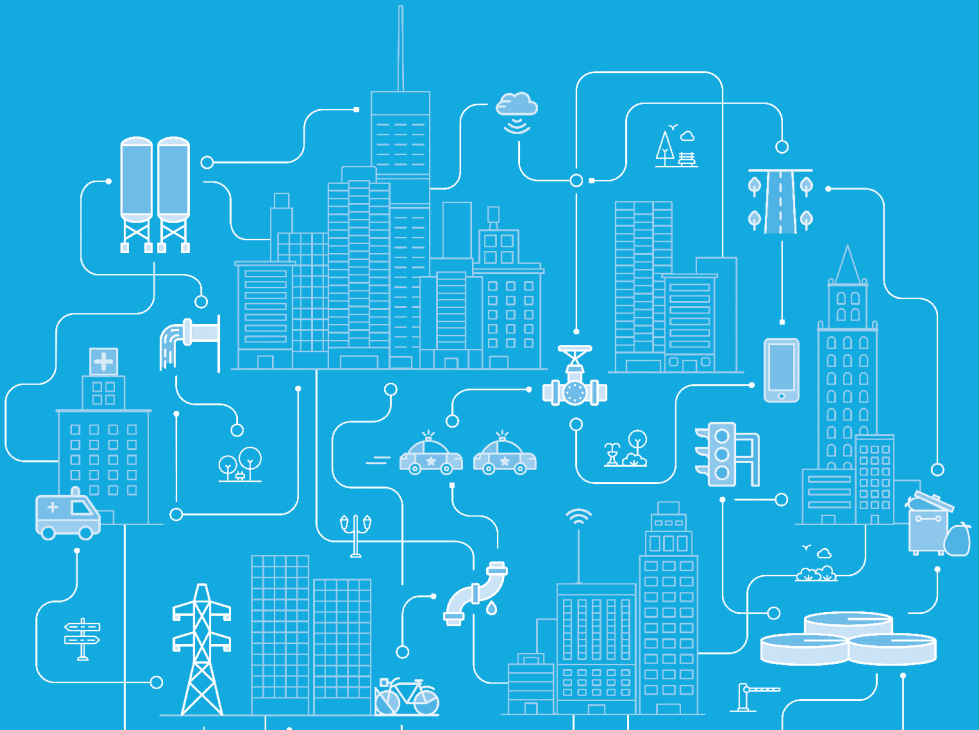


RESILIENT CITIES FACING
CLIMATE CHANGE



HOW TO...

use climate scenarios for analysing climate- related impacts in cities



WHAT IS YOUR PROBLEM?

What climatic phenomenon affects your area?

Select the climate variables whose extreme events affect you:

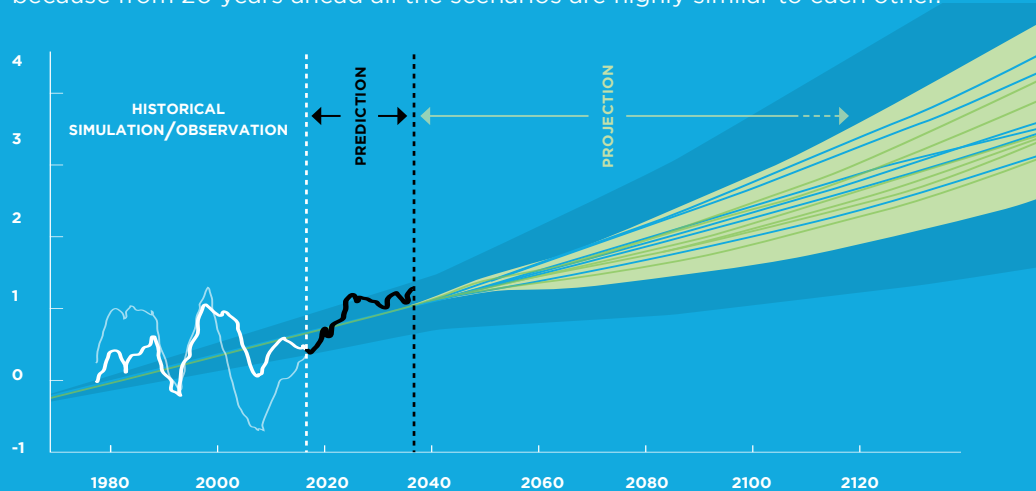


How does it affect?



Prediction vs Projection

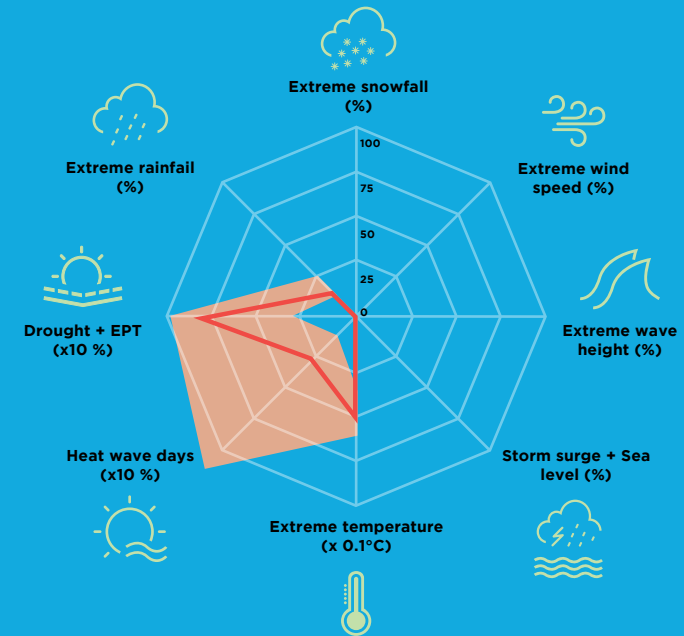
Emission scenarios come from possible political decisions so, in the long term, it does not make sense to talk about climate predictions or the most likely scenario. Only in the near term, at the decadal scale or lower, the prediction term is appropriate, because from 20 years ahead all the scenarios are highly similar to each other.



Example of climate predictions (2018-2038) and climate projections (2038-2100) according to a set of model outputs and compared to observations and historical experiments (1978-2018).

WHAT BENEFITS WOULD YOU ACHIEVE?

- ✓ **Highly detailed scenarios**
Local/regional scenarios for the derived variables.
- ✓ **With high confidence level**
An ensemble of "possible futures" allows to estimate the certainty level accurately.
- ✓ **Adapted to your situation**
The simulation of the derived variables should be understandable, valuable and usable according to the users' specific requirements.
- ✓ **With high quality**
Simulations should also be valid and reliable, thanks to the downscaling method and the whole strategy.



Example of climate change results for a city in the period 2015 to 2100, where the center represents a zero change and the edges represent an increase of 100% with respect to the derived variables to be predicted. The line represents the middle scenario, while the shaded area represents the area of uncertainty.

RESCCUE SOLVES YOUR PROBLEMS

THIS IS HOW!

✓ What is your problem?

Where does it affect?

- It is a regional problem
- It only affects a small location

How long does it last?

- It is a very short phenomenon
- It lasts several days

When does it occur?

- It is a current problem
- It is a possible future problem

It is important to deliver high-quality information:
understandable, valuable, usable, valid and reliable.

What is your time frame?

- Days
- Weeks
- Months
- Years
- Decades

✓ What can you use?

Information types: predictions or projection

- 1 day - 1 week (Weather forecast*)
- Several weeks - 1 decade (climate anomalies PREDICTION)
- Several decades - 1 century (climate PROJECTION)

How many models?

Minimum three, but the more the better.
The ensemble strategy allows to estimate confidence intervals.

How many RCP scenarios?

Advisable to use at least RCP4.5 and RCP8.5**, and combine with several climate models. ⚠️ Emission scenarios are political wills. i.e. there IS NOT the most probable one.

Downscaling:

Scaling spatial and temporal features using dynamical and/or statistical techniques.

✓ What should you do?



Find historical references

Use high-quality observed data as a reference.



Obtain derived variables

Use tools/models fed by climate simulations in order to obtain derived variables as flood level, water quality, etc.



Identify exceeding thresholds

Identify the hazard thresholds according to observed damages in the past and apply them to the simulated variables.



Estimate impacts


Estimate the negative effects on your sector.



Achieve confidence level

Analyse all possibilities of predictions/projections, and sort them to estimate an interval of frequency cases.

What can you use to know that?

WHAT IS YOUR TIME FRAME?	WHAT CAN YOU USE?	WHAT CAN'T YOU USE?
One hour	✓ Deterministic weather forecast	<div style="text-align: center;">  Deterministic climate projection (unique simulation) </div>
One week	✓ Probabilistic weather forecast	
A few months	✓ Ensemble seasonal forecast	
A few years	✓ Ensemble decadal prediction	
A few decades	✓ Ensemble decadal prediction ✓ Ensemble climatic projection	
Mid and late century	✓ Ensemble climate projection	

* Not covered by RESCCUE.
** Minimum the worst in each case (not necessarily the higher RCP)

SETTING THE STAGE: CLIMATE CHANGE AND EXTREME EVENTS SCENARIOS

Use these guidelines to:

Create local climate change scenarios

Local scenarios integrate information on global climate models and local observations. They serve as input for impact modelling in each urban sector.

Climate change scenarios were generated for the three RESCCUE cities according to different climate variables to be considered in the risk assessment, so the adaptation measures can be implemented. To reduce the uncertainty level, a great set of climate scenarios was used.

Results showed an increase of mean temperature and heat waves, changes in rainfall concentration and in the extremes of sea level and wave height, among others.

5 steps to your solution:

- ✓ What is your problem?
- ✓ What benefits should you achieve?
- ✓ What do you need to know?
- ✓ What can you use?
- ✓ What should you do?



RESCCUE Project

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Climate change and extreme events scenarios experts:

Several RESCCUE partners worked together under the leadership of FIC to identify the climate change drivers and related extreme events and to generate the climate scenarios for Barcelona, Lisbon and Bristol:

- FIC (Climate Research Foundation)
- Aquatec - Suez Advanced Solutions
- Cetaqua (Water Technology Centre)
- Opticits
- LNEC (Laboratório Nacional de Engenharia Civil)
- EDP Distribuição Energia
- Ajuntament de Barcelona
- Câmara Municipal de Lisboa
- Bristol City Council



FIC (Climate Research Foundation) was responsible for generating all the climatic, decadal and seasonal scenarios to be used in a common way in the three cities of RESCCUE.

FIC offers simulation and climate prediction services on a local scale, including seasonal prediction, obtaining specific derived variables according to the requirements of each user.

The Climate Research Foundation also participates in different international projects related to climate change and climate variability aimed at improving adaptation for civil protection and the environment, as well as the management of value chains and livelihoods.



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RESCCUE HELPS YOU MAKE YOUR CITY RESILIENT TO CLIMATE CHANGE

The RESCCUE project

RESCCUE (RESilience to cope with Climate Change in Urban arEas—a multisectorial approach focusing on water) is Europe's first large-scale innovation and urban resilience project, aimed to **improve the capability of cities to anticipate, prepare for, respond to, and recover from significant climate-change related threats with minimum damage.**

A multisectorial approach, a key advantage of RESCCUE

The RESCCUE perspective is a holistic one, which focuses rather on the interconnections than on separate city units of the urban infrastructure networks. To interconnect the several sectorial models, the project takes advantage of the existent **HAZUR tool and methodology.**

3 cities, 3 different challenges

The models and tools developed within RESCCUE to analyse urban resilience based on a multisectorial approach have been validated in three different cities, carefully selected by their representativeness of the European diversity in terms of climate type and city characteristics: **Barcelona, Lisbon and Bristol.**

The RESCCUE partners can be your strategic team to help you make your city resilient to climate change:

