

E-CONOM

Online tudományos folyóirat | Online Scientific Journal

Főszerkesztő | Editor-in-Chief
SZÓKA KÁROLY

Kiadja | Publisher
Soproni Egyetem Kiadó |
University of Sopron Press

A szerkesztőség címe | Address
9400 Sopron, Erzsébet u. 9., Hungary
e-conom@uni-sopron.hu

A kiadó címe | Publisher's Address
9400 Sopron, Bajcsy-Zs. u. 4., Hungary

Szerkesztőbizottság | Editorial Board
CZEGLÉDY Tamás
HOSCHEK Mónika
KOLOSZÁR László
TÓTH Balázs István

Tanácsadó Testület | Advisory Board
BÁGER Gusztáv
BLAHÓ András
FARKAS Péter
GILÁNYI Zsolt
KOVÁCS Árpád
LIGETI Zsombor
POGÁ TSA Zoltán
SZÉKELY Csaba

Technikai szerkesztő | Technical Editor
TAKÁCS Eszter

**A szerkesztőség munkatársa |
Editorial Assistant**
IONESCU Astrid

ISSN 2063-644X



SÜTŐ, Attila¹

The role of strategic planning and territorial aspects of sustainability and climate adaptation activities

The challenges of climate change and the necessary planning/development responses are of special importance. Climate change occurs in the geographical space, resulting in territorially different challenges and requiring diverse responses. Territorially conscious planning of these; territorial monitoring & evaluation (MRE) of their effectiveness are thus fundamental policy tasks. However, the weight of territorial approach in adaptation practice is in question. The article overviews the recent scientific literature on adaptation planning/MRE; introduces the most distinguished territorial levels of adaptation planning and examines the recent approaches in its “spatiality”. The literature concentrates mainly on linkages between strategic planning and adaptation; few studies went further than focusing on a given country’s or region’s settlements, or identifying planning practice-related problems and structural limitations at different territorial levels. The detailed examination of territoriality/spatial aspects in adaptation in European countries have not been explored yet, indicating the need for further research in this field.

Keywords: climate change, adaptation, strategic planning, monitoring, evaluation, sustainability

JEL Codes: Q54, R58

A stratégiai tervezés és a területi szemléletmód szerepe a fenntarthatósági és klímaadaptációs tevékenységekben

Az éghajlatváltozás kihívásai és az ezekre adott tervezési/fejlesztési válaszok különösen fontossá válnak napjainkban. Az éghajlatváltozás a földrajzi térben jelentkezik, területileg eltérő kihívásokat eredményezve, és változatos válaszokat igényelve. Ezek területileg tudatos tervezése; eredményességük területi monitoringja és értékelése (MRE) alapvető szakpolitikai feladatok. A területi megközelítés súlya azonban kérdéses a gyakorlatban. A cikk áttekinti az adaptáció tervezésével/MRE-vel kapcsolatos legújabb szakirodalmi eredményeket; azonosítja az alkalmazkodási tervezés legfontosabb területi szintjeit, és megvizsgálja „térbeliségének” legújabb megközelítéseit. A források főként a stratégiai tervezés és az alkalmazkodás közötti összefüggésekre koncentrálnak; kevés tanulmány ment tovább annál, mint hogy egy adott ország vagy régió településeire fókuszáljon, vagy a tervezési gyakorlattal vagy módszerrel kapcsolatos problémákat és strukturális korlátokat azonosítson különböző területi szinteken. A területi vagy térbeli szempontok klímaadaptációs alkalmazásának részletes vizsgálata az európai országokban még nem történt meg, ami további kutatások szükségességét jelzi ezen a területen.

Kulcsszavak: klímaváltozás, klímaadaptáció, stratégiai tervezés, monitoring, értékelés, fenntarthatóság

JEL-kódok: Q54, R58

¹ Sütő, Attila PhD Student, Corvinus University Budapest International Relations and GeoEconomics Doctoral Programme | Chief Planner, Energy Strategy Institute National Adaptation Division. (attila.suto@uni-corvinus.hu; attila.gergely.suto@enstrat.hu).

Introduction, objectives

Climate change impacts and climate adaptation as the provider of responses to and ways of preparing for these impacts have been getting more important in development policy and everyday life. Municipalities, micro-regions, regions, and states show increasing activities in adaptation-oriented policymaking, strategic planning, monitoring, reporting and evaluation (hereinafter: MRE) of climate adaptation actions. However, climate impacts, consequences, and adaptive capacities differ in each location/region. The question is how these planning, and MRE actions contribute to achieving climate policy and sustainable development goals? How and at which territorial level can they consider the aforementioned spatial varieties of impacts and interventions, and do they use territorial thinking and territorial aspects?

Introduction of the topic

Significance of the topic

The challenge of climate change is of crucial geo-economic importance. It is among the most important phenomena that have recently influenced the discourse of sustainable development (Qureshi, 2019). Beyond the changes in climatic factors, the growing intensity and frequency of weather extremities can also be experienced. These can have serious environmental, social and economic consequences, causing growing vulnerability of the exposed sectors and communities. Additionally (or instead: principally), climate change occurs in the geographical space. Its spatial impacts further deepen the existing regional and settlement network-related differences and economic/social inequalities.

Hungary and Central-Eastern Europe are among the vulnerable parts of the continent. However, the region's countries are not among the most significant GHG emitters, so in their case, the adaptation to and preparation for climate change impacts are more important issues than emission reduction. In the region, highly vulnerable sectors and regions emerge. The countries' national strategies and geopolitical positions can only be managed appropriately with consciously handling the challenges of climate change, especially adaptation in their strategic planning and development policy.

As a consequence of the processes mentioned above, adaptation has come to the fore across the world within development policy and climate policy itself. Its history started in the mid-to-late 1990s when local causes and impacts of climate change first attracted greater attention. The 2001 Marrakech Accords was the first Conference of Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) that recognized adaptation as an element of climate policy². Since the middle of 2000's, developed countries have paid more attention to adaptation issues (Schmidt, 2009) and have begun writing and adopting comprehensive national adaptation strategies (Woodruff & Regan, 2018). International and national programmes to develop local climate action plans and support decision-making appeared, though these "first generation" documents dealt with mitigation rather than adaptation (Baker et al., 2012; Geneletti & Zardo, 2015; Woodruff & Regan, 2018). Adaptation's recognition as an essential and complementary policy response to climate change only emerged at the beginning of the 2010s and since then has significantly increased its weight in developed countries (Baker et al., 2012; Benzie, 2014; Pringle et al., 2017). Finally, the Paris Agreement in 2015 nominated adaptation as an equal policy pillar with mitigation (UNFCCC, 2015; Faragó, 2015).

² The Accord created new funding mechanisms to help developing nations adapt to climate impacts.

Nevertheless, a significant difference can be detected between the two climate policy pillars. While Greenhouse Gas (GHG) emission causes problems worldwide and its management requires global cooperation and negotiations; adaptation seeks local answers for particular local impacts. Municipalities implement these responses through local planning and projects. Locals know local problems and the potential responses can be identified relative easily, too. So, adaptation operates more effectively in national state frameworks or at even lower levels than at supranational ones.

Territorial characteristics matter at each level. Each macro-regions of Europe are facing different challenges related to climate change, requiring regionally different counteractions³. But even in a relatively small country like Hungary, significant territorial characteristics exist, too, in climate impacts, exposure, and sensitivity to these impacts, as well as in adaptive capacities⁴ (Figure 1). Hence territorial approach and geographical characteristics are of key importance in climate policy (especially in its adaptation pillar). Interesting question is, how and to what degree do the different countries take territorial issues into account in their climate adaptation planning-related activities?

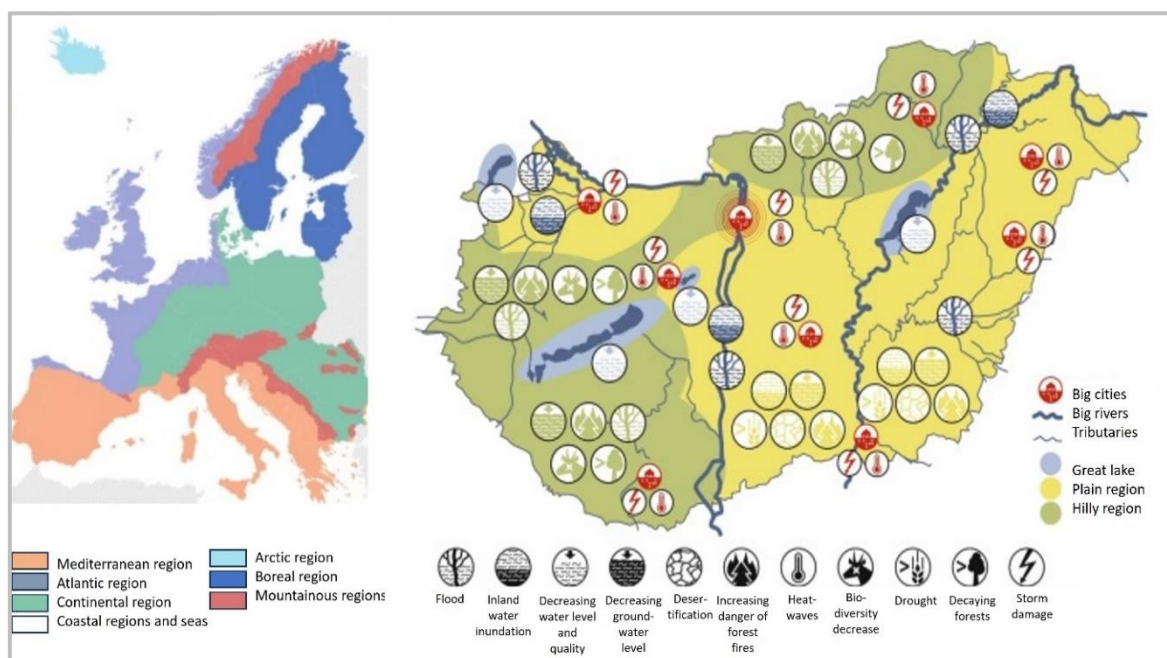


Figure 1: The different climate regions of Europe (left) and the regionally different impacts of climate change in Hungary (right).

Source: EEA, 2012 (left) and Sütő, 2016 (right).

Europe, especially the EU plays a leading role in fighting against climate change at policy level. Its development policy environment indicates this fact: climate mitigation and adaptation emerge among the main priorities of the 2014–2020 and 2021–2027 programming periods. Significant sums have been / will be allocated for these issues from Cohesion Policy

³ E.g. the Atlantic coast is and will suffer from coastal erosion and expected sea level rise; the North from melting permafrost and decreasing quantities of snow; the Mediterranean from extended drought periods and desertification, meanwhile Central-Eastern Europe are in the double squeeze of water abundance and water scarcity (Sütő, 2017).

⁴ The Great Plain and the Small Plain suffer from protracted drought periods, extreme floods, inland water inundations, and desertification. The hilly and mountainous Northern and Western Hungarian territories covered with woods facing flash floods and forest damage through decreasing biodiversity and increasing danger of forest fires. Our bigger towns, where physical infrastructure, society and economy are concentrated, affected by the territorially concentrated impacts of floods, extreme storms, and heat waves (Sütő, 2017).

funds. That situation, and the fact that Hungary's numerous economic development objectives also concentrate directly or implicitly on these fields, also emphasises the issue's actuality (Sütő, 2017; Sütő, 2020).

The objective of the research

Already the previous chapter referred to the fact that climate policy, especially its adaptation pillar, cannot be handled separately from the geographical space. Consequently, integrating territorial aspects into adaptation policy-making; planning the whole adaptation process properly (finding territorially different solutions for territorially different challenges); monitoring territorial achievements of the related strategic objectives systematically; evaluating territorial effectiveness of the adaptation/preparation interventions precisely; following the sectoral “mainstreaming⁵” of adaptation; and strengthening the spatial approach within adaptation policies are fundamental development and climate policy tasks.

Hungarian and Central-Eastern-European climate policy planning and development policy activities are worth moving in the direction that allows for proper integration of territorial thinking into this geographical space-oriented topic and establishing of comprehensive, spatially sensitive strategic planning and MRE frameworks of the national adaptation-related development activities. To facilitate these, overall and long-term objective of the whole research is to support the development of climate- and development policy activities in Central-Eastern-Europe (especially in Hungary), making them capable of the proper and territorially conscious planning, monitoring and evaluation of climate impacts, vulnerabilities and adaptation actions. Hence, it is essential to examine whether to what degree the traditionally sector-oriented planning scenes of the different countries take territorial issues into account in their climate adaptation activities. The first step in the long project is conducting a comprehensive review of the related literature. The review process covered several topics. This article examines the role strategic and/or spatial planning play in the achievement of adaptation objectives, the identification of the principal territorial levels that planning and MRE of adaptation operate on, and the exploration of the current approaches that characterize these activities at these levels. For these it applies 2 subquestions:

- *What are the most significant territorial levels of adaptation planning, monitoring, and evaluations?*
- *Are there any signs of approaches that emphasise the importance of spatial aspects in adaptation or climate impacts in spatial planning?*

These questions are answered respectively by the first and second subchapters of the Discussion. Referring back to the focus of the entire research: identification of the interpretational foundations making the analysis of territorial thinking and spatial aspects in adaptation possible, will be the topic of another article planned to be published soon.

Applied methods

This article introduces short excerpts from recent adaptation planning- and MRE-related articles. Beyond the literature items and background materials I collected from practice in climate adaptation planning during the recent decade, the literature selection was based on detailed library and internet search. In the review process, I used databases of JSTOR (<https://www.jstor.org/>) and the BCE's Library (<https://hunteka.uni-corvinus.hu/>). The used keywords of the advanced search rounds were “*climate policy planning*”, “*(climate) adaptation planning*” “*(climate) adaptation monitoring*”, “*(climate) adaptation evaluation*”, “*climate adaptation strategies*”, “*urban adaptation*”, “*national adaptation*”, “*national adaptation strategies*”, “*climate strategic planning*” “*cli-*

⁵ Mainstreaming means here the integration of adaptation objectives and aspects into sectoral policy documents.

mate adaptation + spatial planning” “*climate adaptation + strategic planning*” and their further permutations.

Regarding the selected criteria for analysis, I basically sought for literature from all territorial levels from local through regional to national or even macro-regional, to find out which of those levels are the most relevant in adaptation planning. I did not apply any regional selection criterion; the processed literature came from all regions/countries of the world. The number of the studies/articles from given countries clearly shows that which the most advanced regions are in this field.

Another criterion of selection was the relative newness of the literature items – regarding the fact that climate adaptation is a relatively new topic, the chosen articles met easily with this requirement.

Considering the different scientific and/or practical fields, I concentrated mainly on those literature that focus on strategic planning, monitoring and evaluation methodology in general or the use of planning and MRE tools in a given example. So urban planning, land use planning, general strategic planning, climate policy planning and management studies served the main pool from I could chose the reviewed items.

I dealt principally with those studies that focus on adaptation planning or MRE in general, either in methodological terms or through comparative analysis of different nations/regions. Though numerous adaptation-oriented studies focus on specific sectors (agriculture, land use, financing, etc.), countries (e.g., Uganda, Nigeria, Nepal, Republic of South-Africa etc.) or regions (e.g., ASEAN countries, East-African states, Caribbean countries, etc.) these are rather regionally tailored documents. In the current literature review phase I preferred the more horizontal, world- or continent-wide examinations to find general conclusions.

Discussion of the topic: literature review results

The article introduces relevant primary literature, both scientific and non-scientific items. It collected exactly 84 pieces of literature so far. Unsurprisingly, most of the authors are from North America (USA, Canada) and Western/North-Western Europe, principally from the Netherlands, the United Kingdom, and Germany. The outstanding data of the USA and the Netherlands can easily be explained by the exceptional role these countries (together with Germany and the United Kingdom) play in the international sphere in the field of general strategic planning and especially in climate adaptation oriented strategic planning.

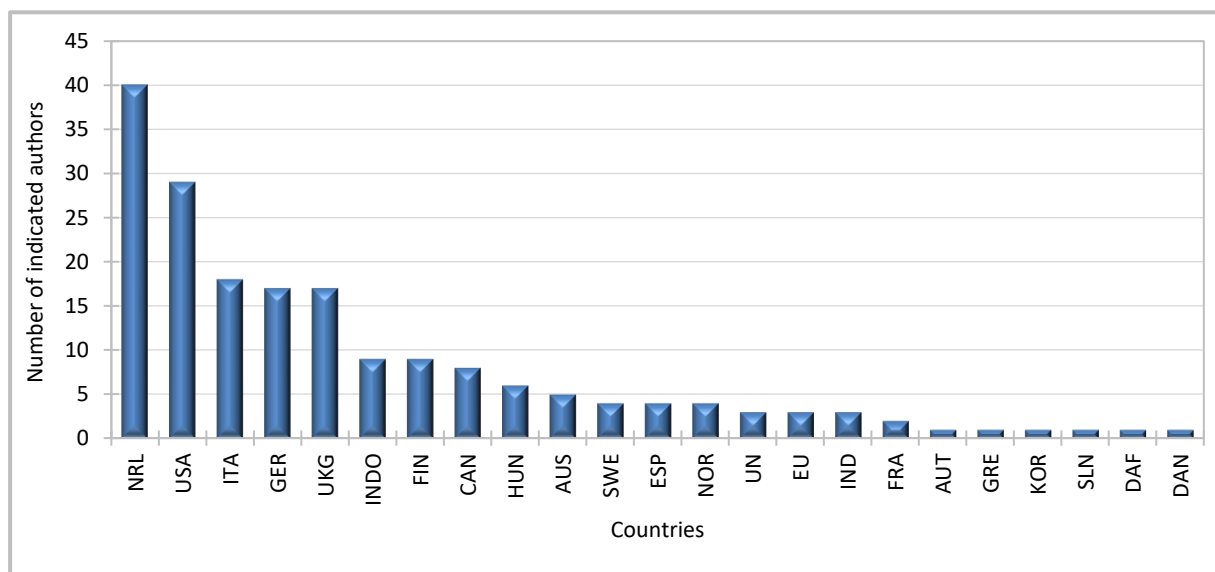


Figure 2: The reviewed literature by authors

Source: Own editing

Fitting to the national distribution of authors if we nominate the actual scientists Van Minnen, Ligvoet, van Nieuwal (the Netherlands), Harley, Pringle (United Kingdom), or Greiving and Fleischhauer (Germany), etc. can be considered pioneers in climate adaptation-related studies⁶ (Figure 2).

Climate policy, especially its adaptation pillar, is a new research topic. Consequently, the year range of the enlisted literature is relatively narrow (Figure 3). Almost all reviewed climate adaptation planning- and MRE-related materials are from the last one and a half decade.

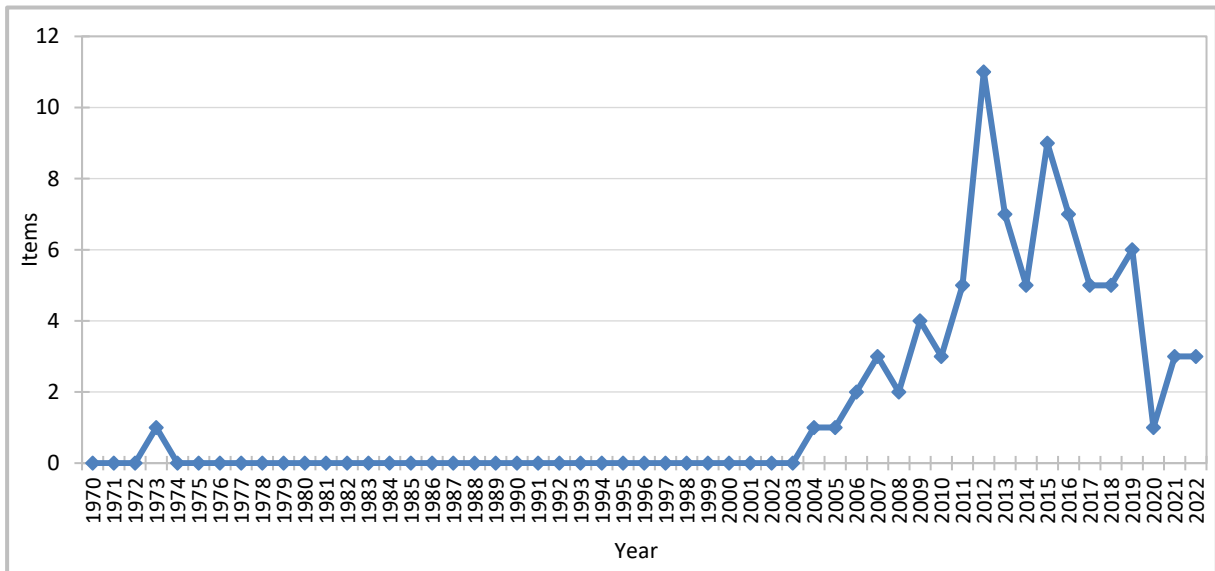


Figure 3: The reviewed literature by year of publishing

Source: own editing

The topic is mainly practice-oriented: it concentrates on planning and MRE, especially in climate policy.

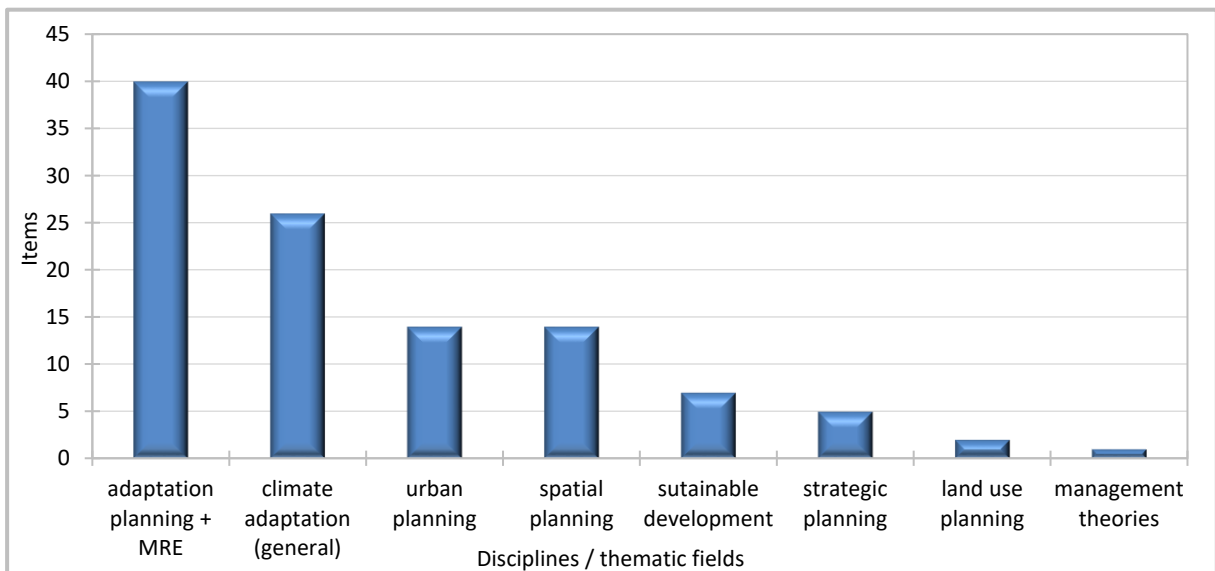


Figure 4: The reviewed literature by disciplines/policy fields

Source: Own editing

⁶ The greater number of authors from some nations (e.g., Indonesia or Australia) can be explained by the presence of one or two multi-author articles in the review.

When we use a more exact disciplinary classification, regional studies, urban studies, planning, and management studies become the main spheres because all the MRE activities to be examined are also dealing with territorial differences of climate change impacts and territorially different adaptive capacities. These regional differences trigger and strengthen existing and fundamentally unfavourable economic and social processes, so the analysis of territorial aspects cannot be avoided (*Figure 4*).

Though vast majority of the reviewed literature is articles and books, however, as the scope of the research is a practice-oriented topic, a significant part of the collected literature is from the practical field. Strategic planning documents, technical reports, policy papers, monitoring/evaluation reports, notes, guidance and working documents are also among the reviewed sources (*Figure 5*).

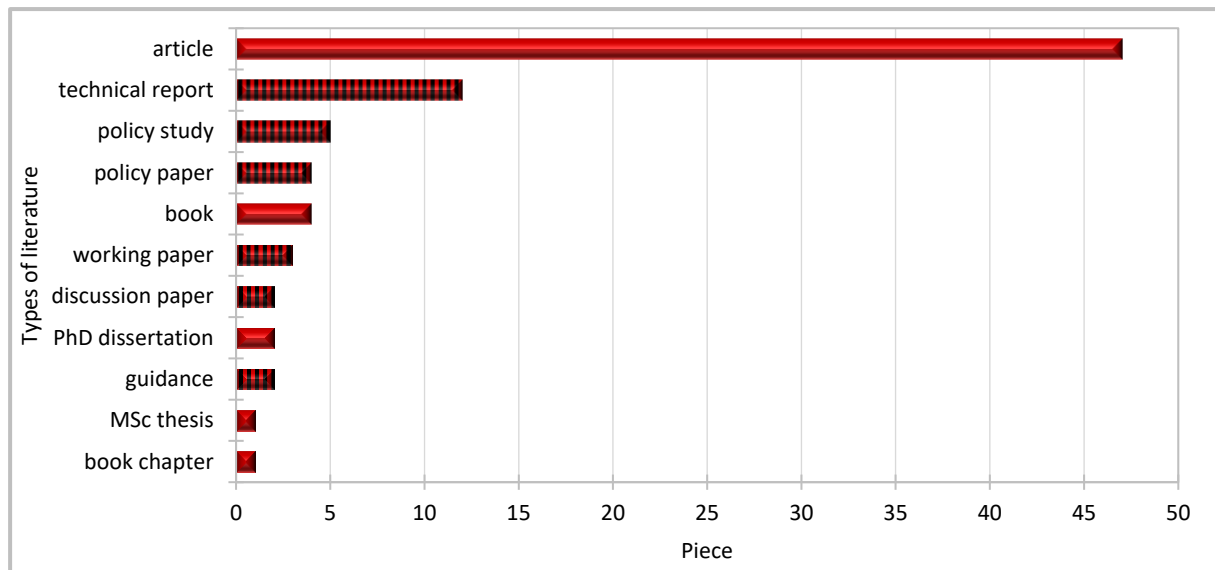


Figure 5: The reviewed literature by types

Source: own editing

Territorial levels and specific regions in climate adaptation planning

One of the most important and frequently examined aspects of climate adaptation (policy) by the literature is that climate change's most characteristic impacts emerge in particular geographic areas (EEA, 2015): in big cities and remote rural areas; in coastal zones and land-locked continental plains; in big river valleys and hilly or mountainous areas. Special territorial answers must be found for challenges in these specific geographical areas. This diversity of challenges and responses gets us to the next question in connection with the levels of territorial governance: on what levels does the majority of adaptation planning and MRE activities concentrate? Picketts and his co-authors suggested that climate adaptation “*is well suited to local government levels*”⁷. (Picketts et al., 2014), where conscious, locally tailored, short-, mid-, and long-term planning can bring solutions. Nevertheless, coordination of the lower territorial levels' activities usually occurs at upper levels in the hierarchy. The next subchapters summarize the literature's results about these lower and upper levels.

The local level

Numerous literature sources underline the prominent role of the local level in adaptation planning: majority of the adaptation-related articles, studies, books and reports deals with this level. Among different types of municipalities, urban adaptation gets particular emphasis: in

⁷ The authors argue that „(...) citizens can participate in creating targeted adaptation strategies that address the important regional impacts, and these strategies will provide tangible benefits to local residents (...)”.

recent decades, climate change has emerged in urban areas as an essential topic. Several comparative policy studies on urban climate actions say that cities are taking an increasing role, with well-documented mitigation experiences (Araos et al., 2016). Yet there have been few global-scale analyses of urban adaptation, best practice settlements, responsible planners, or ways of adaptation. This suggests that the comprehensive analyses of national/local level adaptation strategies could provide useful added information that is still lacking.

Nevertheless, cities globally face significant risks from climate change and are taking an active role in formulating and implementing climate adaptation policies (Hallegatte, 2009; Romero Lankao & Dodman, 2011), using risk assessments' results, climate models, and scenarios for better prediction of climate change impacts (Kerbler, 2016). The local level-oriented literature deals mostly with the plans' characteristics and the potential ways to strengthen planning's and implementation's effectiveness. The literature sources also identify barriers⁸ to effective local climate adaptation planning (Pringle, 2011; Baker et al., 2012; Padhke et al., 2015; Shi et al., 2015; Ford & Berrang-Ford, 2015; UNFCCC, 2015; Araos et al., 2016)⁹. A different group of authors examined changes in strategic planning approaches (Lombardi et al., 2011; Malekpour et al., 2015) or thematic fields (Brown, 2011; Yang et al., 2021).

Another new emphasis that came up in adaptation planning (right at the linking point between sustainable development and climate adaptation) is the evolution of the so-called ecosystem-, or nature-based adaptation measures (EBA or NBA), whose promotion has recently emerged both in the literature and in policies/practices of the local (predominantly urban) level (Jones et al., 2012; Geneletti & Zardo, 2015)¹⁰. Even the European Union's related policy documents [both the first EU climate adaptation strategy (EC, 2013) and its updated version (EC, 2021)] explicitly encourage green infrastructure development and propagate local ecosystem-based approaches in adaptation in general.

While urbanization and climate change had already been acknowledged as essential dimensions and drivers of global change, the significant challenges for urban and spatial governance emerging at their interface were recognized only at the beginning of the 2010's. Wheeler emphasises the creative and proactive ways of sustainable urban planning strategies and introduces some new tools (e.g. use of sustainability indicators, green development rating systems, ecological footprint analysis, educational and consensus-building processes) that have also been developed in consideration with sustainable development aspects (Wheeler, 2013). Birkmann and his co-authors also dealt with new challenges for adaptive urban and spatial governance, examining whether or not existing planning systems and tools meet the requirements of new conditions and processes. They urge shifts in approaches of existing planning systems and formal tools towards more adaptive and strategic planning visions. According to the authors the main strength of adaptive urban governance is the continuous learn-

⁸ According to the studies, these barriers are as follows: inappropriate political leadership/support; lack of clear roles and responsibilities of local governments; scarcity of fiscal and administrative resources; weak ability to obtain and communicate climate information; lack of local expertise; misconception of the problems; absence of statutory obligations; and lack of single available metrics for adaptation, etc. The latter problem makes the quantification difficult, so it is essential to develop standards, methodologies, indicators, and baselines for assessing the achievements of adaptation.

⁹ However, there are only few (Shi, et al., 2015; Araos et al, 2016), if any, global assessments of adaptation taking place across cities. According to these, most urban adaptation interventions still focus on adjustment to physical changes. Baker et al. suggest improving the quality of local adaptation plans through information base development, establishing specific adaptation planning standards and requirements; and strengthening engagement in public participation programmes.

¹⁰ The co-benefits of the two fields contain, among others, biodiversity conservation through improved ecosystem conditions; climate mitigation through increased carbon sequestration; conservation of traditional knowledge and practices; or improved recreation and tourism opportunities and strengthened food security (Geneletti-Zardo, 2015).

ing process enforced in planning to deal effectively with future environmental and societal changes. According to their conclusion, adaptive urban governance and strategic planning should be linked because both provide important requirements that are particularly relevant „in highly dynamic environments”. As a consequence, the authors say that formal planning tools must incorporate vulnerability information; stronger incentives for data exchange are needed; use of different hazard and vulnerability scenarios and risk profiles must be propagated; and more research is needed to develop practical planning tools¹¹ (Birkmann et al., 2014). It is good to see that these enlisted directions have been increasingly integrated into Hungarian climate policy planning during the last years (indicated by the content of the 2nd National Climate Change Strategy or the county-level and municipal climate adaptation strategies).

The regional and the national level

Despite the importance of finding locally relevant answers to local problems and the key function of municipalities / micro-regions in these processes, regional and national governments still play a vital role in preparing for the effects of climate change. Territorial levels between the national and the local comprises more than one scales (regions, sub- or micro-regions, group of settlements, etc.). In the literature only few studies mention these levels. They emphasise that regions might often be the relevant scale for tackling climate policy issues, e.g., in connection with urban sprawl or flood risk management (Heidrich et al., 2016). They urge regional governance solutions in adaptation with flexible and integrated approaches and regional networking, promoting the involvement of subnational governments into the adaptation process (Ottaviani Aalmo et al., 2022). The role of the regional government structures as novel opportunity for coordinating local stakeholders to increase adaptation capacity and resilience is also underlined by Birchall and his colleagues (Birchall et al., 2023)¹².

Even stronger coordinative role can be detected at the national level. National-level adaptation plans are tools to coordinate national adaptation efforts by providing methodological/strategical guidance to government agencies, municipalities, the private sector, and other relevant stakeholders through an evidence-based and systematic approach (Woodruff & Regan, 2018).

Several studies/articles examined national-level adaptation planning and MRE activities in European countries (e.g., Füssel & Klein, 2006; Harley & van Minnen, 2009; Bours et al., 2013 and 2014; van Minnen et al., 2014 and 2018; Pringle et al., 2017; Klostermann et al., 2018). However, most of these are rather policy-oriented technical papers or decision-supporting materials. The key message is that an increasing number of European countries had been taking action on MRE of adaptation at the national level by the middle of the 2010's. Pringle and his colleagues summarize the national situation in 2017. Of course, due to the time of its elaboration, some parts of the report are outdated now, while some are still relevant. However, even the outdated ones carry essential lessons for the current practice. According to the report, until 2015, 14 countries had set up or were being developed systems for adaptation MRE. The authors argue that MRE is not an easy task in adaptation. As opposed to mitigation, measuring progress in adaptation activities is context specific and touches several sectors. Long timeframes and uncertainty characterise adaptation interventions. There are no

¹¹ According to the authors, the main challenges are as follows: lack of adaptation and risk reduction aspects in spatial planning; plans are not accountable enough for the differential and dynamically changing physical/social vulnerabilities; lack of broader participation of local stakeholders; lack of cooperation between different sectoral fields (physical planning/socio-economic development/environmental protection/climate policy); lack of prioritization and classification of different vulnerabilities of urban areas and critical infrastructures; the increasing ability of private business actors to influence urban development agendas; inequalities in capabilities of self-advocacy.

¹² They emphasise the opportunity of regional approach in tackling spatially broad and complex measures, such as climate change through regional governments' greater political jurisdiction, authority and coordinative role.

standard or aggregated metrics, and the related activities are frequently integrated into other sectoral policies rather than being a stand-alone intervention. Therefore, unlike mitigation, they cannot be monitored with a single or few indicators (Pringle et al., 2017). Progress of adaptation strategies and MRE varies considerably across Europe. Most countries had focused by the mid 2010's on planning and monitoring in adaptation; evaluation was only at an early stage then because the implementation of adaptation actions had only just begun (EEA, 2015; EEA, 2016; Pringle et al., 2017).

Effective climate adaptation policy integration into sectoral policies can also be supported by (national) planning. According to Di Gregorio and her co-authors, this integration comprises four important levels, which are all necessary to develop a policy environment that implements a proper, resilient development pathway combining adaptation, mitigation, and sustainable development aspects¹³ (Di Gregorio et al., 2016)¹⁴. Similarly, to Uittenbroek's urban analyses, Di Gregorio and her colleagues emphasise the importance of "adaptation mainstreaming".

Changing emphases in adaptation planning – the emergence of new planning paradigms

Independently from the aforementioned territorial levels of planning and MRE activities, approaches and emphases in these activities and their dynamics are also interesting issues to be examined. In another group of literature items, the authors tried to find signs of changes in strategic, spatial, and adaptation planning paradigms. Looking at the historical evolution of strategic planning over the last century, Malekpour and his colleagues observed path-dependent attributes in strategic thinking that hinder new, alternative solutions. They summarize that the traditional incremental approach of infrastructure planning (that had been the dominant approach for decades) wanted and still wants to optimize the status quo instead of creating possibilities for change, making it challenging to meet the requirements of sustainability transitions (Malekpour et al. 2015)¹⁵.

In recent decades, with the increasing attention on global environmental and social challenges, new directions are outlined. Significant part of the reviewed literature concentrated on adaptation planning's and MRE activities' benefits: their role in planning and implementing adequate interventions supporting adaptive capacities of countries/regions/settlements. Numerous vital factors and notions of environmental economics, sustainable development (e.g. decoupling, circular economy, socially equal development, ecosystem-based solutions), as well as climate adaptation (territorially different impacts, vulnerabilities and adaptation responses), can be propagated and answered among other things via conscious development / sectoral planning activities from pure planning through implementation and to MRE. In one of the definitive works of strategic planning, the concept is described broadly as an activity to support fundamental decisions and development directions that define and guide what an organization is, what and why it does (Bryson et al., 2004). Suppose we substitute in this definition the concept of *organization* with *a given territory or settlement* and close the sentence with *in adaptation to climate change*; the result is the role strategic climate adaptation plan-

¹³ The author brings up the examples that soil conservation can help sequester carbon. Similarly, carbon market revenues can contribute to adaptation through diversification of livelihoods and improved resilience to climatic shocks.

¹⁴ 1) The internal coherence between mitigation and adaptation objectives and policies; 2) the external coherence between climate and development policy objectives; 3) the vertical policy integration of climate aspects into sectoral policies; and 4) the horizontal policy integration that strengthens institutional interactions overarching different sectors.

¹⁵ „Despite the call for sustainability transformation of infrastructure sectors to confront global environmental problems, current strategic planning approaches in these sectors tend to perpetuate conventional infrastructure investments. Some explains this as an ‘entrapment’ or a ‘lock-in’ phenomenon, with reference to planning and highlight that conventional planning approaches are entrenched within current decision-making frameworks and long-term planning follows the path-dependent legacy” (Malekpour, et al. 2015).

ning plays in forming future (spatial) adaptation directions. In other words: planning, and MRE can help to find at least partial solutions for complex problems, independently from the nature of the problems.

Nevertheless, the nature of the problem is a crucial factor which is dealt with by plenty of authors. Differences between the characteristics and possible ways of handling wicked and tamed problems have been emphasised in the climate change-related literature of recent decades. Wicked (social) problems were originally defined as those complex challenges with uncertain nature that increasingly need collective actions. However, at the same time, increasing uncertainty can be detected about their possible solutions (Rittel & Melvin, 1973). Several current sources (e.g. Roggema, 2012; Kerekes, 2021) concentrate on the wickedness of sustainability and climate change and the implications of this wickedness on planning approaches. Both Roggema and Kerekes came up with the idea that we should make use of the results and approaches of the “*wicked problem phenomena*”, especially interdisciplinary and horizontal thinking, also in sustainable development (and climate policy) planning, (Roggema, 2012; Kerekes, 2021). Wheeler also emphasises this holistic, multisectoral nature of sustainable development¹⁶ (Wheeler, 2013), meanwhile, Birkmann and his colleagues underline the importance of different knowledge types’ synthesis in adaptive urban planning¹⁷ (Birkmann et al., 2014). We can see that horizontal/interdisciplinary thinking is already an integrative part of both sustainable development theories and adaptation planning activities, so they inevitably seem appropriate tools to be used even in tackling wicked problems.

Chevalier also finds the proper responses for these challenges in the form of planning when she calls our attention that managing climate change’s unprecedented threat (with its long timescales and uneven impacts). In the related programming and policy-making incremental and transformative adaptation and community-based sustainable management of natural resources can play a crucial role (Chevalier, 2017).

Of course, the question arises: what can we do with traditional, conscious, long-term planning in an “*unpredictable and rapidly changing environment*” as Rittel and Melvin characterised the circumstances of “*wicked and non-ergodic problems*”. I agree with Kerekes that, beyond solving tame problems, we can find ways of approaching wicked/non-ergodic problems as well. Just in these cases we should use new, tailor-made (and I must add that exactly geographically tailored) methods taking into consideration ambiguous and changing nature of stakeholders and high volatility of planning conditions (Kerekes, 2021). As climate adaptation planning and MRE must always be based on accurate mapping of local climate impacts and consequences, on which individual local responses can be based, the problems of “*unpredictable and rapidly changing environment*” versus “*traditional planning approaches*” also emerge. Of course, in this case, we do not tame a wicked problem – but try to find potential answers for the more-or-less known consequences of a complex problem and, at the same time, also the ways to prepare for these challenges. Not because they can be forecasted – on the contrary. But these challenges have frequent consequences and impacts, with similar and recurrent patterns, for that we must be prepared if we can no longer avoid them. And if we are familiar with the potential pool of impacts/consequences, we can choose from the list of potential adaptation responses during planning. All in all: planning remains a valuable tool; only we have to follow aspects of the wicked problems’ management and change our traditional viewpoint, using multiple perspectives (Kerekes, 2021).

¹⁶ Wheeler notes that in the past environmental, economic, and social objectives have often been separated within urban planning and governmental decision-making. Sustainable planning concentrates on multiple fields, so effective sustainability, according to Wheeler, means carefully harmonizing approaches and skills – similar problems and tools emerge as in the case of recommended management of non-ergodic and wicked problems.

¹⁷ Exactly, strategic planning and adaptive urban governance both concentrate on problem definition by considering different knowledge types from different sectors (Birkmann et al., 2014).

Beyond the growing presence of global climate challenge and environmental sustainability issues in the related literature, at the same time, increasing attention is received by spatial issues and relationships between adaptation-oriented, strategic, and spatial planning activities, too. The different works of Greiving and Fleischhauer (Greiving & Fleischhauer, 2010 and 2012; Greiving & Schmidt-Thomé, 2013) have to be particularly mentioned among the very few works focusing on spatiality in adaptation planning. In a comparative study¹⁸ they provided an overview of different national approaches to developing climate change adaptation strategies from a spatial planning/regional development perspective. Their starting point was that climate change leads to regionally differentiated impacts in Europe, influencing the main focus of national adaptation strategies. Moreover, differences in the political-administrative system also play a decisive role in strategies and measures for adaptation to climate change. According to their literature analysis, at the beginning of the 2010s, spatial planning was only given little attention in adaptation and was seen as one of many other sectors. The national adaptation strategies of nine chosen countries were grouped according to spatial planning aspects¹⁹. Finally, a set of recommendations was developed from a German perspective (Greiving-Fleischhauer, 2010). Not only the emergence of spatial planning in adaptation was examined in the literature: there are examples for the other side, too. In another study, Greiving and his colleague focused on national spatial planning activities. They found that vulnerability to natural and climate change-related disasters is “*a consequence of spatial planning’s failure*” to consider “*hazards and risks in spatial development directions*”. After examining national-level spatial plans in Europe, they found that risk assessments are not part of these and their elaboration is the responsibility of sectoral planning. However, spatial planning can also use hazard information and risk assessments’ results at regional and local levels. So the authors say that spatial planning should undertake a coordinative role in conducting multi-risk assessments considering all relevant hazards for given regions (Greiving & Schmidt-Thomé, 2013). Schmidt-Thomé, both in his 2007 article and his 2014 dissertation, further analysed the use of natural hazard and climate change information in European countries’ spatial planning and also gave practical recommendations for decision makers. However, he not only focused on the integration of natural hazards into planning, but also on the future climate change impacts on natural hazards and how this information can be used in decision-making. Among his practical suggestions emerge the further integration of natural hazard analyses, multi-hazard approaches and vulnerability concepts into local, regional and European spatial planning (Schmidt-Thomé, 2007).

Wilson and Piper (2010) and Roggema in his different works (2009, 2012) also dealt with the relationship between changing climatic factors and spatial planning, seeking theoretical/political explanations of the challenges planning facing with. Roggema (2012), especially calls our attention to the uncertainty and long-term nature of climate change impacts that, as he argues, demand new spatial planning approaches. He also nominates this new approach, called it “swarm planning”²⁰ as a method that makes us capable of planning complex adaptive systems. The essence of this is the combination of networks and functions which are put in a

¹⁸ National climate change adaptation strategies of European states from a spatial planning/regional development perspective

¹⁹ The four categories were: 1) there are no statements possible concerning the role of spatial planning; 2) the role of spatial planning is mentioned but not explicitly specified; 3) spatial planning is assigned a specific role, which is yet to be implemented in practice; 4) the adaptation strategy and subsequent documents that directly focus on spatial planning are already in the implementation process.

²⁰ The name of the new paradigm comes from the similarity to a flock of birds. “Swarm”, like a group of birds, can change its shape constantly under influence/intervention and reshape itself after external impacts.

common map²¹. In his approach, spatial planning is no longer concerned with the whole picture but focuses on nodes (or, as he calls them: tipping points) in the network and designs interventions for them. The effective spatial planning, argues Roggema, introduces essential impulses into these tipping points to influence the whole system directing the spatial natural, physical, societal, economic and political elements “*into the direction of optimal balance*” (Roggema, 2012).

Another Dutch group of authors, Uittenbroek and her colleagues, found in the middle of the 2010s that adaptation actions needed to be more effective to solve the emerging challenges. They said mainstreaming adaptation objectives into existing policy domains (especially urban planning) would also be necessary. In other words: their suggested adaptation planning and MRE approach put this mainstreaming into the centre (Uittenbroek et al., 2013).

Birkmann and his co-authors’ strong suggestion that adaptive urban governance and strategic planning should be linked has already been mentioned in the previous subchapter Regarding urban governance and planning, SALAMIN in his 2018 dissertation, also articulated essential messages. He examined the changing emphases in European territorial policies and their implications in given sectors, e.g., urban planning. He underlines that since the 2011 Budapest Declaration and the Hungarian EU Presidency’s Climate Friendly Cities Handbook, demographic and climate change-related challenges have been increasingly integrated into urban development and planning activities. As for spatial planning, proper management of climate impacts has also become one of the field’s hot topics in the 2010s, so the increasing role of planning in handling climate change impacts and consequences has been clearly recognized. According to the author, the current competitiveness-oriented economic governance paradigm might soon be replaced/refined by a sustainability-oriented social perspective. If it happens, says the author, it may use climate policy as a flagship (Salamin, 2018).

Regarding the overviewed literature about spatial planning/climate adaptation relations and strategic planning/climate adaptation linkages, only one scientific work (Greiving & Fleischhauer, 2010) dealt explicitly with spatial aspects in adaptation planning and a few others with connections between spatial and adaptation planning. The territorial / spatial emphases and thinking in current adaptation planning and MRE activities across Europe have not been explored yet.

Summary: conclusions and further directions of the research

During the recent decades, increasing climate vulnerability can be experienced across the world, Europe, and within Hungary’s wider macro-region, too, due to the growing intensity and frequency of weather extremities. Numerous sectors and territories are exposed to and affected by these changes, which pose different impacts in each location. This calls our attention to the need for proper responses: adaptation needs territorially different answers to territorially different problems. Climate adaptation policy and sustainable development have a plenty of common goals and significant synergies. Out of the reviewed literature, several studies emphasised the role of planning and MRE in these connections; and referred to these activities as crucial tools to design development directions, implement them and follow up the intended results.

Meanwhile, climate adaptation has gained substantial momentum in recent years, both in general development policy and especially within climate policy. The growing intensity of adaptation policy activities and the number of documents at different territorial levels, indicates this progress. Among these spatial levels the national and the local (and sometimes the

²¹ Here must be mentioned, to avoid misunderstanding, that Dutch spatial plans are some transition between Hungarian territorial development concepts with strategic development directions and physical plans depicting land use categories.

regional) show the most vital signs of systematic adaptation-oriented thinking and planning, with urban areas playing a pivotal role in related planning activities.

The sheer number of available adaptation planning literature sheds light on the fact that both adaptation’s importance in everyday life and its weight in development policy/climate policy is growing. Regarding the distinguished territorial levels of planning and MRE, while the majority of the literature deals with local (mostly urban) adaptation problems and their management; other studies focus on the national level’s results and activities, too, especially on planning, mainstreaming, and MRE. However, the strongly geographical space-connected, optimally locally tailored adaptation policy, regarding its methodological approaches, does not seem to put enough emphasis on territorial aspects (*Figure 6*).

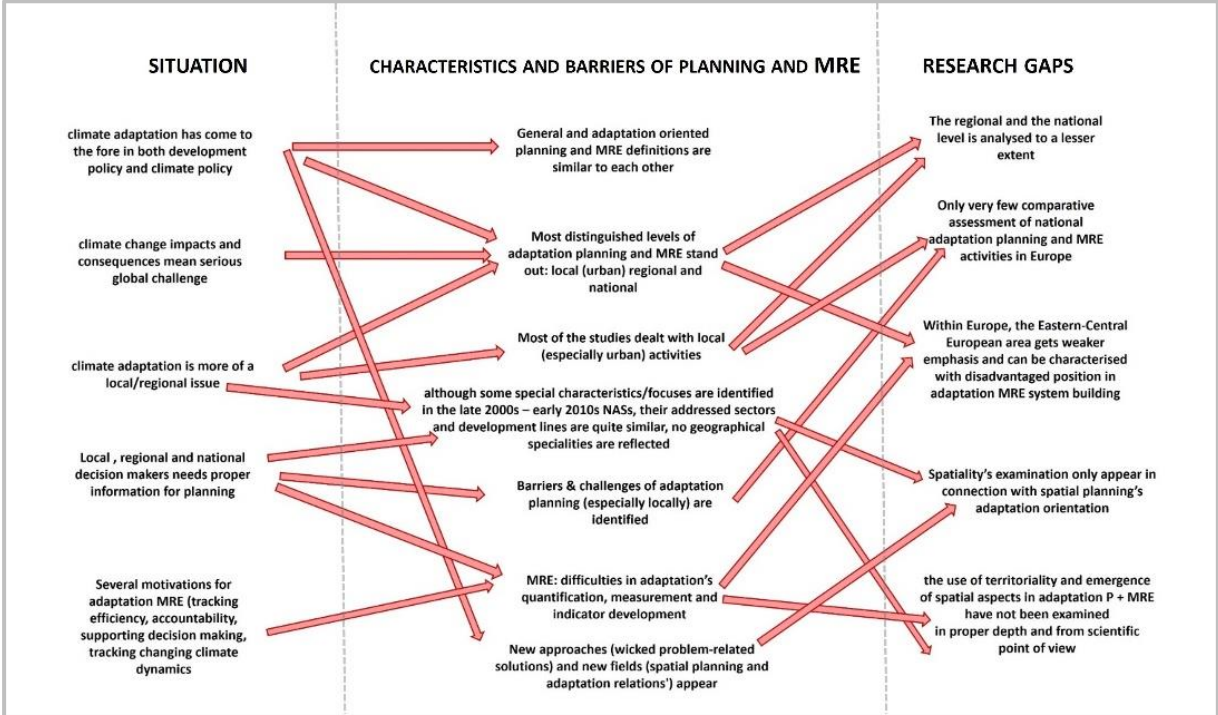


Figure 6: Main outcomes of the literature review
Source: Own editing

The literature dealing with the character of these local and national adaptation policies and measures on the one hand concentrates on their comparison with each other in a given region or a country. Out of these, few go further than identifying planning practice- or planning method-related problems and structural or financial limitations at different territorial levels. The other types of studies focus on adaptation planning approaches and methodologies in general and on linkages between strategic/adaptation/spatial planning. New concepts of adaptation-oriented planning emerge only in a limited number of articles. Some authors focus on the specialty of the challenge of climate change and the need for new ways/methods of planning; some even recommend using approaches such as horizontal and interdisciplinary thinking from the wicked problem phenomena. The importance of spatial planning in adaptation or the growing importance of hazard assessments and risk information in spatial planning also have been recognized in some cases.

However, the role of territorially conscious MRE; the role of spatial thinking and spatial aspects in climate adaptation do not appear directly in the reviewed literature items. Figure 6 summarizes the main findings and the research gaps that stand out consequently.

As a final verdict, we can say: the use of territoriality and emergence of territorial aspects in adaptation planning and MRE have not been examined in proper depth - neither at

national nor at local level in European comparison. My planned future research can take the first steps in this field. The introduced literature review is just the beginning of a more extended examination.

References

- Araos, M., Berrang-Forda, L., Austin, S., Biesbroek, R., & Lesnikowski, A. (2016). Climate change adaptation planning in large cities: A systematic global assessment. *Environmental Science & Policy* 66(2016):375–382. DOI: <https://doi.org/10.1016/j.envsci.2016.06.009>.
- Baker, I., Peterson, A., Brown, G., & McAlpine, C. (2012). Local government response to the impacts of climate change: An evaluation of local climate adaptation plans. *Landscape and Urban Planning* 107(2012):127–136. DOI: <https://doi.org/10.1016/j.landurbplan.2012.05.009>.
- Benzie, M. (2014). National Adaptation Plans and the indirect impacts of climate change. Policy brief. Stockholm Environmental Institute. Jan. 1, 2014.
- Birchall, S. J., Bonnett, N., & Kehler, S. (2023). The influence of governance structure on local resilience: enabling and constraining factors for climate change adaptation in practice. *Urban Climate* 47(2023). DOI: <https://doi.org/10.1016/j.uclim.2022.101348>.
- Birkmann, J., Garschagen, M., & Setiadi, N. (2014). New challenges for adaptive urban governance in highly dynamic environments: Revisiting planning systems and tools for adaptive and strategic planning. *Urban Climate* 7(2014):115–133. DOI: <https://doi.org/10.1016/j.uclim.2014.01.006>.
- Bours, D., McGinn, C., & Pringle, P. (2013). Monitoring and evaluation for climate change adaptation: a synthesis of tools, frameworks and approaches. SEA Change CoP and UKCIP, Oxford.
- Bours, D., McGinn C., & Pringle, P. (2014). Guidance note 1: twelve reasons why climate change adaptation M&E is challenging. SEA Change CoP Phnom Penh and UKCIP, Oxford.
- Brown, K. (2011). Sustainable adaptation: An oxymoron? *Climate and Development* 3(1):21–31. DOI: <https://doi.org/10.3763/cdev.2010.0062>.
- Bryson, J. M. (2004). Strategic Planning for Public and Nonprofit Organizations: A Guide to Strengthening and Sustaining Organizational Achievement. Wiley, San Francisco.
- Chevalier, R. (2017). Integrated community- and ecosystem-based approaches to climate change adaptation. *Policy Insights*, 49(June 2017). South African Institute of International Affairs.
- Di Gregorio, M., Nurrochmat, D. R., Paavola, J., Sarib, I. M., Fatorellia, L., Pramovab, E., Locatellib, B., Brockhausb, M., & Kusumadewia, S. D. (2016). Climate policy integration in the land use sector: Mitigation, adaptation and sustainable development linkages. *Environmental Science & Policy* 67(2017):35–43. DOI: <https://doi.org/10.1016/j.envsci.2016.11.004>.
- European Commission. (2013). Communication: “An EU Strategy on Adaptation to climate change», COM (2013) 216.
- European Commission. (2021). Communication from the Commission to the European Parliament, the Council; the European Economic and Social Committee and the Committee of the Regions on Forging a climate-resilient Europe – the new EU Strategy on Adaptation to CC. COM/2021/82 final. Brussel/Strasbourg.
- European Environmental Agency. (2012). Climate Change Impacts and Vulnerability in Europe. EEA report No 12/2012. Retrieved 14.11.2022, from <http://www.eea.europa.eu/publications/climate-impacts-and-vulnerability-2012>.
- European Environmental Agency. (2015). National monitoring, reporting and evaluation of climate change adaptation in Europe. EEA Technical report, No 20/2015. ISSN 1725-2237. European Environmental Agency, Luxembourg.
- European Environmental Agency. (2016). Environment and climate policy evaluation. EEA Report No 18/2016. European Environmental Agency, Luxembourg.
- Faragó T. (2015). Új nemzetközi éghajlatvédelmi megállapodás. *Magyar Energetika*, 2015(5-6):58–61.
- Ford, J., & Berrang-Ford, L. (2015). The 4Cs of adaptation tracking: consistency, comparability, comprehensiveness, coherency. *Mitigation Adaptation Strategies Global Change* 1–21. DOI: <https://doi.org/10.1007/s11027-014-9627-7>.

- Füssel, H. M., & Klein R. J. T. (2006). Climate Change vulnerability assessments: an evolution of conceptual thinking. *Climate change*, 75:301–329.
DOI: <https://doi.org/10.1007/s10584-006-0329-3>
- Geneletti, D., & Zardo, L. (2016). Ecosystem-based adaptation in cities: An analysis of European urban climate adaptation plans. *Land Use Policy* 50(2016):38–47.
DOI: <https://doi.org/10.1016/j.landusepol.2015.09.003>
- Greiving, S., & Fleischhauer, M. (2010). National strategies of European countries for climate change adaptation: A review from a spatial planning and territorial development perspective. BMVBS-Online-Publikation, No. 21/2010.
- Greiving, S., & Fleischhauer, M. (2012). National Climate Change Adaptation Strategies of European States from a Spatial Planning and Development Perspective. *European Planning Studies. Climate Change and Sustainable Cities*, 20(1):27–48.
DOI: <https://doi.org/10.1080/09654313.2011.638493>
- Greiving, S., & Schmidt-Thomé, P. (2013). European climate vulnerabilities and adaptation: a spatial planning perspective. *European Planning Studies*, 20(1): Climate Change and Sustainable Cities Pages 27-48. Published online: 24 Jan 2012.
DOI: <https://doi.org/10.1080/09654313.2011.638493>
- Hallegatte, S. (2009). Strategies to adapt to an uncertain climate change. *Global Environmental Change* 19(2):240–247. DOI: <https://doi.org/10.1016/j.gloenvcha.2008.12.003>
- Harley, M., & van Minnen, J. (2009). Development of adaptation indicators. European Topic Centre on Air and climate change Technical Paper 2009/6. European Environment Agency. Retrieved: 30-11-2023, from: http://air-climate.eionet.europa.eu/reports/ETCACC_TP_2009_6_ETCACC_TP_2009_6_Adapt_Ind.
- Heidrich, O., Reckien, D., Olazabal, M., Foley, A., Salvia, M., De Gregoria Hurtado, S., Orru, H., Flacke, J., Geneletti, D., Pietrapertosa, F., Hamann, J-J. P., Tiwary, A., Feliu, E., & Dawson, R. J. (2016). National climate policies cross Europe and their impacts on cities strategies. *Journal of Environmental Management*, 168(1 March 2016):36–45.
DOI: <https://doi.org/10.1016/j.jenvman.2015.11.043>
- Jones, H. P., Hole, D. G., & Zavaleta, E. S. (2012). Harnessing nature to help people adapt to climate change. *Nature Climate Change* 2:504–509. DOI: <https://doi.org/10.1038/nclimate1463>.
- Kerbler, B. (2016). Revitalisation of open spaces, changing centralities and neighbourhoods, and the importance of spatial planning for climate change adaptation. *Urbani Izziv*. 27(1) (June 2016):89–94. DOI: <https://doi.org/10.5379/urbani-izziv-en-2016-27-01-000>.
- Kerekes, S. (2021). Chasing the Impossible. Sustainable Development Is a Wicked Problem, but It Can Be and Should Be Tamed! *World Futures*–12.
DOI: <https://doi.org/10.1080/02604027.2021.1974263>.
- Klostermann, J., van de Sandt, K., Harley, M., Hildén, M., Leiter, T. van Minnen, J., Pieterse, N. & van Bree, L. (2018). Towards a framework to assess, compare and develop monitoring and evaluation of climate change adaptation in Europe. *Mitigation & Adaptation Strategies for Global Change*, 23(2): 187–209. (February 2018).
DOI: <https://doi.org/10.1007/s11027-015-9678-4>.
- Lombardi, D. R., Caserio, M., Donovan, R., Hale, J., Hunt, D. V. L., & Weingaertner, C. (2011). Elucidating sustainability sequencing, tensions, and trade-offs in development decision making. *Environment and Planning B: Planning and Design*, 38(6):1105–1121.
DOI: <https://doi.org/10.1068/b36161>.
- Malekpour, S., Brown, R. R., & de Haan, F. J. (2015). Strategic planning of urban infrastructure for environmental sustainability: Understanding the past to intervene for the future. *Cities*, 46:67–75. DOI: <https://doi.org/10.1016/j.cities.2015.05.003>.
- Ottaviani Aalmo, G. O., Gioli, B., Rodriguez, D. G. P., Tuomasjukka, D., Liu, H., Pastore, M.C., Salbitano, F., Bogetoft, P., Saebo, A., & Konijnendijk, C. (2022). Development of a Novel Framework for the Assessment and Improvement of Climate Adaptation and Mitigation Actions in Europe. *Frontiers in Sustainable Cities*, 4.
DOI: <https://doi.org/10.3389/frsc.2022.833098>

- Phadke, R., Manning, Ch., & Burlager, S. (2015). Making it personal: Diversity and deliberation in climate adaptation planning. *Climate Risk Management* 9(2015):62–76.
DOI: <https://doi.org/10.1016/j.crm.2015.06.005>
- Picketts, I. M., Déry, S. J., & Curry, J. A. (2014). Incorporating Climate Change adaptation into local plans. *Journal of Environmental Planning and Management* 57(7).
DOI: <https://doi.org/10.1080/09640568.2013.776951>.
- Pringle, P. (2011). Adapt ME – Adaptation monitoring and evaluation. UKCIP, Oxford, UK. School of Geography and the Environment.
- Pringle, P., Prutsch, A., Mäkinen, K., & Karali, E. (2017). Monitoring, reporting and evaluation of national level adaptation in Europe: Lessons and experiences from other policy domains. European Environmental Agency, European Topic Centre on Climate Change Impacts, Vulnerability and Adaptation. Luxembourg.
- Qureshi, S. (2019). Climate change adaptation for sustainable development: the information and communication technology (ICT) paradox. *Information Technology for Development*, 25(4):625-629. DOI: <https://doi.org/10.1080/02681102.2019.1680164>.
- Rittel, H., & Melvin, W. (1973). Dilemmas in a general theory of planning”. *Policy sciences* 4(2):155–69. DOI: <https://doi.org/10.1007/bf01405730>.
- Roggema, R. (2009). Adaptation to Climate Change: A Spatial Challenge. ISBN 978-1-4020-9358-6 e-ISBN 978-1-4020-9359-3. Library of Congress Control Number: 2009929308 © Springer Science+Business Media B.V. DOI: <https://doi.org/10.1007/978-1-4020-9359-3>.
- Roggema, R. (2012). Adaptation to climate change: does spatial planning help? Swarm planning does! *WIT Transactions on Ecology and the Environment*, 127. WIT Press.
DOI: <https://doi.org/10.2495/rav090141>.
- Romero Lankao, P., & Dodman D. (2011). Cities in transition: transforming urban centers from hotbeds of GHG emission and vulnerability to seedbeds of sustainability and resilience. *Current Opinion in Environmental Sustainability* 3(3):113–120.
DOI: <https://doi.org/10.1016/j.cosust.2011.02.002>.
- Salamin G. (2018). A földrajzi tér alakításának Európaizálódása: Az Európai Unió térbeli stratégiáinak, tervezésének és kohéziós politikájának hatása az európai országok térbeli tervezési rendszereinek transzformációjára. Enyedi György Regionális Tudományok Doktori Iskola, SZIE. DOI: <https://doi.org/10.14751/SZIE.2018.010>.
- Schmidt, Ch. W. (2009, July). Beyond Mitigation: Planning for Climate Change Adaptation. *Environmental Health Perspectives*, 117(7):A306–A309.
DOI: <https://doi.org/10.1289/ehp.117-a306>.
- Schmidt-Thomé, P. (2007). Integration of natural hazards, risk and climate change into spatial planning practices. *Estonian Journal of Earth Sciences*.
DOI: <https://doi.org/10.3176/earth.2007.22>
- Shi, L., Chu, E., & Debats, J. (2015). Explaining Progress in Climate Adaptation Planning Across 156 U.S. Municipalities *Journal of the American Planning Association* 81(3):1–12.
DOI: <https://doi.org/10.1080/01944363.2015.1074526>.
- Sütő, A. (ed.) (2016). *Climate Change and Adaptation – Establishing the National Adaptation Geo-Information System (NAGiS). An effective tool to provide the right answers*. HU04 – Programme for adaptation and climate change. EEA-C11-1 project. Hungarian Mining and Geological institute, Budapest.
- Sütő A. (2017). *Értékelési rendszerek és hazai alkalmazhatóságuk a klímapolitikában*. Diplomamunka. Budapesti Corvinus Egyetem, Társadalomtudományi és Nemzetközi Kapcsolatok Kar, Gazdaságföldrajz, Geoökonómia és Fenntartható Fejlődés Intézet. Budapest.
- Sütő A. (szerk.) (2020). *A magyarországi klímapolitikai monitoring, jelentéstételi és értékelési rendszer (KIMÉR) felállítását és működésének elindítását közvetlenül megalapozó rendszerkonceptió javaslat*. Magyar Bányászati és Földtani Szolgálat, Nemzeti Alkalmazkodási Központ. Budapest.
- Uittenbroek, C. J., Janssen-Jansen, L. B., & Runhaar, H. A. C. (2013). Mainstreaming climate adaptation into urban planning: overcoming barriers, seizing opportunities and evaluating the results in two Dutch case studies. *Regional Environmental Change*, 13:399–411.
DOI: <https://doi.org/10.1007/s10113-012-0348-8>.

- UNFCCC (2015). Paris Agreement. United Nations Framework Convention on Climate Change.
- van Minnen, J. G., Harley, M., van de Sandt, K., & Ligtoet, W. (2014). Adaptation indicators: a basis for monitoring implementation and effectiveness. In Prutsch, A., Grothmann, T., McCallum, S., Schauser, I., & Swart, R. (Eds.). *Climate Change Adaptation Manual, Lessons learned from European and other industrialised countries*, Chapter 14.
- van Minnen, J. G., Harley, M., Franken, R., & Ligtoet, W. (2018): *Developments in Monitoring Climate Change Adaptation in Urban Areas. Quick scan of experiences outside the Netherlands*. PBL Netherlands Environmental Assessment Agency the Hague, 2018 PBL publication number: 3018.
- Wheeler, S. (2013). Planning for Sustainability. Creating Liveable, Equitable and Ecological Communities. Routledge, London. DOI: <https://doi.org/10.4324/9780203134559>.
- Wilson, E., & Piper, J. (2010). Spatial Planning and Climate Change. Routledge, New York. ISBN 9780415495912 Published August 16, 2010, by Routledge. 480 Pages. DOI: <https://doi.org/10.4324/9780203846537>.
- Woodruff, S. C., & Regan, P. (2018, November). Coordinating Plans for Climate Adaptation. *Journal of Planning Education and Research*. DOI: <https://doi.org/10.1177/0739456X18810131>.
- Yang, H., Lee, T., & Juhola, S. (2021). The old and the climate adaptation: Climate justice, risks, and urban adaptation plan. *Sustainable Cities and Society*, 67. DOI: <https://doi.org/10.1016/j.scs.2021.102755>