

AN INTEGRATIVE APPROACH FOR THE DEVELOPMENT OF ENVIRONMENTAL STRATEGY IN THE CLIMATE CHANGE CONTEXT. THE PERSPECTIVE OF LOCAL PUBLIC AUTHORITIES' ACTION

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Abstract

The present research aims at the identification, characterization, and procedural substantiation of the model for the environmental strategy development (feasible, efficient and effective) to achieve the objective of a sustainable (green) local community, by considering the phenomenon of climate change. Three quantitative studies preceded the qualitative research for the development of the conceptual model: (1) Research on citizens' perception, knowledge, attitudes and behaviour towards climate change with Timisoara citizens; (2) Research on exploring the training needs of public servants (from Timis county) in the knowledge field of climate change and sustainable energy consumption; (3) Research on nature-based solutions and green infrastructure for climate change mitigation and adaptation. We have extended the legal framework of the qualitative study with an inventory of contextual and phenomenological premises given by the European Covenant of Mayors for Energy and Climate and details of the Green European Capitals. The ultimate objective of the presented holistic approach to developing the environmental strategy is a resilient urban community (capable of adapting to change while continuing to function normally and continuously develop itself satisfying citizen needs).

Key words: climate change, conceptual model, environment strategy public authorities, sustainable local community, qualitative research.

INTRODUCTION

Currently, local energy and climate strategies need to fit into European policies in this area, considering the 2030 target of reducing greenhouse gas (GHG) emissions by 40% compared to the 1990 baseline, and more recently by considering the long term aims to be climate-neutral by 2050 (an economy with net-zero greenhouse gas emissions) (European Commission, 2021b; Ulpiani et al., 2024; Petrea et al., 2023). At global level, the effects of climate change are already visible and unavoidable due to the inertia of the climate system, but the actions to reduce emissions can help to decelerate the process of aggressive effects (global warming, depletion of freshwater resources, average global sea level rise, etc.) (Fekete et al., 2021; Scorza & Santopietro, 2024).

As evidenced by the new pledges made by the Covenant of Mayors Europe signatories (Melica et al., 2022) or the number of city actors in the United Nation's Global Climate Action Portal (UNFCCC, 2020), many cities have begun to

adopt the policies required for achieving climate neutrality by the year 2050.

To enjoy the benefits of reduced (GHG) emissions, climate adaptation and resilience, energy poverty eradication, and digitalization, among other things, cities are putting forth their own energy and climate policies and action plans. By testing these solutions, social and digital innovation, creative solutions for climate policy, governance frameworks, and funding schemes that might be replicated or expanded across governance levels, cities are also serving as experimentation and innovation hubs (Ulpiani et al., 2024). Furthermore, for many years, cities have benefited from the methodological advice, technical assistance, exchange of best practices, and chances for peer-to-peer learning provided by voluntary initiatives like the Covenant of Mayors (Melica et al., 2022) also, supporting the Sustainable Development Goals (SDG) target by local communities.

The European Commission established the 100 Climate-Neutral and Smart Cities Mission (hereinafter, the Mission) in 2021 in recognition

of the role that cities play in achieving the European Green Deal goal (European Commission, 2019). The Mission's goal is to deliver at least 100 climate-neutral and smart cities by 2030, thereby serving as a model for other European cities to emulate by 2050. A request for Expressions of Interest (EOI) was sent to communities to choose the cohort of climate neutral cities. The EOI consists of 374 questions that cover every important topic to assess a city's readiness, ability to produce outcomes, and ambition. 362 eligible cities responded to it, making the dataset that was produced the first of its type to show the status of ambitious cities' efforts to mitigate climate change in Europe and beyond (Melica et al., 2022).

In this context, the present study aims at the identification, characterization, and procedural substantiation of the model for the environmental strategy development to achieve the objective of a sustainable (green) local community, by considering the phenomenon of climate change. This is a synthesis of several studies developed in the last five years, most by considering the case of Timisoara city area and the metropolitan surroundings (Romania, West Region). Three quantitative studies preceded the qualitative research for the development of the conceptual model and based on the results achieved there have been designed a holistic approach to develop the environmental strategy is a resilient urban community.

MATERIALS AND METHODS

Research on bibliography and state-of-the-art on topics as "climate change" + "local impact" + "mitigation solutions for local communities" (completed by sourced information on legal aspects and from grey literature, as EU state reports and consulting companies' studies and reports) + "good governance practices" (at the local communities' level, for public bodies) has highlighted those environmental strategies, developed by integrating "climate change" aspects are rare and diverse. Overall, this type of strategies must aim to limit greenhouse gas emissions and their negative effects (Bere-Semerédi & Sirbu, 2022; Bere-Semerédi, 2023b).

From a praxiological point of view, dedicated climate, and energy plans (addressing concepts on the impact of climate change on the natural and anthropogenic environment, potential and residual impacts, vulnerability, adaptation, and resilience) need to be developed integrated with economic, social, and environmental development strategies (Bere-Semerédi, 2023b). The premises of this research are also given by the national legal framework on the development of energy and climate plans related to the National Strategy for Sustainable Development of Romania Horizons 2013-2020-2030 (Ministry of Environment, Water and Forestry, 2018; Ministry of Environment, Water and Forestry, 2020), and those at European level, of the existing guidelines, elaborated under the aegis of the "Convention of Mayors for Climate and Energy", by the SDG as described in the documents, reports and recommendations of the United Nations (UNFCCC, 2020), and which create a global but also local framework on sustainable development. In addition, efficient management of the urban environment requires an understanding of the interactions between policy options/decisions, proposed associated objectives and real processes, covering complex social, economic, technical, and environmental aspects that manifest themselves at local level (of an administrative territorial unit, ATU) (Ministry of Environment, Water and Forestry, 2018; Ministry of Environment, Water and Forestry, 2020).

As a result of these considerations, the approach and resolution of the research theme is linked/determined to the local context Timisoara city, Timis county, Romania, connected to the global one through the normative-legislative dimension. A generic schematisation of the research approach is presented in Figure 1 with details in Table 1. Generally, the proposed approach is based on:

- (1) *Theoretical research* oriented towards the study, characterisation, and analysis of practices (from strategic and tactical level) of local public authorities in Romania, but also of cities (leaders at European and global level), to understand the guidelines, approaches, methodologies specific to this approach and of innovative methods developed (existing best practices). Critical

analysis of good practices will allow the design of a model for developing and implementing a feasible, efficient. Designing an effective approach environmental strategy to achieve the goal of a sustainable local community. Furthermore, research will seek to identify knowledge gaps/skills of staff in public organisations, those involved in development, implementation, monitoring, and evaluation of the results of such strategies (operational level staff) (Burke et al., 2015; Bolsen & Druckman, 2018);

- (2) *Applied research* with the main purpose of conducting a pilot investigation on the level of implementation, implementation of strategic environmental planning (in the context of climate change) at the level of local public authorities. Thus, knowledge capitalisation was achieved in terms of the level of training, responsiveness of employees from various ATUs to adopt and implement the model for developing and implementing a feasible, efficient, and effective environmental strategy for achieving the goal of a sustainable local community (acceptability testing and validation) (Pennycook, 2023).

The research context targeted the national local public authorities, but also public and private organisations in Timisoara and the Growth Pole. The results of the research on climate change will make it possible to compare them with those of other cities (benchmarking), which will help define the research gap and the original innovative approach of the strategic model for environmental protection in the context of climate change for the development of a sustainable community.

The main operational objective of the research was to analyse the concrete ways in which an ambitious environment strategy considering climate change could be developed, by a multidisciplinary team, engaging all stakeholders of the community, including the co-creation and future co-implementation of the plan and action measures for reducing, mitigating and adapting to the effects of climate change; communication (internally and externally) has to be considered, too.

In approaching research, the issue of climate change was the central objective, being the subject of strategic thinking and planning. The secondary objectives pursued by the research were:

A second objective pursued by the research will be dedicated to the need for training of the climate strategy planning team, the theoretical and practical knowledge in the field being incomplete. The lack of formal and informal educational curricula in the field of climate change generates (missing complete in 80% of the higher education specializations), on the one hand, a lack of commitment on the part of the collectives in public or private organisations - employees and coordinators of departments/managers, lack of performance or what is even worse inaction. In the current context of climate change, public administration cannot have a passive attitude, or here we even talk about addressing a second aspect, that of managing change, organizational behaviour and good governance through transparency, accountability, participation, efficiency, and coherence (Bere-Semerédi, 2023b).

A third objective was related to stakeholders' management, but especially considering citizens and groups of citizens. The interest in stakeholder management lies in their importance in the effective implementation of climate change measures and actions. A climate strategy developed with excellence can become unopenable or partially effective without the active involvement of civilian actors. Identifying each group in civil society, assessing knowledge, attitude, perception of climate change and understanding potential inputs in that from the strategic planning phase is essential, otherwise the climate strategy risks being emptied of participatory content (Bere-Semerédi, 2023b).

A fourth objective was related to communication in the phase of strategy development in the climate change context, as a basis for transparency.

Organisational and external communication activity is to be analysed from at least the following perspectives: information, awareness, confidence building, transparency of actions, engagement/activation of stakeholders (Bere-Semerédi, 2023b).

Table 1. Methods and tools used in different stages of the approach

Research stages	Target groups/research context	Methods	Tools
(1) Citizens' perception, knowledge, attitudes, and behaviour towards climate change (Bere-Semerédi & Bere-Semerédi, 2019)	Timisoara citizen (West Region of Romania)	Survey Public debate and consultations	Designed Questionnaire (1) Excel and SPSS software Interview protocol (1) Semantic analysis
(2) Exploring the training needs of public servants in the knowledge field of climate change and sustainable energy consumption (Veliscu et al., 2018; Bere-Semerédi et al., 2020)	Public servants from Timis county, Romania	Survey Debate on public institutions readiness	Designed Questionnaire (2) Excel and SPSS software Interview protocol (2) Semantic analysis
(3) Nature-based solutions and green infrastructure for climate change mitigation and adaptation (Bere-Semerédi et al., 2023a).	References and legal documents 2020-2023	Literature review	WoS, SCOPUS data bases

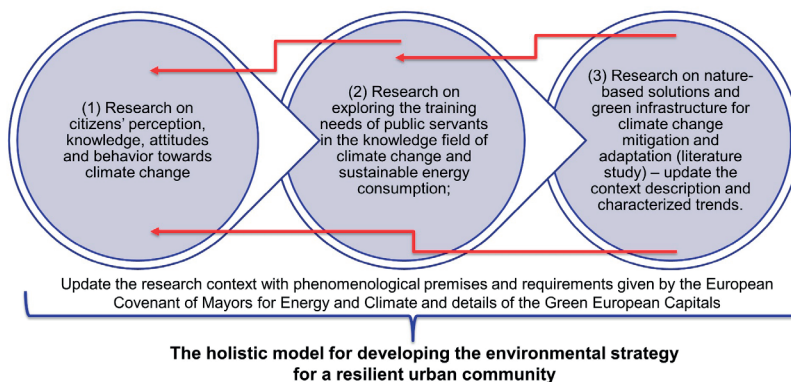


Figure 1. The research methodology

RESULTS AND DISCUSSIONS

In the following sub-chapters are briefly presented some valuable results and conclusions of different research stages.

Results on the citizens' behaviour towards climate change

The complex research scenario together with the results achieved in 2019 are presented in (Bere-Semerédi, & Bere-Semerédi, 2019). In the second research stage of 2020, the same research scenario has been applied with a sample of more than 1200 citizen of Timisoara city (Romania). This research was of great interest for the City Hall of Timisoara - Environmental Directorate that elaborate and implement the "Sustainable Energy Action Plan of the Municipality of Timisoara for 2014-2020" and has responsibilities for designing the Climate

Change Action Plan of the city (being signatory of the Covenant of Mayors for Climate and Energy). Generally, by compared the research results from Timisoara, Romania with those provide by the Climate Action and the Environment Energy Report in 2023 (EC Eurobarometer, 2023) the situation is better, in term of climate change mitigation.

One of the main conclusions of study in 2023 was that 40.50% of respondents said that they thought that climate change was the most important issue facing the world. Furthermore, men in the sample are more likely than women (52.6%) to see climate change as the world's most pressing issue (63.4% vs 52.6%). Respondents aged 50 or over, closely followed by those in the 18-25-39 age groups, are the most likely to identify climate change as the single major global problem. Residents of

condominiums and rural homes, as well as those with high levels of education and those who never or almost never have trouble paying their bills, are more likely to identify climate change as one of the most serious problems facing the world at large. Timisoara citizens believe that "climate change" is the most important problem facing the globe (53%), followed by "poverty, hunger, and lack of drinking water" (34%) and "the economic situation" (including international conflicts) (43%).

Respondents recognized that "international terrorism" has been identified as the only worldwide threat, ranking 15.68%. During the study in 2023, Timisoara had a greater percentage of responders (64.6%) identifying "the increasing global population" and "the spread of infectious diseases" as two of the most important worldwide issues; the terms as "armed conflicts" and "proliferation of nuclear weapons" were used less frequently than were identified by the (EC Eurobarometer, 2023). Overall, 94% of the respondents in the research sample have mentioned "climate change" as one of the most serious problems facing the world today. Regarding the responsibility for addressing climate change, nearly 7 out of 10 respondents cite business and industry and regional/local authorities (EC Eurobarometer, 2023). When it came to the response indicating the respondent's personal responsibility for addressing climate change, a high and surprising proportion of 54% was noted. The percentage of respondents who believe that each of the parties on the list has some responsibility for combating climate change was 44%, which is higher than the 2019 survey.

In brief, Timisoara citizens views "climate change" as the world's most pressing issue,

ranking ahead of economic conditions, hunger, poverty, and a shortage of clean drinking water. Most Timisoara residents consider climate change to be a critical issue facing humanity in the present and in the next years, too. These conclusions indicate a higher awareness on the climate change problems and most for responsibility in addressing and managing climate phenomena.

Results on exploring the public servants' training needs for climate change

In the second stage of the research there has been investigated the public servants' readiness for providing a valuable and relevant action on climate change mitigation. First study was developed in 2020 (Bere-Semerédi et al., 2020) and 67 valid questionnaires were processed and recently, the same research scenario has been applied with an extended sample (243 valid answers) at the West Region of Romania (5 counties).

Table 2 shows the research results related to the knowledge domains and subdomains which, highlights the need for specialized courses in some domains (bold figures): "GHG emissions reduction", "energy consumption", "waste management" and "energy efficiency" ("Very strong level of knowledge"). In addition, it was not surprising to see the survey's conclusions about the training materials, techniques, and multiple-choice method of knowledge transfer (Figure 2). "Respondents usually obtain professional information and knowledge (associated with a self-learning process) from scientific resources, legislation (including laws, norms, and standards) and their involvement activities in different projects, with different partners".

Table 2. Methods and tools used in different stages of the approach.

Topics under survey Knowledge Assessment	1	2	3	4	5
	No knowledge	Low level of knowledge	Moderate level of knowledge	Strong level of knowledge	Very strong level of knowledge
	%	%	%	%	%
GHG emissions reduction	2.45	3.43	5.75	52.00	85.00
Climate change adaptation	2.00	4.13	5.65	67.50	25.50
Sustainability concept	0.00	1.25	2.50	2.50	0.00
Water Consumption	0.00	3.96	35.82	44.00	24.50
Energy Consumption	0.00	3.46	37.31	61.00	75.50
Waste Management	0.00	2.97	38.81	63.25	80.44
Circular Economy	0.00	2.00	7.31	6.50	8.96
Energy efficiency	0.00	2.25	37.31	68.50	78.96

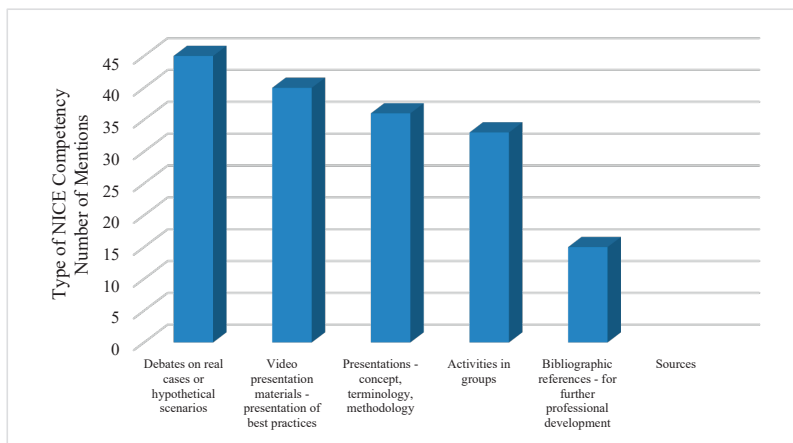


Figure 2. Research results on the adequate training method and information transfer

As the study research result, the debates on actual cases or working on hypothetical scenarios, video presentations of case studies, and the presentation of concepts, terminology, and methodologies followed by group activities (learning, interaction, and work) are the most pertinent training/training methods that could speed up the transfer of information and knowledge of the public servants. The study underlined also, that the public bodies leadership role and the “spirit of organizational learning” were mentioned and most appreciated by respondents as drivers of full filling the knowledge gaps of public servants.

Results on exploring the nature-based solutions and green infrastructure for climate change mitigation

In the last stage of the research there have been developed an inventory of relevant data on nature-based solutions (NBS) and green infrastructure just to identify the most interesting and attractive solutions for climate change mitigation. The main idea was to characterize "good behaviour" in addressing climate change (Bere-Semerédi et al., 2023a). The subject of NBS is multidisciplinary, and complex. Recently, NBS concept and approach have become increasingly appreciated in European cities as a response to addressing urban challenges such as climate change, urban degradation, and obsolete infrastructure;

relevant results on the effectiveness of relevant solutions are still needed.

The bibliographical analysis aims at presenting managerial models or approaches of NBS, in a transdisciplinary manner, by considering actual context of climate change and the related risks. As a result of the research conducted, a consistent bibliographic analysis and synthesis was presented regarding the areas of interest of NBS, key issues addressed and references. All these NBS can be considered and included on the local agenda of local authorities, after a thorough analysis of their effectiveness, with a view to maximising ecosystem benefits. Thus, a problem raised by NBS is co-design and co-participation in implementation to ensure the highest level of community acceptance, after a cost-benefit analysis of possible scenarios (Bere-Semerédi et al., 2023a).

The research on NBS and green infrastructure, as practical ways to mitigate and adapt to the effects of climate change, was approached because of the study of green strategies at the level of European cities/communities, being analysed the candidacy applications of the European Green Capitals. The most relevant common aspect identified in these pioneer cities is that the process of greening, urban regeneration, increasing the quality of life and ensuring the well-being of the inhabitants, for adapting to climate change, is based on NBS.

The model development and testing the public institutions readiness for its implementation

Research results indicate the following key aspects in the strategic planning process:

- (1) The need to involve the citizens in climate actions, by participating as an active and responsible partner, alongside the local public authority. Mitigation and adaptation to climate change and achieving a climate resilient and adapted community status, as a process initiated by the local public authority, supported by the community, through a participatory, transparent planning process and effective climate communication.
- (2) Education for the environment and climate change must be viewed and approached from a double perspective: of information, professional training and increasing administrative (public bodies) capacity at the level of local public administration, organizations, and companies, but also of informing, awareness and increasing the responsibility of the population regarding the new challenges related to environmental issues. Correctly informing citizens contributes to a much firmer commitment and the creation of a critical mass for the voluntary implementation of climate actions at the level of everyone, family and organization and the long-term adoption of a pro-environmental, pro-climate behaviour.
- (3) Communication for environmental protection and climate change plays a crucial role in strategic planning for climate change, being addressed both to climate sceptics and those convinced of the existence and manifestation of the phenomenon at global and local levels. Clear, simple communication based on scientific data and evidence, without exaggeration and with a strong, exemplifying narrative, tends to be one of the success factors of strategic planning, especially if this communication is designed and adapted for each target group and used a greater

diversity of forms and channels of communication.

Finally, as a synthesis of the research results and personal experience in the field, the proposed model for strategic planning for the environment and climate change is presented in Figure 3.

The key elements of the strategic planning model for environment and climate change can be seen in Figure 3. The entire process of strategic environmental planning in the context of climate change is aimed at a bottom-up approach at both the organizational and community level. This aspect must aim at a proactive attitude of public services and civil servants from the specialized departments, with a predilection for the environmental protection departments and the management of emergency situations, so that the triggering factors are those who are aware, supported by the knowledge and understanding of the phenomenon of changes climate, of the risks on the community and in no way generated by a reactive attitude, in response to climate effects manifest at the local level, difficult to control, avoid and with economic and social consequences.

The strategic planning approach must be animated by scientific research data and indisputable evidence on climate change, motivated by the whole context of transforming communities into sustainable, low-carbon urban or rural settlements, the green and energy transition, the opportunity the transformation of public and private spaces through sustainable urban regeneration processes, according to the real needs of the inhabitants. The chance to test and implement innovative investment projects, thanks to European funding, as well as the opportunity to be part of the digital transition that society is currently going through are new arguments to justify the approach of strategic planning for climate change.

The process of initiating strategic planning, supported by political factors, through local elected officials, as well as by the management at the highest level of the organization - mayor, president of the county council, also involves the formation of an action group (Task Force Team), made up of specialists with a good knowledge of the fields of environmental protection, ecosystem services (biology, zoology, environmental engineering) but also of related fields, such as: energy management,

landscape architecture, biology, ecology, spatial development and urban planning, public policies, communication climate and stakeholder engagement, digital solutions and information technology, entrepreneurship and circular economy. This multidisciplinary approach is the key to successful strategic planning for environmental protection, mitigation, and adaptation to climate change by addressing complexities in an integrative way with robust participatory support. The logical process of the activity must be based on well-defined procedures, in a logic and sequencing of the processes, following well-defined working principles, the role of each team member must be well determined, with

well-defined attributions through the job description, and the resource time allocated to the activity should be sufficient to thoroughly organize and carry out individual and team activities, but also to ensure moments of reflection and evaluation of the implemented actions and measures. As graphically explain in Figure 3, the strategic vision for mitigating and adapting to climate change and increasing resilience, the mission and specific objectives of the strategic planning approach are to be associated with key energy and non-energy areas relevant at the local level, supported by the analysis of local risks and vulnerabilities.

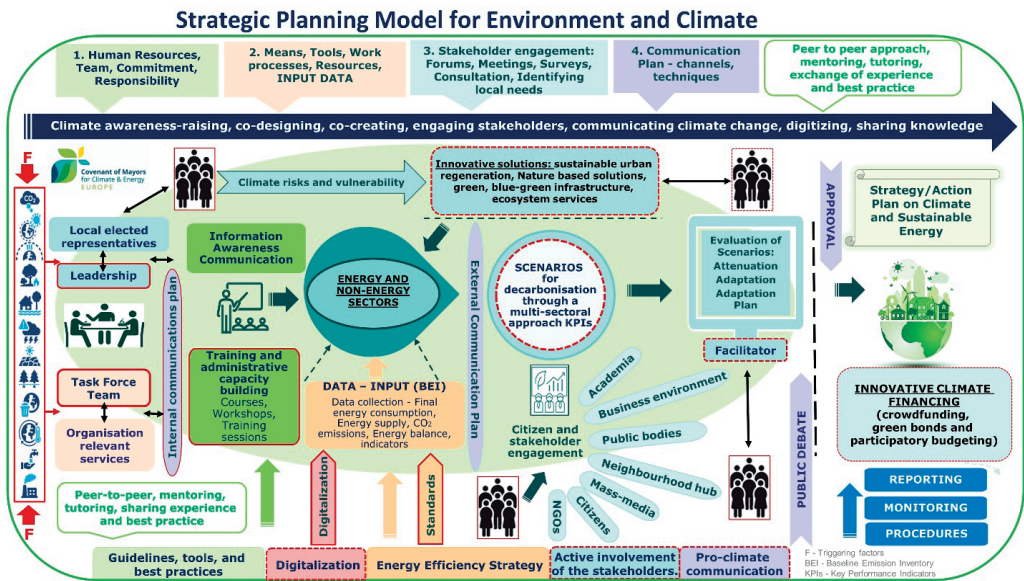


Figure 3. The proposed holistic model for developing the environmental strategy for a resilient urban community

The climate scenarios that will be developed must be based on cost-benefit analyses, and the key indicators for the implementation of strategic actions and measures will be monitored using the Plan-Do-Check-Act cycle, through the collection of climate data, data processing and analysis, results, and information, always having the possibility of adjusting the performance and result indicators.

The internal and external communication process must be permanently supported by clear and strong messages, with robust data and information, through narrative techniques and

the use of communication channels as diverse as possible, adapted to the targeted target groups. For effective communication, making a climate communication plan is very important, connecting this plan with organized climate activities and events is very important.

The pillars that contribute to supporting the strategic planning model for the environment in the context of climate change are: (1) Education for the environment and climate change; (2) Communication on climate change; (3) Engaging stakeholders in strategy co-design and co-implementation of environmental actions; (4)

Digitization and smart solutions in strategic planning for the environment and climate change.

CONCLUSIONS

The presented research was permanently anchored to the praxeological dimension of the environmental, social, and economic phenomena addressed (feed-backs and loops between researchers and practitioners), so that they could be articulated in several recommendations regarding issues such as dilemmas or uncertainties that practitioners may face, as presented in the following:

1. The strategy must be built based on a simple, easy-to-understand structure throughout the development process, including in the case of the environmental strategy in the context of climate change. From this perspective, the success of an environmental strategy depends on two options: the decision of the political decision-makers and that of the local administration to be engaged in the protection of the environment and the urban settlement against climate change and the decision to succeed by reaching the set objectives and targets.
2. The flexibility of strategic documents is the most convenient solution and without being intimidated by the process of developing or revising the strategy, the leadership must take this step, after proper monitoring and evaluation.
3. Testing the logic of strategic thinking and the ongoing analysis of environmental risks are two actions that improve strategic options. Focusing on costs, capabilities, and rigid planning can be pitfalls for the strategy development team, because the planning activity tends to dominate the strategy.

One of the future research opportunities is to extend the research through a longitudinal study that analyses the evolution of the strategy in the implementation process, through the study of strategic environmental management. It will also be appropriate to replicate this study on other local government organizations that wish to develop or update their energy and climate change strategy or environmental strategy,

future research could “test” and develop the results of this research.

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