CLIMATE ADAPTATION STRATEGY

Proposal
short version

PIANO clima ROMA

ROMA

THE CLIMATE IN ROME HAS ALREADY CHANGED

The territory of Rome has seen significant changes in temperatures and rainfall in recent years. The meteorological data processed by ISTAT (the Italian National Institute of Statistics) based on the readings of the control units highlight a trend of rising temperatures between 1971 and 2021, with the highest values recorded in the last ten years. **In Rome the increase in heat is more marked than in all the other regional capitals in Italy:** the average temperature for the period 2011-2021 marks higher values in Rome (17.7°C), on average respectively +1.7°C compared to the period 1981-2010. In particular, the *number of summer days* (i.e. those days with a maximum temperature greater than 25 degrees) and *tropical nights* (with temperatures that do not fall below 20 degrees) are increasing, and, at the same time, the number of days with frost is decreasing.
Concerning rainfall, however, there is an increase in variability and changes in rainfall regimes, with rainy years alternating with less rainy years, increasingly more days without rainfall and, at the same time, an increase in the intensity of rainfall on some days. Total annual precipitation averaged 807 millimeters in the period 1971-2000, then dropped to 783 in the period 2011-2021. An analysis of days with very intense precipitation highlights how **rain is increasingly concentrated on very rainy days, with negative consequences for managing the phenomena.**
Rome is also the Municipality in Italy that is most suffering the consequences of the increase in the frequency and intensity of floods and heavy rains, with **flooding due to intense rains blocking trains and stopping traffic in underpasses and on roads - with interventions by the civil protection squads** to make places and people safe - but also of days with strong winds, as well as tornadoes and storm surges in the coastal areas.

WHAT IS THE REASON FOR A CLIMATE ADAPTATION STRATEGY?

Rome must prepare to face climate change scenarios that will increase these phenomena. The United Nations Intergovernmental Panel on Climate Change (IPCC) has classified the **Mediterranean** as a hotspot of global warming, i.e. one of the world's most vulnerable areas and an area where the processes of the increase in sea and land surface temperatures will be more accentuated, therefore we must pay particular attention to it, and an area where it is most urgent to implement options for adaptation.
For Rome, the climate variations developed by the Euro-Mediterranean Centre on Climate Change for the Strategy take into consideration the period between 2036 and 2065 with three different scenarios sharing the **same unequivocal trend of increasing average temperatures, duration of hot periods, the thermal discomfort index and the reduction in the number of days of frost.**

	Temperatura media	Indice di durata dei periodi di caldo	Indice di disagio termico (Categoria 4)	Giorni di gelo
Mitigazione aggressiva	+1,1 °C (±0,3°C)	+22 giorni (±14 giorni)	+8 giorni (±4 giorni)	-7 giorni (±4 giorni)
Forte mitigazione	+1,5 °C (±0,3 °C)	+34 giorni (±15 giorni)	+10 giorni (±4 giorni)	-9 giorni (±5 giorni)
Ad elevate emissioni	+1,9 °C (±0,3°C)	+48 giorni (±17 giorni)	+12 giorni (±4 giorni)	-12 giorni (±7 giorni)

Annual climate variations (ensemble mean and standard deviation reported in brackets) expected on some indicators considered for the period 2036-2065, compared to the reference period 1981-2010, for the RCP2.6, RCP4.5 and RCP8.5 scenarios. The values are

averaged on a municipal scale and estimate an increase in temperatures of 0.9 degrees which has already occurred compared to the reference period.

Rome is a city where already today several neighbourhoods are located in areas characterised by high risk to the water systems and, therefore, by a high vulnerability to phenomena of intense rainfall. The uncertainty regarding the 21st-century scenario is still great according to scientists, we do not know exactly what will happen in each neighbourhood, but **not intervening would increase social inequalities and would hurt Rome's economy.** The epidemiological data highlight the impact that the increase in temperatures and heat waves already has in some areas of Rome in terms of mortality. These are the neighbourhoods where there are the greatest social problems, where frailty is most relevant with elderly people living alone and families who cannot afford systems to cool the increasingly hot nights and days.

The dimension of vulnerability on which there is a need to intervene is impressive in numbers: according to the Flood Risk Management Plan, drawn up by the District Authority for the Central Apennines Basin, almost 400 thousand people live in areas at hydrogeological risk. With around 145,000 people in areas subject to direct flooding of waterways and around 245,000 in areas affected by potential flash flooding phenomena. However, if we consider the effects of rising temperatures, the epidemiological analyses carried out by the Department of Epidemiology of the DEP (Regional Healthcare Services) for Lazio in the Municipality of Rome highlight an increase in mortality and hospital admissions as a consequence of periods of heat waves, with a greater and synergetic effect when associated with peak periods of air pollution. The integrated analysis of environmental and social vulnerability, due to the low socioeconomic status, highlights how 9% of the resident population in Rome lives in neighbourhoods at risk during periods of prolonged heat waves, particularly in the eastern area.

The choice to develop the city's first adaptation strategy is motivated precisely by the need to have a clear and coherent reference framework for the measures to be taken, which allows us to respond to the vulnerabilities that have been highlighted, but also to study the analyses in depth in order to address the most complex areas where the issues are intertwined. **The Strategy is the most effective tool for governing a process, such as that of climate adaptation, which inevitably involves many diverse responsibilities and competencies.** The purpose of this document is to build a path for sharing risks, objectives and intervention priorities for effective institutional cooperation and to achieve results that depend on the effectiveness of the regulatory framework, the certainty of funding, the clarity of skills, plans, programmes and interventions carried out by different entities. Rome's climate adaptation is a process that will see periodic reviews and adjustments to respond to the priorities identified in the strategy.

The time frame for the strategy.
The proposed Strategy identifies the priorities, objectives and adaptation measures that Rome must implement by 2030 to adapt the territory to ongoing impacts and those foreseeable as a consequence of climate scenarios and impacts that may occur by 2050.

Zero risk does not exist.
It is not possible - both from a technical and economic point of view - to completely protect Rome, like any city in the world, from the various impacts caused by climate change. What have by now become daily news reports tell of devastating floods due to rains that, in just a few hours, go far beyond quantities expected in months or years. Even more so, it is impossible to guarantee the safe disposal of such significant amounts of rainfall in a city that has neighbourhoods in areas where the Tiber could burst its banks and are at risk of landslides, or built illegally, and therefore with sewage systems that are inadequate to deal with heavy rainfall. However, a series of measures can be taken to prevent the consequences and

reduce the scale of risks that the different phenomena could determine, starting precisely from those areas that are most at risk and most fragile from a socioeconomic point of view.

What is adaptation?
"In human systems, the process of adapting to the current or expected climate and its effects, in order to limit damage or take advantage of positive opportunities. In natural systems, the process of adapting to the current climate and its effects; human intervention can facilitate the adaptation to the expected climate and its effects".
From the 2022 IPCC (Intergovernmental Panel on Climate Change) glossary

The path of the strategy

To address such complex and intertwined issues, we need a tool that identifies the issues that are priorities to be addressed, that is flexible for the scenario of uncertainty with respect to the non-linearity of the impacts that it will face, that is discussed with the city and shared with the numerous institutional, social, and economic subjects that will have a responsibility in the process of adaptation. To carry out the identified measures, there will be a need for redevelopment and safety plans and projects, systems of prevention, citizen alert and information channels, civil protection, technical and scientific in-depth analysis, monitoring, governance and redefinition of project rules for interventions.

The work is based on **an analysis of ongoing impacts and risks for the territory of Rome, meteorological data and the assessment of future climate change scenarios.** Institutes and research centres, universities and national institutions were involved in the drafting – ENEA (the National Agency for New Technologies, Energy and the Environment), ISPRA (the National Institute for Environmental Protection and Research), CMCC (the Euro-Mediterranean Centre on Climate Change) Foundation, CNR (the Italian National Research Council), ISTAT (the Italian National Institute of Statistics), the Department of Epidemiology of the Local Healthcare Service for Rome 1, the University, the District Authority for the Central Apennine Basin, the Coastal Reclamation Consortium for the North Coast, Areti, FS (the National Railways) – to reconstruct the situation and vulnerabilities. An essential contribution came from diverse subjects, which complements that of the structures of the administration to understand the ongoing processes, their possible evolutions, to identify the most appropriate and effective decisions.

Furthermore, information **has been gathered on the framework of ongoing projects which goes in the direction of making the city more resilient** to impacts. An example is the interventions on the water network which in recent years have made it possible to reduce losses in the water network to 27.8%, compared to a national average of 42%. There are several projects that are either ongoing or have been financed - with national, regional, municipal resources from the NRRP and funding from the 2025 Jubilee - which concern the adaptation and the process of making water and sewer infrastructures safe, the safety of flood risk areas, urban forestation and the redevelopment of squares and public spaces, parks with climate adaptation objectives as well as those aimed at extending the network of drinking water fountains.

The strategy is part of a complex system of regulatory references and European (with the **EU Commission** in the role of guidance and support which began in 2013), national (On 21 December 2023 the **Ministry of the Environment and Energy Security approved the National Plan for adaptation** to climate change), regional (with the **Sustainable Development Strategy** approved in 2021), metropolitan (with the **Metropolitan Strategic Plan, 2022-2024**) planning, as well as multiple competencies in the various areas of climate adaptation.

The work that the Municipality is carrying out on adaptation is part of **agreements and scientific collaboration with cities and international networks.** Rome was selected by the European Commission to be among the 100 cities of the "Carbon-neutral and smart cities by 2030" Mission and, on 14 November 2023, it approved the revision of the Action Plan for Sustainable Energy and the Climate, introducing more ambitious targets in reducing greenhouse gas emissions. The city is part of the C40 and Iclei networks committed to the climate and is involved in specific working groups sharing experiences and projects on climate adaptation.

Adaptation is also a great opportunity to reconsider urban spaces, infrastructures and neighbourhoods. It can become an opportunity to address the problems of securing public spaces in an innovative way, through innovative solutions to re-examine squares and neighbourhoods, buildings and homes to make them safe and livable thanks to the careful use of trees, green spaces, shading, building materials, and water. As demonstrated by the European cities that have focused on urban redevelopment centred on environmental quality and innovation, it is possible to combine economic growth and the well-being of citizens, while at the same time attracting investments, and creating new businesses and jobs.

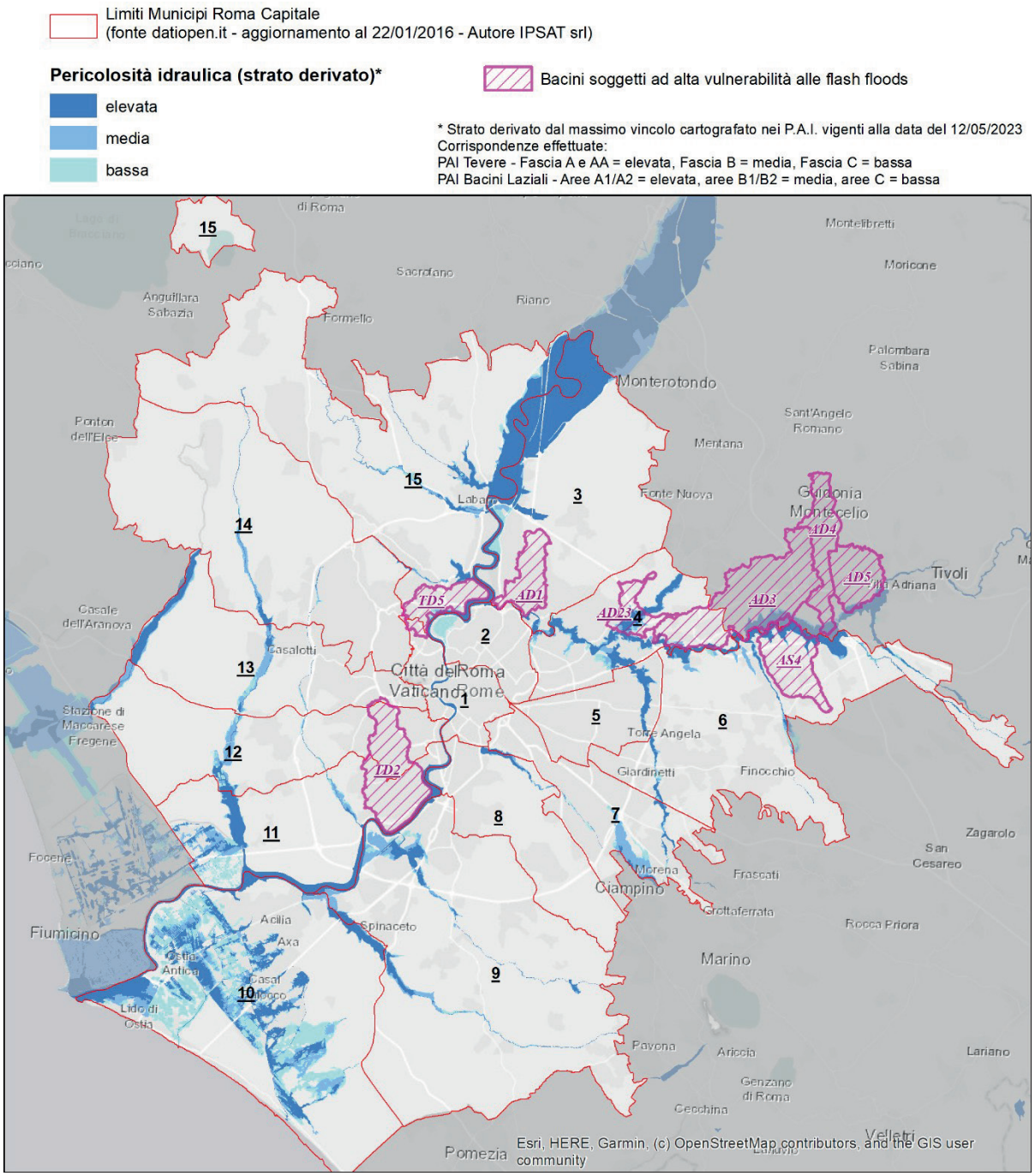
Several international studies demonstrate that investments in adaptation are advantageous from a public spending point of view, they reduce the growing expenses that countries incur as a consequence of the damage caused by meteorological phenomena and they produce benefits in terms of increased biodiversity, quality of air, water management, greenhouse gas emissions, as well as the livability and quality of public spaces.

THE PRIORITIES OF ADAPTATION IN ROME

During the course of its long history, Rome has seen significant cultural, social, political and geographical changes – one thinks of ancient Ostia, Trajan's Port and the modifications of the river bends and the coastline. It has experienced floods of the Tiber that brought the city to its knees, epidemics and fires with devastating consequences, in periods in which these impacts were difficult to predict and the knowledge and economic resources for effective prevention did not exist. Today we have the possibility of being able to assess how much global climate change may determine and, therefore, precisely for this reason, we have the responsibility to prepare ourselves with the actions necessary to reduce the consequences.

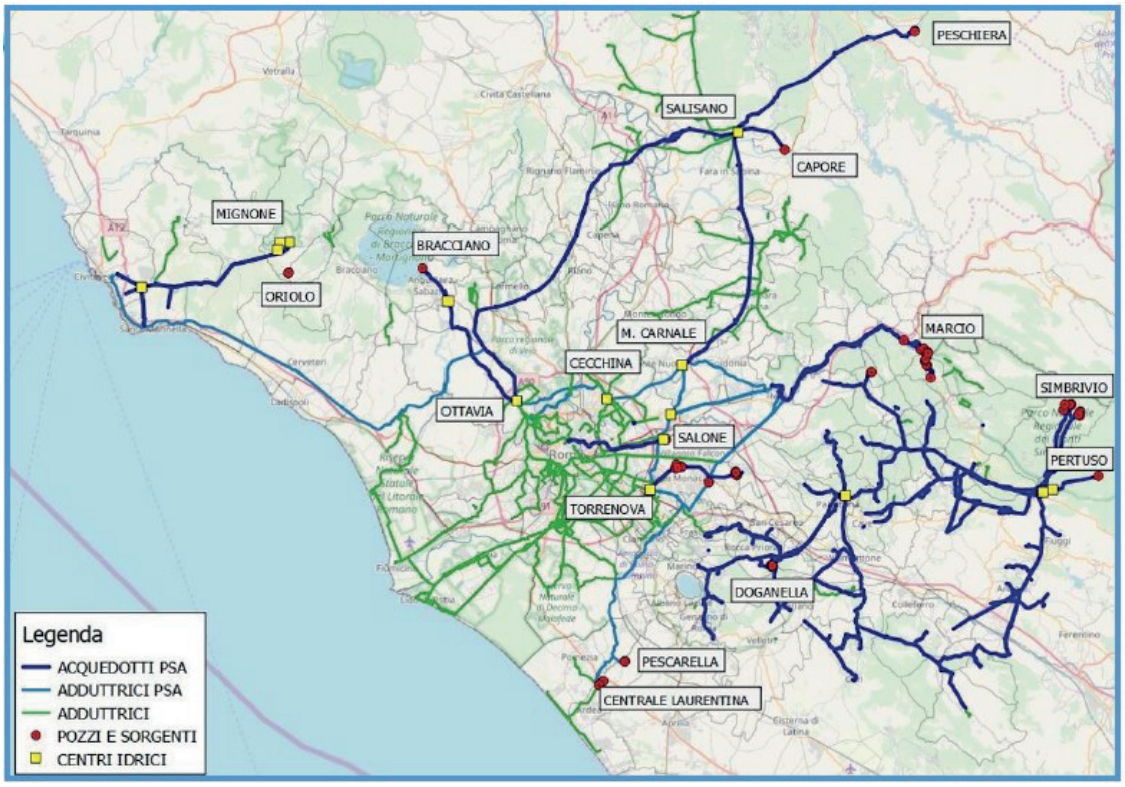
The analyses of the ongoing impacts and the indications coming from the analyses and scenarios of climate change point out the fact that there are four priority issues to be addressed, in the territory of Rome, to reduce the risks to urban spaces, ecosystems and the social and economic fabric:

1) THE GREATER INTENSITY AND FREQUENCY OF HEAVY RAIN AND FLOODS, with consequences for infrastructures and urban spaces, greater risks of river flooding.



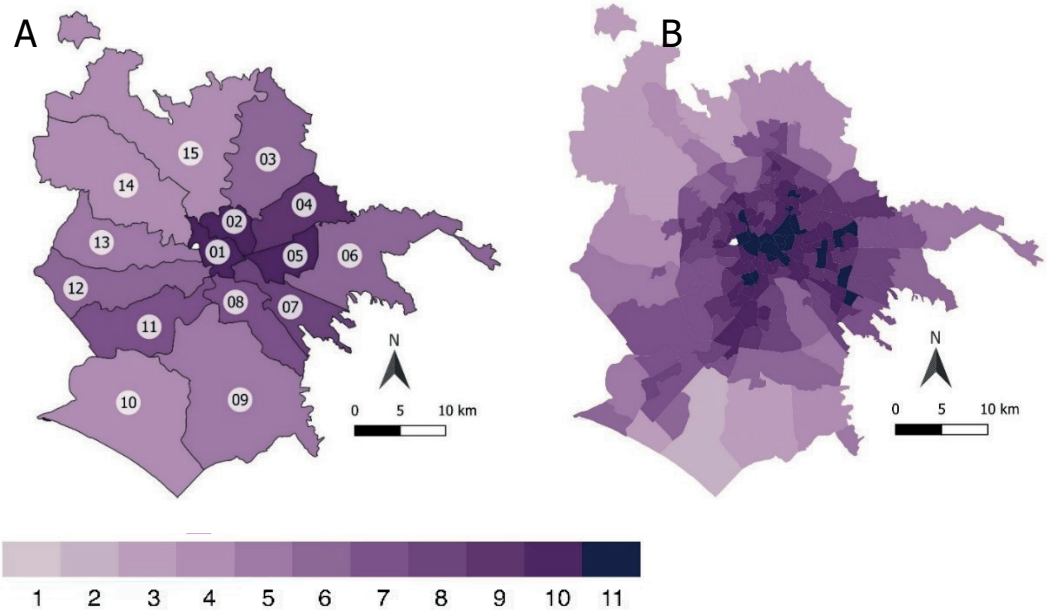
Floodable areas of waterways in the Rome area and areas vulnerable to flash floods.

2) **THE SECURITY OF WATER SUPPLIES**, in a scenario of longer periods of drought which leads to an acceleration of conservation measures, reduction of leakages and reuse.



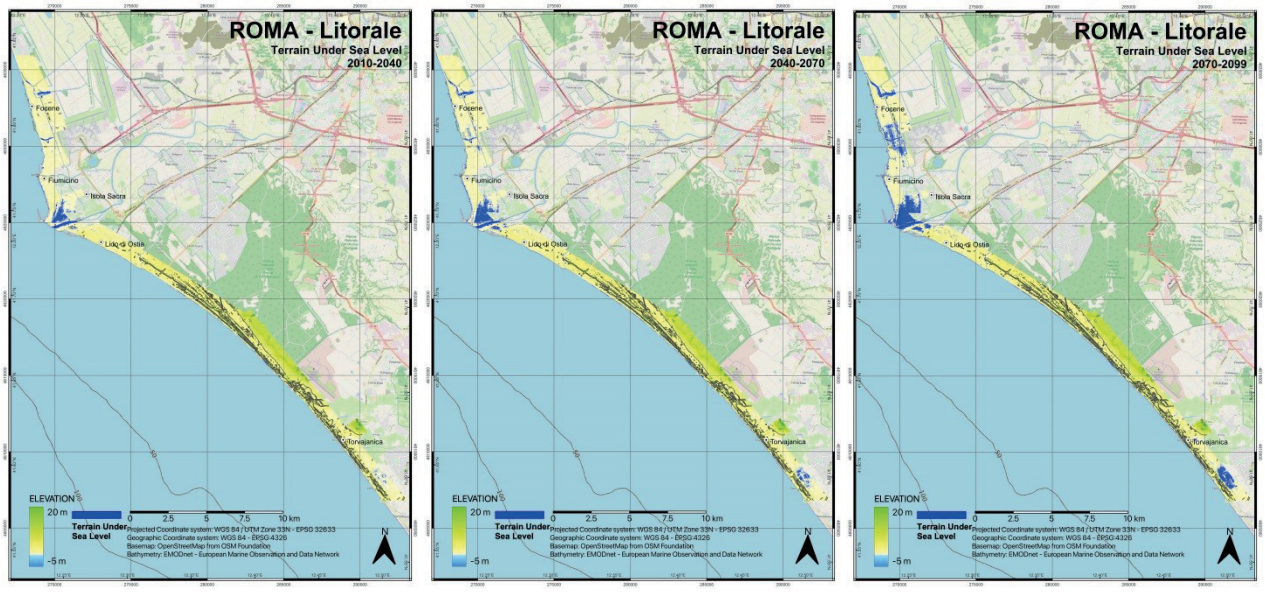
Map of the ATO2 (area 2 of optimal territorial scope) water catchment and aqueduct system

3) **THE RISE IN TEMPERATURES AND INCREASE IN HEAT WAVES,** in a city where the degree of heat has already increased and where there are neighbourhoods with a worrying island effect of urban heat.



Average values of environmental and climate vulnerability by health district (A) and by urban area (B).

4) The intensification of impacts on the coastal shoreline, from coastal erosion processes, to the impacts of storm surges and tornadoes, in a scenario of rising sea levels.



Coastal areas that will be lower than the sea level in 2040, 2070, and 2099.

The climate adaptation objectives for the territory of Rome

REDUCE THE RISKS TO THE SAFETY AND HEALTH OF THE PEOPLE

The alternation of events of extreme rainfall, long periods of drought and heat waves increases the vulnerability of natural, infrastructural and settlement systems. **Some neighbourhoods are more at risk than others** when the level of the Tiber rises, or in the event of violent storms, or during heat waves. This requires knowledge of the territory capable of guaranteeing effective **warning and prevention systems** throughout the city, the strengthening of **civil protection** tools in order to guarantee effective measures starting from where the consequences risk being the most serious. Likewise**, in every intervention that concerns infrastructures, squares, and/or neighbourhoods, it is necessary to change the approach** and **introduce climate adaptation objectives** to reduce the impact of both intense rains (also with the creation of underground cisterns) and at the same time that of heat waves, to protect people's safety and health, and the livability of the spaces.

RECONSIDER THE CITY'S RELATIONSHIP WITH WATER AND THE SEA

An essential issue in a climate change scenario is **ensuring safe access to water**. Today Rome has one of the lowest rates of water network leakages in Italy; furthermore, important investments are underway to secure water supplies and more efficient management and reduction of leakages. But the consumption of precious spring water must be drastically reduced, as well as withdrawals from wells, through innovative choices of water conservation in domestic, agricultural and industrial uses and the replacement with water coming from the accumulation of rainwater and from purifiers, therefore clean and usable for all compatible uses as required by European Directives. We must also **strengthen the role of the soil as a "sponge",** increasing the spaces where water can penetrate the ground to reduce the risk to the water

systems during intense rains, recharging the aquifer with natural drainage, removing asphalt and planting trees in order to make urban spaces cooler. The **coastal area of Rome is a delicate ecosystem to be protected**, erosion processes have increased in recent years and from a perspective of sea level rise, the simulation models of changes in the coastline clearly indicate the areas at greatest risk, because they would be lower than sea level, as well as those areas where the rising processes of the salt wedge could intensify.

REDUCE HEAT IN NEIGHBOURHOODS, IMPROVE LIVABILITY

In Rome, the rise in temperatures during heat waves can, in some neighbourhoods, reach levels that endanger people's health. Because there is the added island effect of urban heat created by the waterproofing of the soil, by materials such as asphalt and concrete which absorb the heat, and by the presence of cars. It is therefore necessary to intervene starting from the most vulnerable neighbourhoods - i.e. those characterised by less advantageous socioeconomic conditions and by urban buildings that are more unfavourable to alleviating the heat - and those at risk**. Adaptation measures can contribute to reducing perceived temperatures**, enhancing the positive role played by biodiversity, water, shading, materials with the highest albedo, through the implementation of Nature-Based Solutions (NBS), i.e. nature-based actions capable of providing benefits not only to the environment but also to livability.

START WITH THE MOST FRAGILE NEIGHBOURHOODS

Climate adaptation must aim at reducing risks and impacts beginning with the neighbourhoods where the hydrogeological risk is greatest and where the risk to people's health during heat wave phenomena is most significant. In these neighbourhoods, it is necessary to strengthen prevention measures, epidemiological analyses to monitor the health impacts of heat and pollution in collaboration with the Department of Epidemiology for the Lazio region (DEP Lazio), the role of social centres in the neighbourhoods together with the associations of the Third Sector (a group of private entities that carry out activities of general interest), so people do not feel alone, make them aware of the risks and allow them to access services and interventions that can reduce consequences to their health.

AN ECONOMY RESILIENT TO CLIMATE IMPACTS

The analyses of the Bank of Italy and those of the National Climate Adaptation Plan highlight the risks deriving from the loss of biodiversity and deteriorated social and working conditions which affect the actual and potential growth of the economy. In Rome, these risks concern industrial, handicraft and agricultural activities which are suffering increasingly significant damage as a result of violent rains and more difficult water management due to prolonged periods of drought. And they affect various activities which, with longer and more intense periods of heat, must reconsider the organisation of work, starting from the agricultural sector where it also affects the type of crops and irrigation systems. It certainly concerns a strategic sector of the city such as tourism, with the historic centre that in all satellite analyses is the hottest area of the city during the day and which risks a reduction in summer flows, because the city is no longer attractive due to the high temperatures.

Adaptation measures

The adaptation measures will necessarily have to prepare the territory of Rome for ongoing and foreseeable impacts as a consequence of climate scenarios and effects that may occur in 2050. The competent institutions have been identified for the various measures.

Prevention measures, alert and civil protection measures

Actions with the purpose of informing and raising awareness among citizens regarding the risks and correct behaviour to assume in case of events, of alerts in the vicinity of an emergency event, of emergency

response to get people to safety and of maintenance and management of the territory and riverbeds at risk are decisive for increasing the effectiveness of prevention in urban spaces and infrastructures. **The Civil Protection Plan** is the tool with which, in accordance with the Law, rescue interventions and protection of the population and property at risk are established and coordinated, and within the adaptation Strategy this will play a fundamental role in the coordination of competencies, analyses and in the coordination of interventions among the different structures within the Municipality and with Entities and Institutions, and will focus on four main strategic lines: Coordination of prevention and maintenance activities; Preparation for emergency management; Communication of information and alerts to citizens; creating a culture of civil protection.

Measures for monitoring, study and in-depth knowledge

The cognitive framework highlights the complexity of the ongoing processes and the scenarios that could occur and evolve in forms and with leaps in scale yet to be fully understood. With the aim of having an interpretation of the processes that is as updated, complete and integrated as possible, **collaboration and the sharing of analyses and monitoring will be strengthened among** *Roma Capitale*, the District Authority for the Central Apennine Basin, the Lazio Region and the Entities of research so as to obtain an **integrated system with a** shared and open-source **database** of meteorological and hydrological data operated by institutions and research bodies. **Temperature monitoring will be extended through the installation of new control units in the areas** where the impacts of heat waves are most significant, and new **satellite and epidemiological analyses** of the effects of heat on health will be promoted, through a reading of the information integrated with quality data regarding the air. **Protocols will be defined for the study of**: biodiversity and its role in climate adaptation, the erosive processes of the coastal area and the causes, the role of the wetlands present for climate regulation and the contribution of the creation of artificial humid ecosystems and spaces for the flow of water during intense rainfall, the climatic risks for the agro-zootechnical systems in the territory of the Municipality and of the metropolitan city, the vulnerability of cultural heritage due to the increase in intensity and frequency of heavy rainfall events, exposure to waves of heat and air pollution.

Measures to strengthen resilience with respect to the priorities that have been identified

The strategy identifies climate adaptation measures to strengthen the resilience of urban spaces, ecosystems, and the social and economic fabric concerning the priority impacts identified for the territory of Rome.

1) Measures to strengthen resilience against intense rainfall and flooding

	Adaptation measures	Competent Authority
1)	Implementing the priority interventions identified by the Flood Risk Management Plan regarding the management of river floods upstream of Rome and the tributaries of the Tiber.	Authority for the Basin District, Lazio Region, Government.
2)	Implementing interventions to alleviate risk to the water systems in reclaimed areas	Authority for the Basin District, Lazio Region, Government, Reclamation Consortia
3)	Securing the 26 priority landslide sites identified by ISPRA (the National Institute for Environmental Protection and Research) and included in the Outline Plan of the Hydrogeological Structure.	Authority for the Basin District, Lazio Region, Government.
4)	Maintenance of the whitewater sewage network with the strengthening of the drain plan, the identification of redevelopment, and preventive interventions, starting from the areas at greatest risk to water systems and	*Roma Capitale*, Metropolitan City, EGATO (Management bodies that

	subject to flash floods.	deal with waste within territorial areas)
5)	Increasing the interventions on the resilience of infrastructure and energy networks, setting up a committee to coordinate with companies, introducing project guidelines.	*Roma Capitale*, Metropolitan City
6)	Protection of areas at risk to water systems and those subject to flash floods, strengthening the minimum soil permeability indices and guidelines for water system invariance and rainwater management in urban transformations.	*Roma Capitale*, Authority for the Basin District
7)	Strengthening the climate adaptation objectives within the Tiber River Contract for sharing guidelines and interventions in river territories with institutional and local entities.	Metropolitan City

2) Measures to ensure the safety of water supplies

Adaptation measures	**Competent Authority**
1) Doubling and securing the Peschiera aqueduct	EGATO (Management bodies that deal with the waste within territorial areas), ACEA ATO 2 (The integrated water services for Rome and the province)
2) Reducing leakages in the aqueduct system through districtisation interventions, digitalization of monitoring systems, replacement of deteriorated pipes.	EGATO, ACEA ATO2
3) Adjusting the network of sewer collectors, completing the connection to the purification network of the users still without them, strengthening the sizing of the purifiers to guarantee the treatment standards required by the Water Reuse Regulation 741/2020.	EGATO, ACEA ATO 2
4) Creating a network for the distribution of water coming from purifiers for all compatible uses starting with the irrigation of parks and gardens, for industrial needs, for street cleaning and agricultural uses.	EGATO, ACEA ATO 2, *Roma Capitale*
5) Expanding the network of reservoirs for collecting rainwater in parks and agricultural areas for their use by farms and in urban gardens	*Roma Capitale*, Metropolitan City
6) Protection of groundwater and the monitoring of wells, experimenting with interventions to encourage the infiltration of excess rainwater into the aquifers, the use of water from wells for the irrigation of public parks.	*Roma Capitale*, Metropolitan City
7) Promoting the reduction of consumption, recovery and treatment of white and grey water in buildings and manufacturing activities for all compatible uses.	*Roma Capitale*, Metropolitan City
8) Experimenting with innovative models of integrated management of water resources in manufacturing districts and agricultural areas through more efficient models of recovery and reuse.	*Roma Capitale*, Metropolitan City

3) Measures to reduce the impact of heat waves and rising temperatures

Adaptation measures	**Competent Authority**
1) Approving an intervention plan for the adaptation to heat waves of urban	*Roma Capitale*

areas at greatest risk during daytime and night-time hours, to alleviate the impacts on the most vulnerable segments of the population and on businesses.	
2) Introducing Guidelines for interventions affecting public spaces and buildings, starting with schools, to reduce the heat island effect, with indications on materials and NBSs (Nature-based solutions), the use of simulation programmes on pre- and post-intervention temperatures.	*Roma Capitale*
3) Approving a plan for the ecological and biodiversity network of the metropolitan city regarding forestation interventions and the planting/replacement of trees along the streets beginning with those areas that are most vulnerable to heat waves and regarding the enhancement of ecological connections.	*Roma Capitale*, Metropolitan City
4) Review of the technical standards and building regulations to strengthen the protection of soil permeability and the connections to the ecological network (wetlands, minor network, protected areas and urban parks), to introduce solutions that aim in the direction of climate adaptation (Natural Based Solutions, water management, green roofs, solar shading, etc.).	Roma Capitale
5) Expansion the network of drinking water fountains to squares and public spaces without them, beginning with the areas at greatest risk during heat waves.	EGATO, ACEA ATO 2, *Roma Capitale*
6) Creation of an integrated temperature monitoring system located throughout the municipal area which integrates existing measurements with new control units in the areas where the urban heat island effect is greatest	*Roma Capitale*

4) Measures to strengthen the resilience of the coastal area and coastal residential areas

	Adaptation measures	**Competent Authority**
1)	Approval of the Plan for the defense and management of the coastlines, planning and implementation of coastal defense interventions and coastal residential areas in line with climate adaptation objectives	Authority for the Basin District, Lazio Region
2)	Coordination of interventions in the coastal area, monitoring and direction of climate adaptation actions and actions to combat the rise of the salt wedge	Metropolitan City, Lazio Region
3)	Approval of the new Plan for sandy shore use with the redefinition of the areas and of the accesses to encourage free use, and the redevelopment of the offer with removable and eco-compatible structures.	*Roma Capitale* for implementation, Lazio Region for approval
4)	Implementation of interventions to strengthen and extend the coastal dune system	*Roma Capitale*, Lazio Region

THE FINANCING OF THE MEASURES

For the measures identified for strengthening resilience against intense rainfall and floods, which affect the coastal area, the entities that have a central role in planning and financing are the **Authority for the basin district, the Lazio Region, the Ministry of the Environment and Energy Security** (for interventions regarding hydrogeological instability) and the **Ministry of Infrastructure** (for interventions regarding dams and reservoirs). The District Authority has the responsibility of approving the three-year Programme of interventions, to be shared within the Permanent Institutional Conference in which the competent Ministries and the Lazio Region are involved. Furthermore, the Region identifies the areas where public

maintenance services must be organised to protect against flood risk, and the responsibilities for interventions on the waterways, which is fundamental for effective governance. The Metropolitan City of *Roma Capitale* plays the role of directing and coordinating territorial strategies, which is essential with respect to issues that go beyond the municipal dimension, such as interventions concerning networks of infrastructures and energy, manufacturing districts and for the enhancement of River Contracts.

For interventions concerning the water network, **EGATO** (the governing body of the optimal territorial area, in which the Municipalities within the perimeter participate) defines the priorities and establishes the programme, with investments that can be repaid through the water fees. Instead, the implementation of the interventions is the responsibility of the entity that has the concession of the integrated water service of Rome and province (ACEA ATO 2) for the collection, supply and distribution of water suitable for human consumption and the sewage and purification services of domestic or similar wastewater. *Roma Capitale*, with the Metropolitan City, has a central role in implementing the innovations necessary to carry forward the objectives of recovery and integrated management of water resources and the protection of groundwater.

For measures to combat the impacts of heat waves, possible channels of national financing will need to be explored (via the **National Plan for Adaptation to Climate Change**), European programmes and projects in support of environmental, construction and urban planning interventions. **Roma Capitale was selected by the European Commission, as part of the TSI** (Technical Support Instrument) programme to support public administrations, with funding for the formulation, by 2025, of an **action plan for reducing the impacts of the island effect of urban heat** in the areas at greatest risk, with the involvement of local stakeholders, and for the drafting of Guidelines for interventions concerning public space in order to keep the different adaptation objectives together (NBS Projects, integrated management of the water system with recovery and reuse of purified water, materials and solar shading, transformation of asphalted and waterproofed parking areas, etc.). To carry out the interventions, it is important to have the collaboration of the **European Investment Bank** and the **CDP (Cassa Depositi e Prestiti,** an Italian development bank), and the establishment of public-private partnerships.

Responsibility for planning regarding the defense and management of the coasts lies with the Authority for the Basin District of central Italy, while the Region is responsible for planning interventions for the defense of the coastlines and coastal residential areas, and for financing them with the contribution of the state resources. The coordination of interventions and the monitoring of ongoing changes have a decisive role in the effectiveness of interventions on the coast, where the Lazio Region and the Metropolitan City have a central role, in order to establish guidelines to adapt the coast to the impacts of erosion and storm surges in the most effective way, but also to the rise of the salt wedge which has effects on biodiversity, agriculture and groundwater.

Measures that have been financed

- The construction of the Peschiera Aqueduct, for a total expense of 1.2 billion, of which 700 million was allocated in the 2023 Budget Law and the remaining part is covered by the integrated water service fees.
- Investments covered by NRRP funds and MASE outline plans 2020-2021-2023 for measures regarding safety measures for the water systems: those of the Malafede, Tor Sapienza, Acqua Acetosa ditches, and of the Bagnolo and Pantano, Palocco, Dragoncello canals, for a total of 56,516,401 Euros.
- Investments totaling 343 million euros for the reduction of water leakages across the entire ATO2 perimeter, including NRRP funds, for the period 2023-2028.
- Investments of approximately 180 million euros for the implementation of various interventions for the adaptation of sewage collectors, maintenance and redevelopment of drains, urban forestation, creation of new Parks along the Tiber River and in Ostia, climate adaptation projects within the experimental

programme of the Ministry of the Environment and Energy Security, for the redevelopment of squares with climate adaptation objectives, with funding included in Jubilee 2025, in the NRRP, from national resources and those of the municipal administration.

Measures not funded for which a cost estimate is available

The Basin Authority has identified the framework of priority interventions for safety and reduction of hydrogeological risk in the Rome area, given in detail below, which foresees a total expenditure of approximately 840 million euros:

- Interventions to alleviate the risk of the flooding of the Tiber River in Rome, for a total of 590 million euros.
- Interventions to alleviate the risk to the water system of the secondary tributary network of the Tiber River for a total of 82 million euros:
- Interventions to alleviate the risk to the water systems in the reclaimed areas for a total of 131 million euros.
- Interventions to make the 26 priority situations safe from the risk of landslides for a total of 40 million euros.

Measures concerning the network of water systems financed through fees

The planned interventions to reduce the leakages in the aqueduct system, to complete the connection to the purification network of users still without it, and to adapt the purifiers can be included in EGATO's plan and be covered as financed by water fees, with realization to be paid for by ACEA ATO2 (The integrated water services for Rome and province).

Measures concerning the water network not financed through fees

There is currently no provision for coverage through fees of the expenses for the construction of infrastructures for the supply and distribution of water from purifiers with the aim of enhancing its use for all compatible uses. For these interventions, EGATO (management bodies that deal with waste within territorial areas) will have to prepare a study with an estimate of costs for the construction of connections to the purifiers for compatible uses and open a dialogue with ARERA (Regulatory Authority for Energy, Networks and the Environment) which, in the most recent resolutions, has made it possible to use fees for experiments that go in the direction of a more efficient use of water resources.

Measures for which studies and cost estimates need to be completed

The strategy includes various measures which imply the development of plans, programmes and studies whose competencies are to be identified and which will lead to an estimate of the costs for the necessary financing.

PUBLIC CONSULTATION AND STAKEHOLDER INVOLVEMENT

The adaptation Strategy represents a highly innovative step for urban policies. For the first time, Rome is observed from a perspective, such as that of climate, projected into the future, and where it is necessary to understand the possible deep changes that might occur. For this reason, it is important to open up an extensive discussion on the analyses and scenarios contained in the document, in order to raise awareness of the challenges the city faces and identify shared measures to adapt Rome to a 21st-century climate scenario.

A public consultation process is now opening up on the proposed Strategy which will last until April 2024 and will then lead to the final approval in the Capitoline Assembly by the summer. The objectives of this

phase are to inform and involve **citizens** in the work that is intended to be carried out on a highly topical issue and which makes everyone responsible for their own behaviour and for the need to pay attention to the possible risks that might be involved; to discussion and **scientific in-depth analysis** of the various issues that emerge from the cognitive framework, to discussion with the **stakeholders** who are fundamental for carrying forward climate policies and through which adaptation and mitigation fuse together, in a path that will accompany the strategy along its horizon to 2030.

The first area of discussion on the proposed Strategy and its implementation over time is the **institutional one.** In fact, the responsibilities and roles with respect to the different aspects and issues are diversified and the aim is to strengthen discussion and **synergy with plans and programmes** that intervene in the territory. In particular, the scope of discussion with the **Government** on the priorities and interventions to be implemented will be the **National Climate Adaptation Plan**, which was approved on 21 December 2023. **With the District Authority for the Central Apennine Basin,** the measures will have to be explored in greater depth within the **three-year plan of interventions** which gives a central role to the Government, through the Ministry for the Environment, Land and Sea Protection and the Ministry of Infrastructure and Transport, as well as the Lazio Region, for financing. With the **Lazio Region**, which has legislative power in the matter, the issue of governance will have to be addressed with respect to the responsibilities, currently diversified, with respect to the maintenance of secondary waterways and the related coverage of costs. The issue of coordination and strategic direction of the Municipalities' interventions on forestation and adaptation of the coastal area will be addressed with the **metropolitan city**.
The internal governance of the administration of the process will be strengthened to clarify the path of implementation of the measures and the integration of climate adaptation and mitigation policies through the creation of a **working group coordinated by the Climate Office, with the involvement of the various departments.** Furthermore, to carry out the objectives, we want to strengthen **the work with the subsidiaries** so as to share priorities and coordinate interventions, with those that manage the infrastructural networks, and **training modules** will be organised to update the competencies of the administration's experts.

Observations from citizens, associations, interest groups
The proposed strategy will be published on the *Roma Capitale* website and all citizens can send observations, proposals, and requests for clarification until **30 April 2024** to the following email address: **pianoclima@comune.roma.it**

Themed conferences and workshops
To make an in-depth study of the analyses, priorities and measures foreseen by the strategy, discussion and in-depth study meetings will be organised in February and April, to which those in the Municipalities will be added as well as others based on discussions with stakeholders:

Conferences on the priorities identified by the strategy
- **Strengthening resilience against heavy rains and floods**
- **Reducing the waste of water and strengthening the reuse of purified water, guaranteeing the safety of supplies**
- **Adapting the city to heat waves and rising temperatures**
- **Reducing impacts on the coastal area**

Themed workshops
- **Rome's economy in the scenario of climate change.**
- **The historic centre of Rome at 40 degrees: the challenges for livability and tourist attractiveness**
- **Biodiversity and protected areas for mitigation and adaptation to the climate crisis**

Discussion roundtables with stakeholders on climate adaptation and mitigation
Meetings will be organised on the proposal with the "interested parties" (stakeholders) to open a discussion on the analyses and measures, explore projects and interventions, involve the various players in the implementation throughout the approval and implementation process, which will also concern the actions of climate mitigation as part of the implementation of the action plan for sustainable energy and the climate and the drafting of the Climate City Contract foreseen by the "100 carbon-neutral and smart cities by 2030" Mission of the European Commission.
The roundtables will be organised with: business organisations, the city agricultural Conference, general green States, environmental and Third Sector Associations, trade unions, research Entities and universities, Companies from the infrastructure, energy and technological networks.