



**RESILIENT CITIES FACING
CLIMATE CHANGE**



HOW TO...

effectively prioritise adaptation strategies to enhance urban resilience



WHAT IS YOUR CITY CONCERN?

What are the most prominent impacts in your city?

Select the most pressing climate impacts that affect you

- Pluvial floods Coastal floods Droughts
 Fluvial floods CSO spills

Focus to services-oriented adaptation strategies

Different approaches can be considered when addressing the potential adaptation strategies. In RESCCUE, the focus is on improving the resilience of urban services, from an infrastructure operability perspective. Although these strategies have the welfare of citizens on the spotlight, the assessment of purely social-oriented strategies are not in the scope. It has been designed to downselect from a first rapid exercise the top measures that would deserve further analysis, avoiding the use of unnecessary resources of analysts and researchers.

The key variables involved in the prioritization of measures are the life-cycle cost, the potential city's recovery time reduction, and the co-benefits that they can provide. Furthermore, climate risks reduction criteria are essential in this methodology.

PLUVIAL FLOOD RISKS

Example of Pluvial flood risks considered for the case study of Barcelona.



CITIZENS: reduction of high risks
• People's safety (pedestrians & vehicles stability)



PROPERTY AND VEHICLES: reduction of EAD*
• Direct damages to buildings & vehicles
• Indirect damages to businesses



WASTE SECTOR: reduction of number of unstable containers
• Solid waste containers stability

*EAD = Expected Annual Damage

WHAT BENEFITS WOULD YOU ACHIEVE?

✓ A flexible and comprehensive adaptation measures prioritization methodology

The proposed methodology is flexible and comprehensive in equal measure, which allows to be replicated in cities even with limited data availability.

✓ Flexible approach to prioritise adaptation measures in any city

Different impacts and risks assessments have been considered in the three cities, where the flexibility of the proposed methodology has been proven.

✓ A roadmap to enhance communication

A rigorous document has been developed which is broken down into three main stages: a theoretical framework, a practical guidance and a final section related to cities' practices. The lessons learnt by Barcelona, Bristol and Lisbon have been gathered in order to support other cities.

Take a look at the graphic below to see how the strategies to cope with climate impacts were identified in Lisbon.

Existing city plans



RESCCUE results

RESCCUE

RAF
URBAN CLIMATE RISK ASSESSMENT FRAMEWORK FOR URBAN SERVICES

+

=

20 NEW STRATEGIES

As a result of updating or adding new ones to the existing city plans

RESCCUE SOLVES YOUR PROBLEMS THIS IS HOW!

✓ What is your city's status?

What are the consequences that usually occur during and after a climate impact?

- Injuries and fatalities of residents
- Urban services failure and cascading effects
- All of the previous ones and even more
- Business closure and more

How is the city maturity in terms of addressing climate impacts?

- Addressing climate impacts is not included in the City Council agenda
- A climate plan is being elaborated
- A climate plan is currently available

Who are the main stakeholders?

- City Council
- Supramunicipal organizations
- Utilities operators
- All of them and even more

It is important to characterize properly the problem, identify the key actors, and above all, do not start from scratch if previous work is already done.

✓ What should you do?



Find existing or ongoing climate plans

In them the climate risks are addressed and adaptation strategies (and the measures that form them) are proposed.



Define the scope of the strategies

Mitigation and/or adaptation. Social and/or urban services oriented.



List the strategies and their related measures

Prepare the list without considering restrictions such as financial.



Estimate the cost and the city recovery time

With this information, measures can be prioritized. If not available, take an approximation from previous similar case studies



Select the most significant measures and group them for further analysis

These groups, called adaptation scenarios, may be prioritized according to the results of a more detailed analysis.

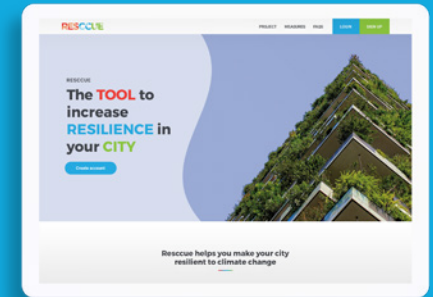
✓ What can you use?

Adaptation strategies web-platform

- Select measures from the database and create specific strategies for your city
- Add new measures to create specific strategies for your city

Methodology to prioritize measures

- Stage-based method to narrow down measures selection
- Combination of technical and economic impact assessment
- Stakeholder engagement for significant results



Final multi-criteria ranking results

Example of adaptation scenarios (A-E) prioritization results based on 4 different criteria:

RANK	AVOIDED DAMAGE	COSTS	NET BENEFITS	RISK REDUCTION (T10)	
	Adaptation scenario (M€/yr)	Adaptation scenario (M€/yr)	Adaptation scenario (M€/yr)	Adaptation scenario %	Adaptation scenario %
1	(A) 49.0	(E) 10.7	(B) 40.5	(A) 99%	(A) 99.0%
2	(B) 43.0	(C) 11.8	(A) 40.0	(D) 79%	(B) 90.4%
3	(C) 41.9	(B) 11.9	(D) 39.7	(C) 79%	(C) 90.2%
4	(D) 41.7	(D) 12.6	(C) 39.1	(B) 77%	(D) 87.2%
5	(E) 23.7	(A) 24.4	(E) 23.6	(E) 34%	(E) 45.0%

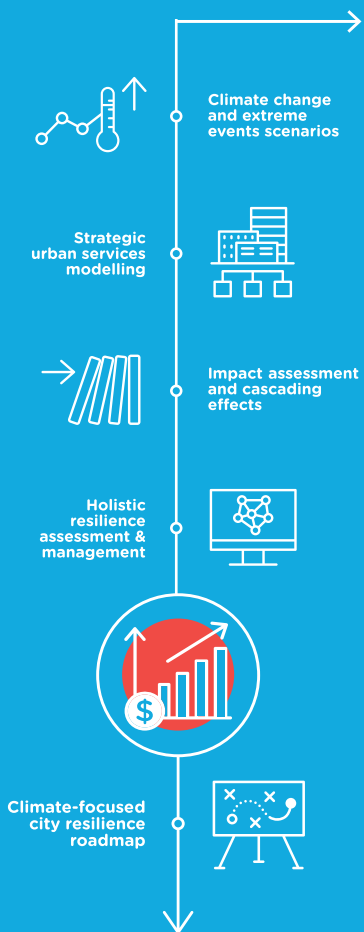


Stability for pedestrians



Stability for vehicles

SUPPORTING DECISION MAKING: EFFICIENT CLIMATE ADAPTATION MEASURES SELECTION



Use these guidelines to:

Prioritize climate adaptation measures for cities and enhance communication systems for stakeholder participation

Cities must adapt to increasing climate impacts. There are many adaptation strategies, formed by sets of measures, available to cope with them. However, counting with limited resources and urgent need of action, it is important to set an implementation order that is consistent with the context of each city.

A methodological framework to prioritize adaptation measures is presented here. It builds upon the research carried out in the RESCCUE project, offering flexible policy tools for all types of cities.

Furthermore, these guidelines offer city officials practical guidance on how to increase urban resilience by enhancing their communication systems. A related action plan was developed based on lessons learnt by Barcelona, Lisbon and Bristol.

5 steps to your solution:

- ✓ What is your city concern?
- ✓ What benefits would you achieve?
- ✓ What is your city's status?
- ✓ What should you do?
- ✓ What can you use?

RESCCUE Project

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Resilience and adaptation scenarios experts:

Several RESCCUE partners worked together under the leadership of Cetaqua to characterize the city's problems and propose a list of strategies which measures had to be prioritized for Barcelona, Lisbon and Bristol:

- Cetaqua (Water Technology Centre)
- Aquatec - Suez Advanced Solutions
- University of Exeter
- LNEC (Laboratório Nacional de Engenharia Civil)
- Ajuntament de Barcelona
- IREC (Catalonia Institute for Energy Research)
- UN-Habitat
- ENDESA
- Câmara Municipal de Lisboa
- EDP Distribuição Energia
- Hidra
- Bristol City Council
- Wessex Water
- Urban DNA
- AdP (Águas de Portugal, SPGS)
- AdTA (Águas do Tejo Atlântico)



Cetaqua, Water Technology Centre, was responsible for developing a measures and strategies web-based platform, together with the proposal of a methodology to prioritize adaptation measures.

Cetaqua represents a pioneering collaborative model among the sectors of public scientific institution, university and water company. This model has been established as a European benchmark in the application of scientific knowledge to water and the environment. Cetaqua's mission is to anticipate society's needs to propose new R&D&I solutions in order to ensure the sustainability and efficiency of the water cycle, while taking local needs into account.

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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 **proposed tools and methodologies.**

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:

