THE NETWORKING PLATFORM OF LIFE CLIVUT

Climate Value of Urban Trees

Partners

The LIFE CLIVUT project - LIFE18 GIC/IT/001217 has received funding from the LIFE Programme of the European Union

Coordinating beneficary

Associated beneficiaries

ARISTOTLE UNIVERSITY OF THESSALONIKI

Comune di Perugia

INTRODUCTION

Background and Aim of the Platform Meeting

We are pleased to present the publication that encapsulates the essence of the Networking Platform organized by the project, "LIFE CLIVUT - Climate Value of Urban Trees." The event was successfully held on July 1, from 8:30 a.m. to 5:00 p.m., at the picturesque Barton Park in Perugia. Moreover, participants had the opportunity to join the discussions remotely through the Google Meet platform.

The primary aim of this event was to foster collaboration and knowledge exchange among diverse projects and initiatives. By bringing together experts, representatives from European institutions, local authorities, LIFE projects, and international specialists, the platform sought to facilitate discussions centered around strategies to combat climate change within the urban context.

Throughout the meeting, engaging roundtable discussions took place, deftly moderated by knowledgeable specialists in relevant fields. These dynamic conversations provided an excellent opportunity for an in-depth exploration of various topics, allowing for the exchange of practical insights and advice among the participating projects.

The central theme of the event was the central role of the urban context in defining the 'European Long-Term Strategy 2050'. Participants collaboratively explored lessons learnt and best practices that can help urban areas design and adopt effective strategies against climate change.

This publication testifies to the dedication and collective effort of all participants, whose contributions and expertise have enriched the discourse to support the urban context in designing and adopting strategies against climate change. We hope that the insights shared here will continue to inspire and guide transformative actions toward a greener future for urban environments.

URBAN FORESTS AND ECOSYSTEM SERVICES

Panel 1

PANEL DISCUSSION: LIFE GRIN

In the case of Greece - the cities of Amarousion and Heraklion (Crete) and several other associated urban centers - the objective has been to introduce ecosystem services provided by urban green areas into environments that have typically been dominated by stone, cement and roadways. This has proved challenging given a lack of public awareness with respect to the benefits of urban green infrastructure, in part due to a lack of public information.

This continues to be the case, notwithstanding the establishment of guidelines, the identification of specific policies and actions to be implemented, and a public communications program. The absence of supporting legislation and laws has also proved to be an obstacle not only to effective implementation but also to proper urban green management.

Elena Loukakis:
HOMEOTECH, environmental management company.

This low level of public awareness, including as to the benefits of such investments to the general public, has also been a contributing factor. This would require having access to ongoing monitoring-data from the city authorities, amongst whom there needs to be greater coordination - a problem they themselves do not yet acknowledge.

Thus, LIFE GRIN project team developed an IT tool, which is to facilitate information collection and organization. This tool will incorporate a register for urban green infrastructure, accessible only to authorized users from, Municipalities and the Central Services, and will provide general information about the current situation. It aims to help the decision-making centre form a comprehensive overview of the current situation, in order to define the most fitting strategy for each area, as well as the cost of the measures to be implemented. Unlike Italy, there continues to be a lack of vision, a lack of funding, and a lack of staff.

The result, in some cases, has been inappropriate recommendations relating to specie selection thereby minimizing the positive effects that urban green areas can have on the health of local populations.

The major challenge therefore is how to raise public awareness and create the political-will amongst public authorities to invest appropriately - based on scientific evidence - in urban forests and ecosystem services.

Elena Loukakis:
HOMEOTECH, environmental management company.

PANEL DISCUSSION: LIFE VEG-GAP

The project seeks to show for three cities in Italy (Bologna and Milan) and Spain (Madrid), the effects of green spaces and vegetation on both air temperature and quality at city level - the intention being to inform both the public and governmental authorities as to the complex interaction between green areas, pollutants emissions and urban morphology. The results reveal that the cities needs to generate more data through monitoring in order to support the assessment of the simultaneous impact of vegetation on air quality and temperature including the emission of biogenic volatile organic carbon (BVOC).

A successful approach for sustainable city development requires a longer term vision and more effective coordination amongst public and private entities at city level. Effective greening of cities will require a close collaboration between urban planners, scientists, local governments, citizens, etc. and careful consideration of the effects of the several different options on the atmosphere using existing models thereby avoiding negative effects on climate, air quality and biodiversity.

Mihaela Mircea:
Research scientist, Italian National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA).

PANEL DISCUSSION: LIFE URBAN GREEN

The project includes two European municipalities in Rimini in Italy and Krakow in Poland, as well as collaboration with the University of Taipei. One of the principal objectives is to determine how to select the appropriate cultivar\tree for local soil, water and climatic conditions with the goal being to select the variety that will do best in the local environement.

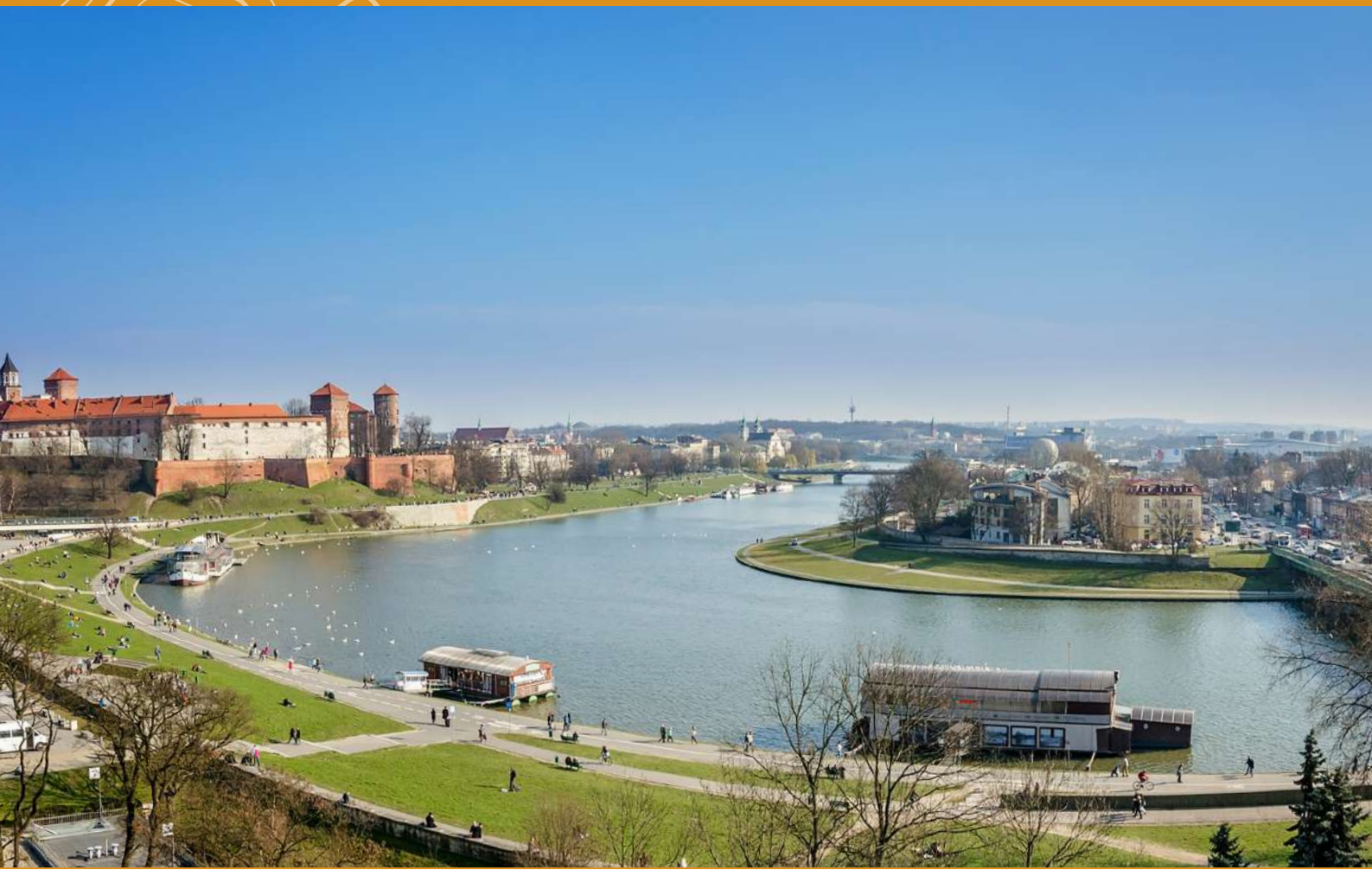
The selection criteria also take into account the extent to which the cultivar\tree contributes to reducing atmospheric CO2, improving the microclimate, and air quality. Such benefits were directly measured during the 4 years of field campaigns in which dendrometric and physiological traits of 17 woody species were characterized. Water use of the different species was calculated from transpiration data and compared to potential evapotranspiration to get the crop coefficient, which was used to schedule smart irrigation.

Alessio Fini:
Associate Professor, Department of Agricultural and Environmental Sciences - Production, Landscape, Agroenergy, University of Milan.

The project highlighted the importance of species selection for ES delivery at urban sites, but underlines the need to extend the number of species investigated. This would be crucial, because only through diversification of the urban forest will it be possible to avoid catastrophic tree losses following the recent arrival of invasive pests and pathogens, which may become increasingly destructive in the context of warming climatic conditions, as with the Ash Borer in mainland Italy and locusts in Sardinia.

Although the project lasted 38 months, a longer investigation period would have been beneficial to the project. This would have required appropriate training of project participants\ partners who in some cases were not experienced or trained researchers operating in accordance with scientific methodology.

Alessio Fini:
Associate Professor, Department of Agricultural and Environmental Sciences - Production, Landscape, Agroenergy, University of Milan.



PANEL DISCUSSION:
NATURE BASED SOLUTION AS A TOOL FOR CLIMATE CHANGE ADAPTATION AND MITIGATION

Based in Ispra, Italy, the Joint Research Center of the EU is dedicated, inter alia, to research on understanding the role of bio-diversity in growing urban areas. In Italy in particular, there has been an emphasis on identifying nature-based solutions to the impact of warming, including mainstreaming bio-diversity and greening into all new urban construction. Some 14 major urban areas have been identified.

Despite a request for government-issued guidelines, however, none have yet been produced and there is uncertainty as to the amount of financing that might be made available to apply the guidelines once completed. This seeming lack of urgency in implementation is partly attributable to the lack of scientific understanding on the part of political authorities and policy makers. Strengthening the links between the science\research institutes and policy makers is a priority.

Lorenzo Ciccarese:
Research Director, Head of the Division for Terrestrial Species and Habitat Conservation and Sustainable Management of Land Systems, at ISPRA.

ISSUES TO BE ADDRESSED

A general conclusion implicit in the comments of all the panelists is that cities are more agile than national or regional governments and can therefore more easily learn from one another and cooperate with one another. Moreover, they often have considerable autonomy over key sectors that remain large emitters of GHGs, such as housing, uban construction and transport. And yet, despite this autonomy, it is clear that, as observed in a recent report on the situation in the United Kingdom by Lord Deben, the Chairman of Britain's Climate Change Commission, "the Government has willed the ends, but not the means."

In the cases presented in today's panel, the means include both, financial and technical support suggesting, too often, an absence of political will on the part of local, as well as higher levels of authority. The key question therefore is not so much what needs to be done, but rather how can those bodies responsible for implementing ecosystem services effectively do so?

Without the resources to educate the public on the benefits to be derived from urban greening and the serious costs of failing to do so, there is little incentive for politicians and policy makers to implement policies and programs that would redirect scarce public resources away from alternative expenditures that might benefit them politically in the short term.

URBAN GREEN MANAGEMENT VS CLIMATE CHANGE CHALLENGES

Panel 2

INTRODUCTION

We are starting the discussion from the statements of the latest scientific base of IPCC report (2021) where it has been stated that land surface air temperatures have risen faster than the global surface temperature since the 1850s, and it is virtually certain that this differential warming will persist into the future as well as the frequency and intensity of hot extremes and intensity and duration of heatwaves that have increased since 1950 and will further increase in the future even if global warming is stabilized at 1.5°C.

These signals among others, are related since the non-linearity of the climate system to many consequences one of the most important is the widespread, pervasive impacts to ecosystems, people, settlements, and infrastructure given the observed increases in the frequency and intensity of climate and weather extremes, including hot extremes on land and in the ocean, heavy precipitation events, drought and fire weather, adverse impacts from tropical cyclones, with related losses and damage that have increased due to sea level rise and the increase in heavy precipitation.

Adaptation to climate change has different meanings in relation to the different areas and risk factors discussed.

These climate impacts are observed and are increasingly severe and interconnected with often irreversible impacts on ecosystems, biodiversity and human systems, giving rise to the need to diversify the response that the territory at the regional and urban level has to mitigate these impacts.

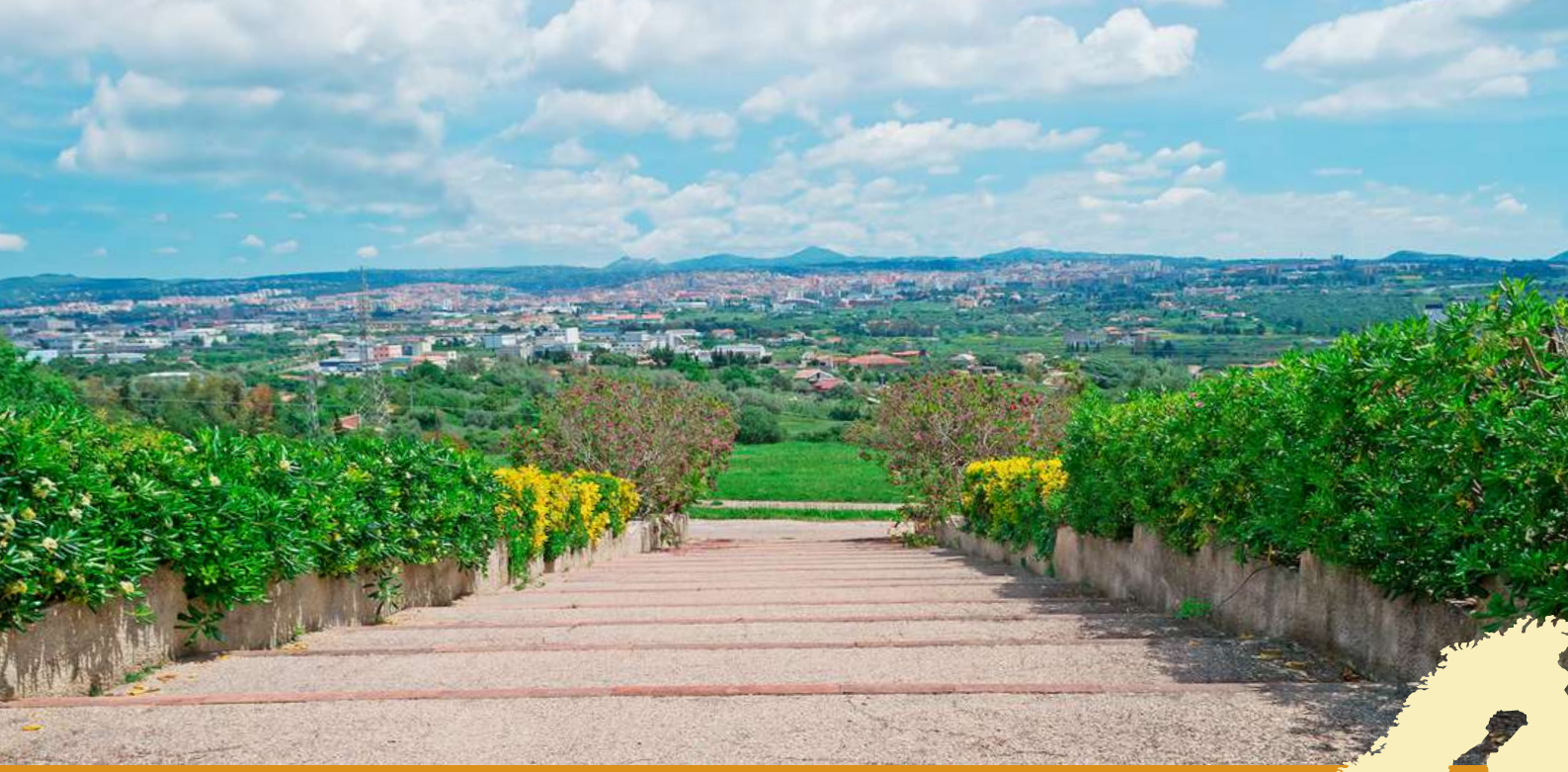
Paolina Bongioannini Cerlini (Moderator): University of Perugia, Interuniversity Center for Research on Pollution by Physical Agents (CIRIAF-CRC).

The Life Projects that we set out and discuss here aim precisely to investigate ways to mitigate and reduce the risk of irreversibility of climate impacts for a variety of possible risk factors and to reduce the vulnerability of European society, which we have seen can change in communities and regions as overtime. If adaptation in human systems, can be anticipatory or reactive to a certain risk , as well as transformational, this means that our social-ecological system can anticipate the climate change and its impacts, throughout appropriately guided policies, and social changes.

The first project we discuss (LIFE MASTER ADAPT) seems to deal with this type of adaptation. The second (LIFE DESERT ADAPT) seems to be aimed instead at mitigating impacts related to a specific aspect, soil degradation, in the context of climate change. The third project (LIFE CLIVUT) is based on the mitigation effect in urban settings produced by urban greenery.

All the projects are now dealing with very rapid changes in fundamental climate parameters that are shifting the climate average of all indicators toward very extreme statistical tails. We now ask the presenters to give us information on the mitigation and adaptation actions they think are possible at this point in the evolution of the present climate oscillation.

Paolina Bongioannini Cerlini (Moderator):
University of Perugia, Interuniversity Center for Research on Pollution by Physical Agents (CIRIAF-CRC).



PANEL DISCUSSION: LIFE MASTER ADAPT

Life Master Adapt project coordinated by the Sardinia region and having as partners two Universities, in Sassari and Venice and the ISPRA (Superior Institute for Environmental Protection and Research) and other partners, was concerned about the reaction of local authorities to the local effects of climate change, being the adaptation measures included as a global challenge in the international Paris agreement. In fact the specific adaptation measures should be tailored to the specific characteristic of the territory, because unlike mitigation actions, which are global, adaptation actions are local.

To support the local authorities and municipalities at metropolitan aggregation to manage these challenges, the project build a pathway and methodologies first by analyzing the main climate risks and vulnerabilities in two different regions and metropolitan areas (Cagliari, Sassari, Venice, and municipalities in Apulia).

Serena Marras:
Researcher at the Department of Agricultural Science, University of Sassari. Member of the IAFES Division.

Then the project tried to identify for each climate risk and analyze for each territory the principal solutions to be implemented, the adaptation measures, involving at the same time the main stakeholders and actors in the territories with the authorities at all levels by providing them with guide lance describing the methodologies to apply, to conduct vulnerability analysis, to develop policies and strategies and to plan for adaptation and to guide municipalities and local authorities to perform the main streaming.

The project was based on supporting the regions on how to insert the climate change considerations in already developed or ongoing policies when in same cases the priority was not to develop a new plan for adaptation, but a priority was to understand if already implemented policies could have or explicitly or implicitly some considerations about climate risks.

The project stated that the main streaming process consists of providing the tools on how to insert a climate risk analysis in policies and to adopt adaptation solutions effective for the territory.

The main climate risks in the regions involved were Sardinia, (fire, drought, heat islans) Lomabardy with the municipalities of Cagliari, Sassari. Venice (erosion, heat waves), Seveso (floods and heat waves), Salento in the Apulia region (drought).

Serena Marras:
Researcher at the Department of Agricultural Science, University of Sassari. Member of the IAFES Division.

PANEL DISCUSSION: LIFE DESERT ADAPT

Life Master Adapt had to do with policy related to the desertification problem in Southern Europe, with 9 partners: farmers and Universities, in Italy, in Sicily and Extremadura in Spain and in Alentejo, in the central part of Portugal.

The combination of lack of water and increase of temperature is bringing part of Europe on the edge of desertification. In these areas the lack of water is the main concern and the very low precipitation levels in the Mediterranean area brings the desertification and land degradation problem to the level where the soil loses the organic matter and becomes mineral, the plants cannot stand the conditions, and where one has to recover the land for the plants to grow.

Simona Castaldi:
Associate Professor Department of Biological and Pharmaceutical Environmental Science and Technology (DISTABiF), University of Campania Luigi Vanvitelli.

Then during the five years of the project the dramatic decrease of rainfall and increase of temperature, in periods when the farmers were used to plant (spring and autumn) and support the plants, it has made the plant and trees growth becoming more and more difficult and slow. and, since there was no possibility of irrigating them even in urban areas, to recover the plants, the need to add a structured, rich, and deep soil where roots plants can go deep, has become of paramount importance.

In order to manage and do urban greening, choices have to be taken about the kind of green that is sustainable and ecological: If there is the need to irrigate in cities, like Rome, there is the need to compartmentalize the use of water resources during the day, and therefore the choice must be to use plants that are as natural as possible as in ecological aggregation, a consortium of shrubs and trees deep soil and herbs that can survive without irrigation. We cannot think to have unlimited water resources, as if we were in Ireland, but we have to consider the impact of green and its water footprint on water scarcity related to green management.

We have to change the way of thinking in more integrated manner including to think in terms of future temperature and precipitation projections, and in term of survival and suitability of greening and what is the economic and environmental costs of all this.

The assessment of full costs in a climate different from now, from both side (economical and environmental) is needed. In the present project LIFE MASTER ADAPT the choice was to use the best practice, to preserve soil, to help vegetation in a natural way, and in general to use internal made solution is the best choice in order to think to the new green in terms of environmental, economic and social adaptation.

PANEL DISCUSSION: LIFE CLIVUT

Life Clivut was an information project where our efforts were directed to search and to collect a large amount of information about growing trees and green in urban areas. Acquire information about services and about growth and adaptation of trees and plants in urban areas, was the main goal of this project. A growing equation for plants has been introducedwithin the software used in the project in Bologna, Perugia, Lisbon, Cascais, and Thessaloniki. Different categories of green have been monitored, to have a significant picture of the green areas but also farmers have been monitored (CESAP). Life Clivut was a climate governance information project to increase the knowledge of the citizenship of the involved parts. Speaking to different categories of students as primary and high school, universities about the importance of green areas with citizen science being one of the main objectives of the project.

In the second year another goal of the project was the registration of morphological data and other trees and census plants data to the platform and map of TREE CLIVUT database, continuously updated and enriched also by the citizens. The influence of climate change in LIFE CLIVUT we have seen, using the growing equation, with a great difference between urban and forest areas. Above all in these last years with extreme events, change in temperatures and in all the climate and environmental parameters impact in the growing of plant and trees and in the urban areas where the growing equation has to be adapted to these different conditions for the soil and other parameters.

Fabio Orlandi:
Associate Professor Department of Civil and Environmental Engineering, University of Perugia.

INTERACTIVE DISCUSSION AND Q&A TIME

Suggestions about policies to be followed at different scales and areas for changes deriving form the same global trends of climate change?

LIFE-MASTER ADAPT

One has to consider the European scale with adaptation strategies at national level but also strategic objectives to be followed in different sectors. At regional and local scale (municipality scale) there is the need of high-resolution data that allow the administration to understand differences and to solve climate hazards and the characteristics of different territory.

This allow to understand also which are differences in the impact to understand the main measures to be adopted and the strategies to be implemented. At municipality scale it is important to differentiate the neighborhood (city center, industrial and agricultural areas, natural areas), the impacts could be different. We need to increase the resolution of the data to perform climate analysis. At regional and national level only, strategic objectives can be provided. There are some propositions of actions to be implemented, but the decisions should be made at local level.

Water resources are they the main problem for plants and urban areas?

LIFE-DESERT ADAPT

The problem is partially the water management because for example in the Po River there is less water, but around the agriculture is drying the water, what is in this case the right management of the water resource for trees and agriculture? The policy of water use must be linked to the regional and interregional policy. The problem is much more complex due to the change of level available for water resources and environment. The problem #1 is to choose the priorities given the climate change. There is the need of a quick change of all levels of coordination and to put fundamental priorities before others.

With such strong influence of climate change the carbon sequestration is less of what expected and all system services are conditioned and with a very simple software the data will resul far from what expected.

Suggestions:
Involve stakeholders more into the adaptation and decision process about mitigation of climate change.

STUDENTS, CITIZENS AND ENTERPRISES FOR THE CLIMATE CHANGE

Panel 3

THE PANEL

The panel was dedicated to **STUDENTS, CITIZENS and ENTERPRISES** and their role in climate change (CC) related initiatives, choices and commitment. Three experts shared their experiences and views: Ines Ramalho Cascais Ambiente in Portugal sharing some insights from the project Oxygenio, Laura Antosa from Regione Abruzzo bringing the experience from the LIFE A_Greenet, and Arianna Cecchi from ART-ER, an agency born to promote knowledge, innovation and internationalization of the Region Emilia Romagna (RER), discussing about four different projects/initiatives.

Experts reported first about environmental to socio-cultural challenges under climate change and necessary adaptation, including then views on the initial and/or reached level of awareness, interest and further expectations from the different groups.

Panelists debated about the focus to promote hard solutions (green/blue and NBS) through soft actions, i.e. enabling in the adoption of above solutions (awareness raising, creating dialogue among stakeholders, establishment of climate and health observatories, new legislations and regulations, etc.).

The main drivers of the presented projects were of two types:

Political, in line with the development of regional to local climate change adaptation strategies and plans, urban planning regulations, as well as the needed adherence to the EU carbon neutrality objectives to design and implement clear actions and accounting systems for them;

Physical, to concretely face increasing mean temperatures, extreme events like heatwaves, tropical nights and scarce to heavy precipitation periods, which impacts cities and coasts and their connected environmental resources, air quality, health, and the economy.

The solutions addressed by the projects through stakeholder involvement activities refer in particular to regeneration or creation of green areas in cities and/or along coastal forests, improving the management of these areas, adopting green/blue to nature-based solutions to improve environmental to human health, and reinforcing in general the connection of people with nature.

Then the focus was on how different groups (that is local/regional authorities, professionals, enterprises, citizens, youths and students) with different expertise, ages, roles in the society, were involved. We learnt that the type of people addressed was very wide, from students (YOUZ, Oxygenio), citizens (Oxygenio, Permanent Forum on CC in RER) to practitioners and companies (REBUS, Just Transformation, Permanent Forum on CC in RER, Oxygenio, A_Greenet), decision makers (A_Greenet, Permanent Forum on CC in RER, Just Transformation). Thus, methods and approaches were different and with different levels of "success".

The "easiest" to involve were youths (project YOUZ), also thank to the mobilization of local authorities and local grass-root movements, with very active and creative participation on the topic of ecological transition. Then practitioners were involved in REBUS through a sort of simulation to co-design - gathered in multidisciplinary teams - "green" projects for regenerating urban areas and competing in tender but with real data (city maps, climate information and projections to do what-if analysis). The preparation was a very intensive work but compensated by the participation that was very large and effective, and there has been follow-on activities on that (a game for high schools), and participants benefited in terms of increased knowledge and new ideas that many have adopted in their subsequent work.

More challenging was the engagement in the project Just Transformation, involving many types of people (companies, industrial associations, policy officers, researchers etc.) and the aim was creating first a vision and a step change in the decision making to accelerate solutions. It was tricky to engage and integrate the different views, but it was, however, a useful experience to break the ice in terms of political commitment and to start thinking more at multi-sectoral level.

Additional experience from the project CLIVUT demonstrated large participation and interest from policy makers through courses on how to manage green assets, while it was also seen that the degree of success with association of citizens, for which open-air activities were successful reinforcing the people-nature link, is also function of the quality and strength of relationships with municipality governments.

Even more challenging was to involve companies, of any type and especially small-medium: in ER 1% are large companies but 30% responded among the 300 answering to the initial survey of the Permanent Forum on CC in ER.

The most concerned about CC seems to be energy, agriculture and construction companies, although there is an unbalance among what they already did for mitigation with respect to adaptation. However, if working in small groups, discussing just around CC without competition, some interest was demonstrated with also suggestions to continue with similar initiatives, in particular involving the supply chain. Also from CLIVUT the most challenging sector appeared to be the business one, this could depend on the reputation of people that try to involve companies and for this reason it is crucial to dedicate time in clarifying benefits the companies can achieve on the short and medium term, and also to enlarge the view on these benefits along the supply chain. An advice emerged is to be sure that in the process of involving companies (especially the largest ones) in no way the activities are used as a sort of "green washing" strategy.

One of the aspects mentioned and on which there was agreement is the need of improving the co-creation: this asks for strong preparatory activities and exchange among scientists/researchers and stakeholders, in order to unifying, or however making closer, the different languages.

Costs

were recognized as the main drivers of choices and changes, a system to quantify and communicate the economic value of (co-)benefits is a challenge to address.

PROJECTS LINKS

- **LIFE GrIn:** https://lifegrin.gr/
- **LIFE VEG-GAP:** https://www.lifeveggap.eu/
- **LIFE URBAN GREEN:** https://www.lifeurbangreen.eu/
- **Joint Research Center of the EU:** https://commission.europa.eu/about-european-commission/departments-and-executive-agencies/joint-research-centre_en
- **LIFE MASTER ADAPT:** https://masteradapt.eu/?lang=en
- **LIFE DESERT ADAPT:** http://www.desert-adapt.it/index.php/en/
- **LIFE CLIVUT:** https://www.lifeclivut.eu/
- **YOUZ:** https://www.youz.emr.it/
- **REBUS:** https://territorio.regione.emilia-romagna.it/qualita-urbana/aree-tematiche/sostenibilita/rebus

  https://www.art-er.it/2020/07/position-paper-la-trasformazione-giusta-in-emilia-romagna/

  https://ambiente.regione.emilia-romagna.it/it/cambiamenti-climatici/gli-strumenti/forum-regionale-cambiamenti-climatici
- **LIFE:** https://www.lifeagreenet.eu/site/

  https://ambiente.cascais.pt/pt/projetos/oxigenio

LIFE CLIVUT

CLIMATE VALUE OF URBAN TREES

Partners

The LIFE CLIVUT project - LIFE18 GIC/IT/001217 has received funding from the LIFE Programme of the European Union

Coordinating beneficary

Associated beneficiaries

ARISTOTLE UNIVERSITY OF THESSALONIKI

Comune di Perugia