



Layman's Report

BUILDING RESILIENT CITIES

GUIDELINES FOR CLIMATE CHANGE ADAPTATION

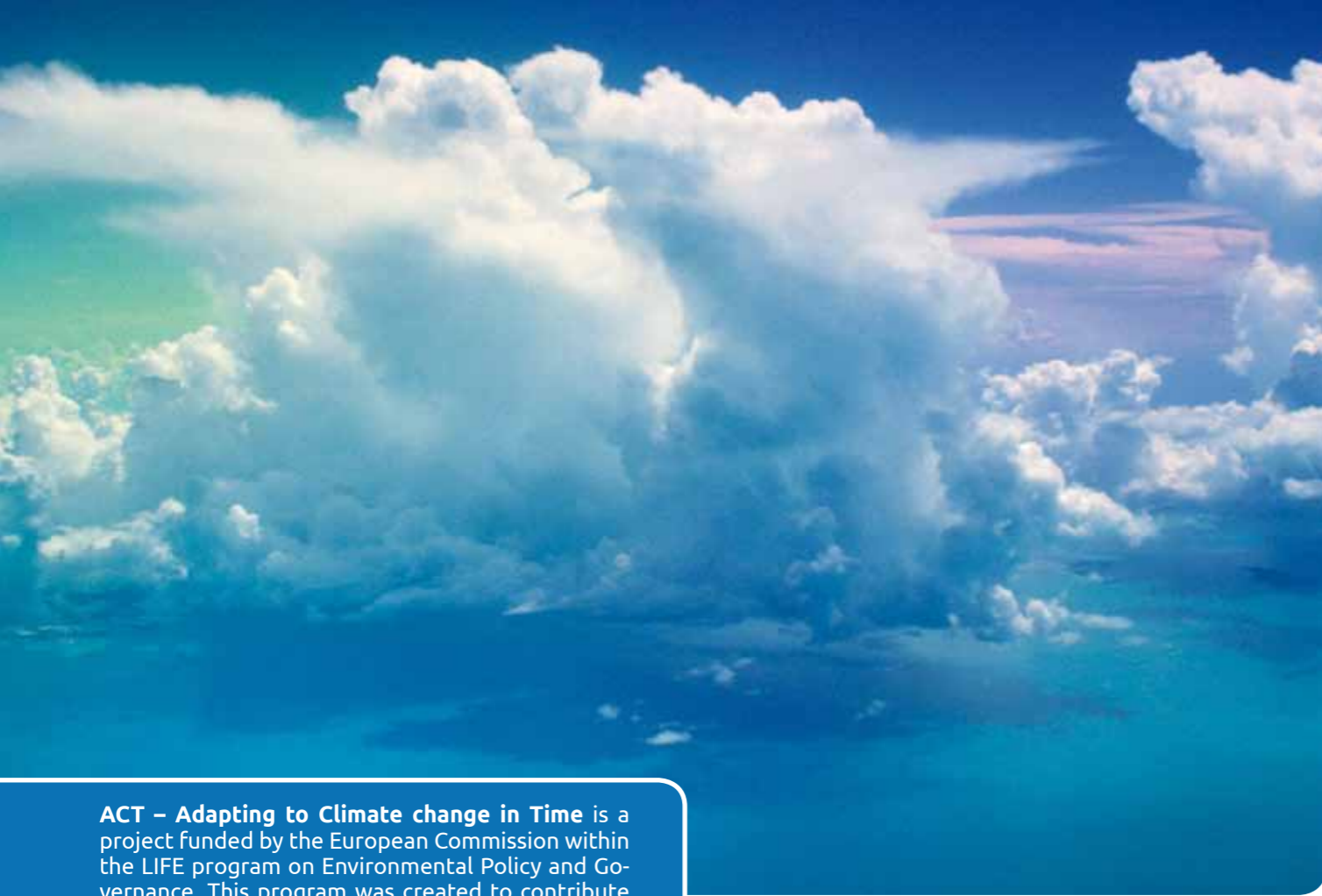


Adapting to
Climate change
in Time

LIFE08 ENV/IT/000436



With the contribution of
the LIFE financial instrument
of the European Community



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PROJECT BUDGET

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LAYMAN'S REPORT

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RESIST TO CLIMATE CHANGE: A **CLIMA-SMART** APPROACH

Since 1992, with the adoption of the United Nations Framework Convention on Climate Change (UNFCCC), world governments have mostly focused on actions to reduce greenhouse gases (GHGs) emissions. Nowadays, there is broader consensus and awareness on the fact that climate change effects are occurring and are destined to increase in the long term. It is therefore necessary to strengthen and support the initiatives for climate change adaptation at the national, regional and local level to address extreme events that will keep hitting our planet with increasing frequency.

In April 2013, the European Commission (EC) presented two important documents: **The European Adaptation Strategy to Climate Change**, which introduces a normative framework and mechanisms to enable the EU to address current and future effects of these changes and a green paper **On the Insurance of Natural and man-made Disasters**, which formally launches a public consultation on the status of adequacy and availability of insurance systems on the market.

An EC note states that warming in Europe is occurring at a faster pace than in other parts of the world. Every year, extreme weather events increase in number and eventually cause great economic

losses, issues linked to public healthcare and loss of human lives. Heat waves, forest fires, drought in Southern and Central Europe, abundant precipitations, risk of flood and of erosion in coastal zones of Northern and North-Eastern Europe are all the most compelling issues that poses a direct threat to the EU. In Europe, between 1980 and 2011, **more than 2.500 people lost their life due to flood, over 5.5 million have experienced damage, with economic losses beyond 90 billion euro.**

A cost-benefit analysis on the effects of climate change demonstrates that every euro spent on adaptation initiatives would allow us to save 6 euro in avoided damage. Missing the opportunity to adapt to climate change would have an estimated cost of 100 billion (per year) euro in 2020, which would jump up to 250 billion euro in 2050.

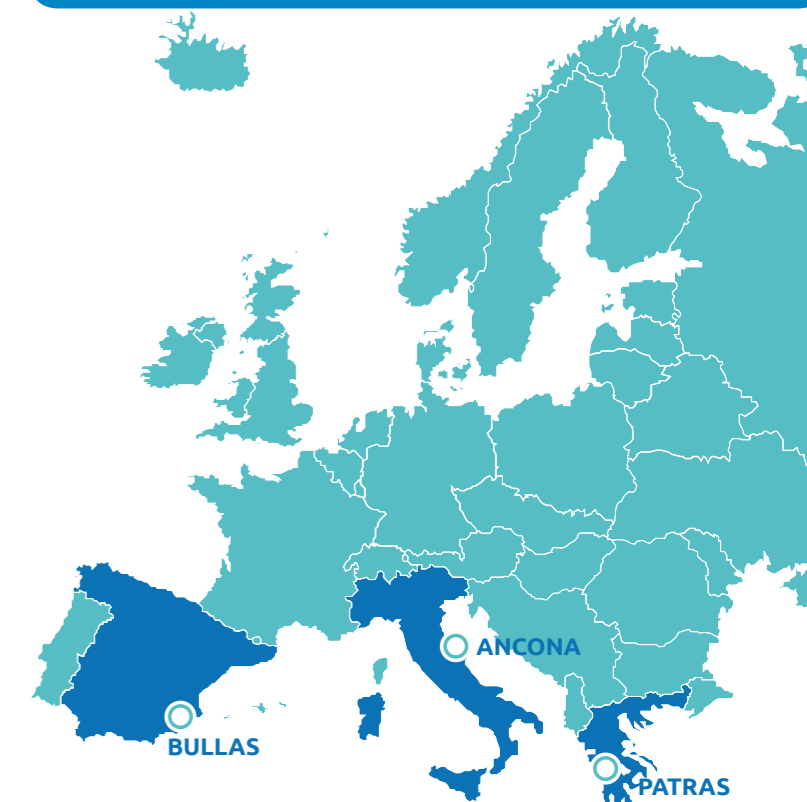
Hence, it seems to be clear that it is necessary to adopt a local *clima-smart* strategy integrating an analysis of current climate change effects while defining mitigation and adaptation policies and actions. This strategy should also envisage the adoption of smart solutions and technologies to tackle climate change.

The main goal for the project **Adapting to Climate Change (ACT)** was to develop a Local Adaptation Strategy, through a well-defined, integrated and participated methodological process, that was also shared by all local actors on the territory. This strategy is meant to take into consideration the environmental, social and economic impacts of climate change to increase the resilience of cities vis-à-vis the phenomenon.

Every region has its own peculiarities. The Mediterranean basin regions – one of the most vulnerable areas to climate change – face similar issues; for this reason it was possible to identify a common methodology and process to be replicated in several contexts. The methodology has been implemented by the three local partners of the project – the **Municipalities of Ancona** (Italy), **Bullas** (Spain) and **Patras** (Greece) – with the technical support of ISPRA – the Institute for Environmental Protection and Research (Italy) – with the collaboration of the Forum of Adriatic and Ionian Cities (FAIC).

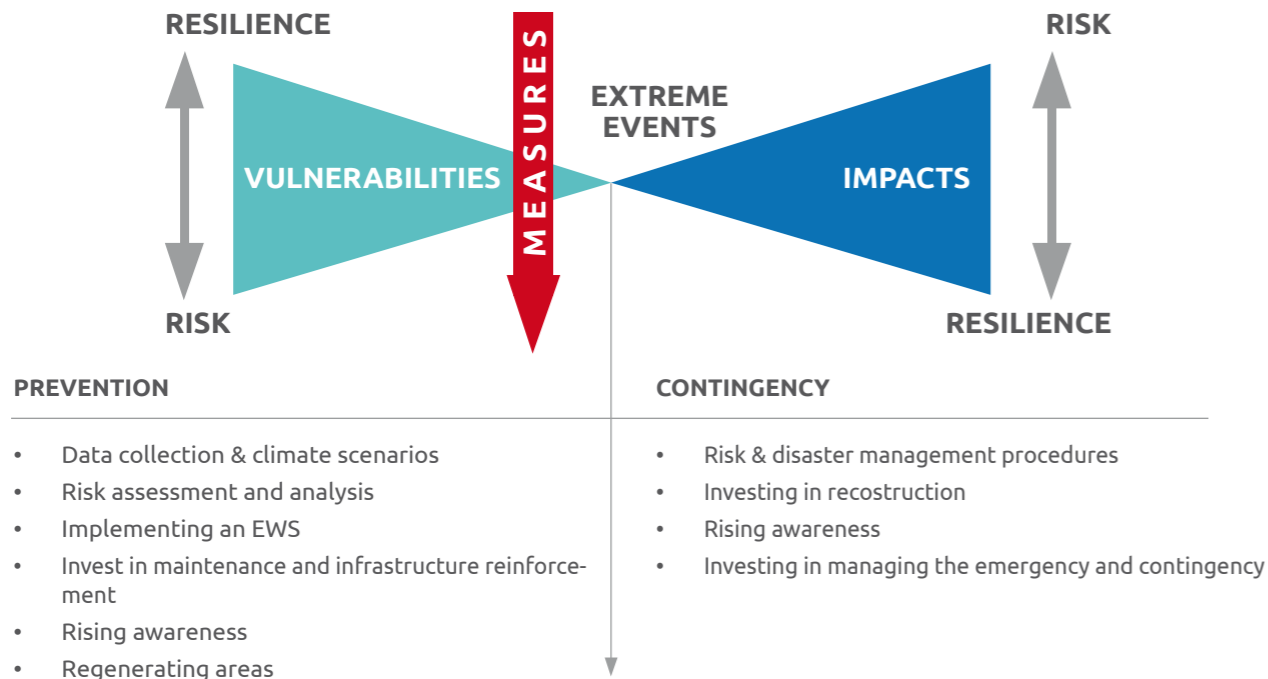
The application of this methodology allowed the three Partners to set up their Adaptation Plan, which is oriented towards the limitation of climate change impacts and the reduction of vulnerabilities for territories and local communities. Every Plan was conceived with a prime objective: **the reduction of risk caused by climate change by increasing single communities' resilience.** There is a tight, though indirect, relationship between these concepts, which can trade places according to the issue at hand: while managing climate change impacts, reducing vulnerabilities, acting on contingency or on preventing negative effects. The more the attention is focused on contingency plans – and especially by acting with delay through erratic measures – the more the impacts of climate change are considerable, thereby increasing the negative trade-off between the level of risk and the system's capability to absorb it, that is to be resilient.

THE EUROPEAN **LIFE ACT** PROJECT





REVERSE THE RESILIENCE - RISK PYRAMID



THE LOCAL ADAPTATION BOARD TOWARDS A MULTILEVEL GOVERNANCE SYSTEM FOR AN INTEGRATED MANAGEMENT OF CLIMATE CHANGE

One of the first steps taken by the Cities involved in the ACT project was the creation of a multidisciplinary and inter-sectorial working group that allowed to deal with several aspects and issues linked to climate change: the **Local Adaptation Board (LAB)**. Every City created its own LAB, which included representatives of several of the sectors involved: environmental protection, soil safeguard, water resources safeguard, civil protection, infrastructure, business and industry, tourism, communication, etc.

The definition of LABs was facilitated by the implementation of the Matrix (**Direct/Indirect Influence Matrix**), thanks to which it was possible to map the stakeholders to involve in the process. The choice was based on criteria of capacity to influence the decision-making process and on the level of competence on the topic at hand.

The process of mapping the stakeholders allowed the launch of a multi-level participation process. The first stage consisted in establishing enhanced involvement, whereby key stakeholders actively contributed in the efforts of analysis, evaluation of impacts and planning. During the second phase, participation allowed the creation of consensus and strengthened the capacity for territorial governance on climate change.

It was also thanks to this process of sharing that the Partners could start the first initiatives and foresee new ones to be launched in collaboration with business and civil society, which have an active role within the community. This process will allow Municipalities to manage the activities foreseen by the Plans and to carry out the planning of necessary measures in the future.



MAIN RESULTS

The partners of the European project ACT reached the primary goals established in the planning phase and created the necessary tools that will support local administrations in defining their Local Adaptation Plans. These encompass the:

- Definition of a **methodology** to evaluate local impacts;
- Definition of **local strategies and actions** that lead to the definition of **LAPs**;
- Development of **guidelines** to spread the results in other contexts.

Moreover, this project has a particularly important value because it allowed the three city-partners to start and set the basis for a resilience path on the territory, a crucial process for the future of the community. The project allowed to:

- Increase the **knowledge** base on problems linked to climate change and relevant stakeholders' awareness;

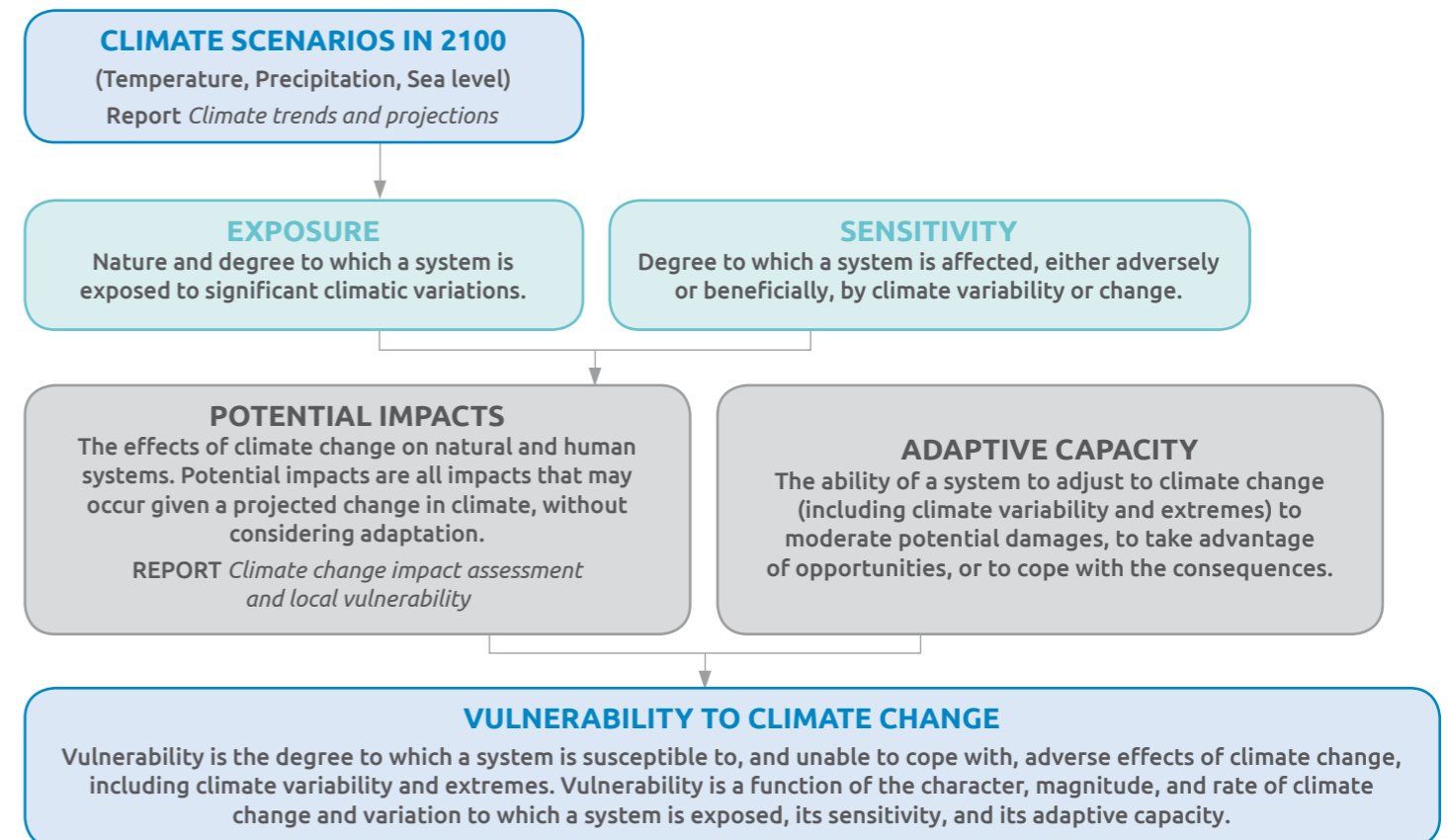
- Understand the importance of implementing **adaptation and resilience measures** to be applied in the short-medium term to tackle current **climate change** and to prevent extreme events;
- Map out all sources of information and the existing monitoring instruments to identify possible gaps;
- Create a **working-group** composed by all interested interlocutors – internal and external to the local authority – to address the issues at hand in the perspective of a public-private partnership;
- Examine more in depth climate change-related issues arising in cities and identify **solutions for the most vulnerable systems and sectors**;
- Start a **sharing process with the citizenship** on several relevant and urgent activities.

METHODOLOGY DEVELOPED AND ASSESSMENT PROCESS

ISPRA managed the methodological coordination provided by Action 3 - Local Impact Assessment, in order to ensure a common approach and a shared method for the assessment of impacts and vulnerabilities for the three partner cities.

The diagram shows the methodology adopted, defined on the basis of a thorough review of the existing literature (<http://www.actlife.eu/EN/deliverables.xhtml>: **State of the Art review on Adaptation**) and explains the definitions adopted by the Intergovernmental Panel on Climate Change (IPCC).

The methodology used involved the preparation of climate scenarios to the year 2100 for the main climatic variables (<http://www.actlife.eu/EN/deliverables.xhtml>: **Climate trends and projections**) and the development of a set of indicators for the different components of vulnerability. The impact analysis was performed using methods and models, which allowed the quantification of the future effects of climate change on the considered natural areas and socio-economic systems (<http://www.actlife.eu/EN/deliverables.xhtml>: **Climate change impact assessment and local vulnerability**). Where it was not possible to perform a quantitative analysis, consulting experts in the field carried out qualitative ones.



ACT PROJECT ACTIONS AND OUTPUTS

1. Baseline Scenario

State of the art Report and Baseline Scenario on local climate changes. It contains a collection of existing forecasting models and scenarios and experiences of Local Adaptation Plans made at the international level.

2. Local Impact Assessment

Roadmap for local adaptation to guide local authorities to adapt their territories. It contains the common methodology for the assessment of local impact applied by ACT project partners in their own context taking into account economic, social and environmental reference.

3. Local adaptation strategies

Local Adaptation Plans of Ancona, Patras and Bullas e Patrasso, elaborated by each partners within the Local Adaptation Board. The Committee is composed by all sectors of the Municipality that are interested in the initiative and by selected interlocutors representing the most vulnerable sectors. The Board is composed of the main stakeholders of all the relevant sectors selected from the vulnerable areas emerged from the local impact assessment.

4. Evaluation of project results

Project results are elaborated through a **peer review** process in order to develop the Guidelines for **Local Adaptation Plans** of ACT project, that can be implemented by other local authorities interested in developing this path.

5. Communication and dissemination

Communication is a fundamental aspect of LIFE projects, during all phases of the project and to all relevant stakeholders: public authorities, scientific community, business, associations and citizens. In particular, the work focuses on the dissemination of results and the application of the **Guidelines**.



THE ROADMAP FOR LOCAL ADAPTATION PLANS

In the context of Action 3, ISPRA prepared the Roadmap for the development of Local Adaptation Plans to climate change (LAP). The Roadmap is based on the results of previous actions, which have provided important scientific evidence on climate change scenarios in the three areas concerned. The document represents a link between the impact assessments carried out for each local municipality and its Local Adaptation Plans.

The Roadmap is aimed at providing support to start-up and to proceed with the adoption of LAPs at the local level. This process entails a definition of the most vulnerable sectors where to focus LAPs, the identification of the approach and of the strategic guidelines to be adopted at the local level. It therefore provides useful recommendations for the implementation of an effective adaptation process.

The Roadmap therefore identifies 8 categories of actions:

1. ensure political support;
2. build technical and managerial commitment;
3. planning;
4. plan the implementation;
5. plan monitoring, evaluation and review;
6. engage stakeholders;
7. integrate adaptation into sectoral policies and programs;
8. communicate and disseminate.

Finally, the paper proposes some general recommendations, based on shared principles of good adaptation, and specific suggestions for local governments responsible for the preparation of Plans.



Step 1 GETTING STARTED

Organizational and technical management and political commitment are two key features of the initial step. In addition, an initial identification of the financial resources required should be useful at this stage.

Step 2 REVIEW THE AVAILABLE KNOWLEDGE AND ESTABLISH A BASELINE

The collection of available information on the local climate and its impacts is a fundamental step to adapt to climate change and for the creation of a reference scenario. Learning from other experiences, while trying at the same time to avoid the mistakes previously committed, helps making climate change adaptation successful.

Step 3 ASSESS VULNERABILITY AND RISK

The assessment of vulnerability and risk is based on the available information collected and aims at identifying priorities for adaptation as well as knowledge gaps and needs.

Step 4 PLAN

Based on the priorities previously identified, objectives and targets should be established. Therefore, it is possible to create a portfolio of adaptation options and select the best measures based on specific criteria.

Step 5 IMPLEMENT

At this stage, it is fundamental to identify the responsibility for implementation and define the implementation tools, the financial resources and the drivers and constraints for implementation.

Step 6 MONITOR, EVALUATE AND UPDATE

The progress on adaptation are monitored and evaluated regularly through appropriate indicators. An update of the plan should be performed after a review of scientific assumptions.

During the whole adaptation policy cycle, specific cross-cutting activities should be performed, such as: the involvement of stakeholders, mainstreaming of adaptation, communication and raising awareness.

For each step, a specific chapter provides a box containing key messages and some basic theoretical concepts that are useful for a better understanding of contents and practical examples.

THE GUIDELINES FOR LOCAL ADAPTATION PLANS

The Guidelines for Local Adaptation Plans are the result of the activity carried out within Action 7 – Evaluation of project results under the LIFE ACT. The Institute for Environmental Protection and Research (ISPRA, Italy), in cooperation with the local partners of the project, elaborated the document.

While climate change is commonly perceived as a global issue, leading to an increase of the global mean temperature, its effects show themselves locally thus affecting local environmental resources, economic activities, and social aspects. Adaptation in natural or human systems in response to actual or expected climatic stimuli or their effects – which moderates harm or exploits beneficial opportunities (IPCC) – is therefore needed at all levels of administration, and cities are central in this context.

The purpose of the Guidelines is to provide practical and operational support to public administrations that are interested in starting a process towards adaptation to climate change. In particular, the main beneficiaries are those local authorities located in the Mediterranean area where similar vulnerabilities - with respect to those identified in the areas investigated during the project - might be experienced. The approach proposed is not intended to provide a prescriptive format to users - there is no approach that fits all - but it rather aims at providing local administrators with basic theoretical concepts on key climate adaptation issues as well as at offering examples of successful experiences gained during the project.

The structure of the Guidelines has been drawn on the basis of the main common elements of the adaptation policy cycle, with particular attention to the Adaptation Support Tool provided by the Climate-Adapt Platform. Below is a brief description of the steps to be followed:



LOCAL ADAPTATION PLAN – MUNICIPALITY OF ANCONA (ITALY)



Context information	<p>Ancona, a port city with an international dimension, is characterized by dynamic forces and by a historical position that determines a relation of negative synergistic effects with its urban plant/structure. In addition, it is located in an area with complex terrain.</p> <p>In the last few decades, major weather events affecting the city – either natural or artificially induced – have produced the following phenomena: the deep, great landslide of Ancona, flooding as a result of localized concentrations of impromptu phenomena of short but high intensity, coastal erosion, rising summer heat waves.</p> <p>It is expected that the increase in temperature, the uneven distribution of rainfall and sea level rise will have consequences on soil and subsoil. There will be increased coastal erosion and landslides on the road and railway infrastructures, which run behind the coastline, and on the conservation of cultural and artistic achievements.</p>
Intervention Areas	<p>The sectors identified as priority action areas are: soil and subsoil (landslides), coastal erosion, infrastructure connectivity and mobility, cultural heritage.</p>
Key Actions	<p>There is a symbolic action for each priority area of intervention.</p> <p>Landslides: enhancement and optimization of the system of early warning of Ancona's landslide, coupled with extension of monitoring landslides that are ranked as very dangerous ones (P4) in the whole municipal territory of Ancona.</p> <p>Coastal erosion: defence of Portonovo's coast obtained by moving back from the coastline bathing establishments and restaurants.</p> <p>Cultural Heritage: training for the creation of specific professionals for assessment, monitoring and analysis of the historical and cultural heritage.</p> <p>Infrastructure connectivity and mobility: restoration of full functionality and safety of the railway and the Via Flaminia.</p>
Other priority actions	<p>In order to give substance to the objectives of the Plan, the following types of intervention measures were identified:</p> <ul style="list-style-type: none"> political decisions, such as the definition of the governance process and the award of a financial budget for adaptation on the budget of the Municipality of Ancona; management actions to improve knowledge on erosion, training of new professionals, enhanced public awareness and improvement of warning mechanisms; technological infrastructure actions, for the improvement and extension of technologies for monitoring landslides and for the protection of the coasts; behavioral measures, with appropriate information campaigns for the population.
Activities already implemented	<ul style="list-style-type: none"> Early Monitoring System of Ancona landslide (24 hours). Project "Staff Exchange": cultural exchange between Italian and Swedish engineers on the themes of landslide monitoring and early warning systems. Restoring the full functionality and safety of the railway. Partner of the campaign UNISDR "My City is Getting Ready"
Local Adaptation Board	<p>The Local Adaptation Board consists of 10 members representing: FSI (Italian State-owned Railway) ANAS Regional Civil Protection, Superintendent for the Architectural and Landscape Heritage of the Marche Region, Marche Region, Polytechnic University of Marche, Ancona Province, ISPRA.</p>
What does this Adaptation Plan represent?	<p>It is the operational tool that substantiates the scopes of our slogan:</p> <p><i>Act now, because the consequences of climate change are becoming pressing</i></p> <p><i>Act together, because only with the cooperation of all stakeholders can you fully achieve the objectives of adjustment/adaptation</i></p> <p><i>Re-Act to challenges, because adaptation requires customized approaches for different challenges</i></p>



LOCAL ADAPTATION PLAN – MUNICIPALITY OF PATRAS (GREECE)

<p>Patras combines the proximity, and therefore interaction, with the sea and the mountain. As in every coastal city, the coastal zone is a very important economic element that needs to be protected and preserved. At the same time, Patras needs to protect and explore development opportunities in its mountainous part. Water represents also a vital element that connects mountainous and the coastal zones with their numerous rivers and streams. These are the main characteristics that were taken primarily into account when drawing up the Local Adaptation Plan.</p>	Context information
<p>The main areas of intervention are:</p> <p>Biodiversity-Forests: a very significant NATURA 2000 area (Mountain Panachaiko) is located inside the geographical boundaries of Patras municipality. It faces significant risk of degradation, which is aggravated by climate change. The interventions planned mainly aim at protecting this area, while providing education to citizens, as well as creating infrastructures for its sustainable use and development.</p> <p>Coastal Zone: coastal erosion is already taking place destroying public and private property, putting human lives in danger and compromising further development of tourism activities along the coast. The main interventions planned need to be of technical nature in order to protect existing infrastructures from the impact of climate change.</p> <p>Water: although current demand is met, there are interventions planned for meeting the future increase of demand, both by technical studies and by awareness campaigns.</p>	Intervention Areas
<p>The key actions in the main areas of intervention are:</p> <p>Biodiversity-Forests: implementation of the fire-protection study for the Panachaiko mountain, the Environmental Information Centre for Panachaiko Natura 2000 area, the development of a sustainable network of recreational sites and routes in Panachaiko.</p> <p>Coastal erosion: protection of coastline through ad hoc walls and protecting barriers.</p> <p>Water: the Peiros-Parapeiros dam that will provide water for the city of Patras in the coming decades, the Leakage-control system implemented by the Municipal Company for Water Supply Drainage, and the Water House information center.</p>	Key Actions
<p>It is very important to establish a monitoring system that will follow closely the impacts of climate change as well as the effectiveness of the actions taken, in order to be able to provide input for adjustments-improvements of the Local Adaptation Plan.</p>	Other priority actions
<ul style="list-style-type: none"> The Environmental Information Centre for Panachaiko Natura 2000 area and the Leakage-control system are already in place. The Peiros-Parapeiros dam, the Water House information center, and the network of recreational sites and routes in Panachaiko are expected to be concluded in the coming months. Partner of the campaign UNISDR "My City is Getting Ready" 	Activities already implemented
<p>The Local Adaptation Board is comprised of representatives of the Municipal Council, the University of Patras, the Region of Western Greece, the commercial and technical Chambers of the area, and NGOs.</p>	Local Adaptation Board
<p><i>Withstand climate change and create a safe environment for citizens!</i></p>	What does this Adaptation Plan represent?

LOCAL ADAPTATION PLAN – MUNICIPALITY OF BULLAS (SPAIN)



Context information	<p>Bullas is located about 650 metres above the sea level. This factor has a strong influence over its Mediterranean climate, giving it a higher level of rainfall (about 400 mm/year) and cooler temperatures. The increase of the temperatures and the irregular distribution of precipitations will have an influence over quality in wine production and other crops such as apricot, almond, olive, etc. The food industry, focused on the production of wine and vegetables, will be affected by this change in its production patterns and sales. Moreover, the increase of temperatures will make the hot season longer, which will have a direct effect on the number of tourists during this period.</p>
Intervention Areas	<p>For each selected area – tourism, agriculture and soil, health, transportation infrastructure – the methodology used is based on the following steps: identification of current adaptation options; how do these options need to be improved to deal with today's climate? Reduce vulnerability today? Additional strategies identified?; how do these options need to be improved to deal with future climate change and variability? Reduce vulnerability in the future? Additional identified strategies?; how to prioritize these adaptation options? how to integrate them into existing policies?, and best options for Bullas.</p>
Key Actions	<p>The main objective of the following adaptation measures is to enhance Bullas Natural Winery as a sustainable tourism option, giving value to climate change mitigation and adaptation measures. Some of the proposed actions aim to increase the adaptation capacity of the municipality on two dimensions. On the one hand, by collecting indicators that show actual tourist trends according to meteorology in order to be able to act in advance toward climate change and, on the other hand, by increasing awareness among tourists and stakeholders.</p> <p>In the agricultural sector, the displayed measures should raise awareness amongst farmers, and provide the sector with the means to adapt to climate change by creating a knowledge-sharing platform. This tool, having restricted access for the stakeholders involved, would help set up local early alert systems (meteorological, weeds and pest, etc.) and practical information about new technology, crops variety, best available techniques (BAT), etc.</p>
Other priority actions	<p>Awareness campaigns including self-protection measures and existing accessible air conditioned public facilities against thermal stress.</p>
Activities already implemented	<ul style="list-style-type: none"> • The Wine Museum has a different timetable during the summer and winter seasons. • An awning has been fixed up at the traditional craft market "El Zacatín" to create a more comfortable atmosphere for visitors from May to October. • There are indigenous trees in the public parks to provide shade and at the same time to save water when irrigated as they are better adapted to water scarcity. • We are working on decreasing the energy consumption in the whole municipality through the accession to the Covenant of Mayors and also on an Action Plan for the Sustainable Energy within the Local Adaptation Plan. • We are trying to raise the awareness of the farmers but also among the whole citizenship, to provide the means for adaptation through an instrument where knowledge is shared. Today, this instrument is the blog www.proyectoactbullas.blogspot.com. • Partner of the campaign UNISDR "My City is Getting Ready"
Local Adaptation Board	<p>The Local Adaptation Board has 13 components, which are representative institutions such as the Municipality of Bullas, the Regulating Board of the D.O Bullas Wine, the Wine Route Association and external technical experts.</p>
What does this Adaptation Plan represent?	<p><i>Adaptation is an opportunity. We take it!</i></p>



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