Proceedings of the Resilient Cities 2018 congress

Session: Getting the most out of climate services for cities

Urban climate services – prerequisites and tools for their effective use

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Abstract:

For most cities it is not straightforward what their information needs are when embarking in adaptation planning, and even for cities with experience in adaptation planning the sourcing of new climate information can be demanding in next phases of adaptation planning and implementation. Also questions such as from what source(s) to acquire climate services, and how to assess the quality and appropriateness for a particular city may be hard to crack without guidance. Similarly, cities could consider joint acquisition and reflect whether they mainly acquire data or more comprehensive - consultancy embedded - climate services.

The EU Horizon 2020 project EU-MACS analyzes how the market for climate services can be enhanced so as to better fulfil information needs of prospective climate service users, such as cities. In the EU-MACS based session during the Resilient Cities 2018 congress the trajectory from information need identification to acquisition and use of climate services for adaptation planning was reviewed. Helsinki and Bologna gave hands-on examples of the emergence of actionable adaptation planning. Both cities stress the importance of an integrative strategy and vision on the actual plan is to be built, whereas both noted that new indicator tools for decision making and monitoring are needed. EU-MACS researchers discussed the role of imteraction formats and of information & stakeholder interaction mapping as means to generate an adequate and properly shared package climate services for a city. Even in cities with significant, good quality and actionable adaptation planning, such as Helsinki and Bologna, the informational process is not necessarily optimal, easily leading to missed opportuntiies as well as costly and potentially confusuing redundancy in climate information acquisition.

Keywords: adaptation indicators, adaptation planning, Bologna, climate services, co-design, Helsinki, information sharing, urban planning

1 Introduction

Climate change causes a large range of challenges and opportunities for cities. In order to be able to cope with all these challenges new decision relevant information is needed in conjunction with existing information for urban planning and management. This new information *and* its integration with existing urban information is often referred to as ‘climate services’. The term ‘climate services’ is not necessarily very clear. A more precise term would be ‘climate information and consultancy services’, whereas in practice this is often integrated with management information for a certain purpose, e.g. ‘urban hydrological management’ or ‘urban storm water management’. Furthermore, climate services (hereafter CS) may concern both management of current risk levels (seasonal and sub-seasonal CS) and of long term climate change adaptation oriented plans (e.g. revision of building norms).

In this paper we concentrate on the *adaptation oriented CS*. It should be realized that the use of seasonal CS may as such also raise coping capabilities regarding climate change, whereas its use can also support or promote learning effects which can stimulate the uptake of adaptation oriented CS. In other words CS merit to be understood and managed on the basis of integrative views and structures.

Even though in many countries legal frameworks have been put up that to a varying extent oblige local authorities to devise climate change adaptation plans, many cities are grappling with what such plans should encompass, to what risks it should answer, how detailed the information should be, how public the information should be, etc. Furthermore, even large(r) – example setting – cities which employed adaptation planning and related use of CS often exhibit fairly arbitrary selectivity in their choice of risks to be covered. It is not exceptional if selection is rather based on available information than pre-assessed risks.

In the H2020 project EU-MACS is assessed what are the causes of hesitant uptake of CS. These can be fundamental (such as lack of awareness or of a relevant vision) as well as be practical (operational inefficiencies with respect to matching demand and supply of CS), whereas these categories of causes are not necessarily disjunct. In this paper we concentrate on shortcomings at the demand side and operational matching obstacles.

2 Theories and methods

Hierarchical sets of obstacles interact with each other. The three main categories distinguished are supply side based weaknesses, demand side based weaknesses and operational matching weaknesses (fig.1). These categories of obstacles are grounded in transaction cost theory (Williamson & Cheng 2014; Perrels & Stegmaier 2018).

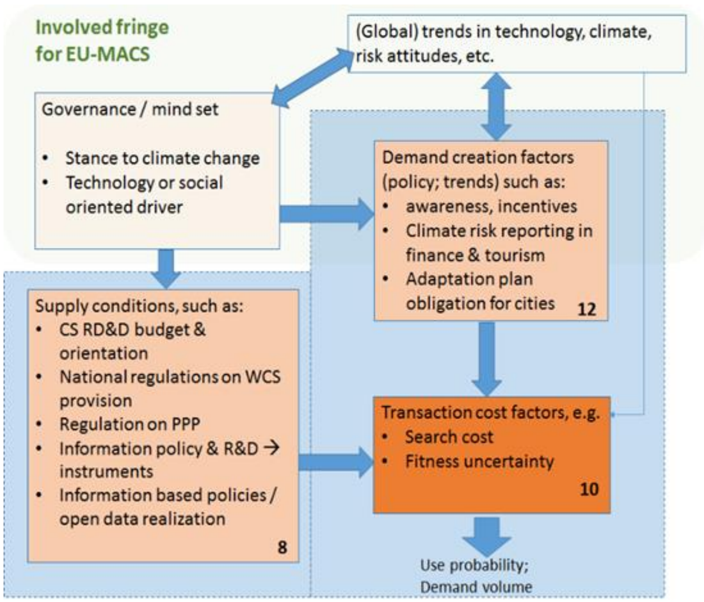

Figure 1. Main categories of obstacles to uptake of climate change

Structural demand side shortcomings can be: lack of (legal or economic) incentives, lack of awareness, no sense of urgency among politicians, Lack of awareness of climate change and of CS is a waning category in urban planning in many parts of the World.

If there is in principle (latent) demand for CS, difficulties in search and selection (effectively high transaction costs) may still frustrate a significant part of that demand. Lack of cooperation or hampering sharing of information within a city administration or among authorities from the same urban region, may mean lasting underutilization of the CS potential or even fundamentally different appraisals of urban development and investment initiatives, whereas also cross organisation learning with respect to climate change effects is diminished.

In EU-MACS extensive information was gathered about encountered and observed obstacles for the uptake and use of CS by means of surveys (Cortekar et al 2017) as well as interviews and workshops (e.g. Larosa and Perrels 2017; Giordano et al 2017). From these assessments sets of obstacles per main category were defined and rated in terms of significance (Perrels & Stegmaier 2018). On the basis of that selection a set of questions was developed in order to have a kind of external test by session participants on the identified obstacles with special reference to urban context for adaptation and CS.

Types of information sharing and approaches of establishing climate information needs are regarded important features and as yet poorly addressed in urban CS studies. Therefore, EU-MACS explored these processes in more detail (Giordano et al 2017). By means of interviews the information collection and interaction process (and related visioning process) of involved stakeholders were analysed (stakeholder network analysis SNA) and eventually translated in fuzzy cognitive maps representing intensity and structure of information interactions (Fig.2) and consequences of adding relevant information in terms of likely decisions or choices. It was shown that more effort for information sharing, including in early stages, could really improve the relevance and effectiveness of the eventually selected climate service package.

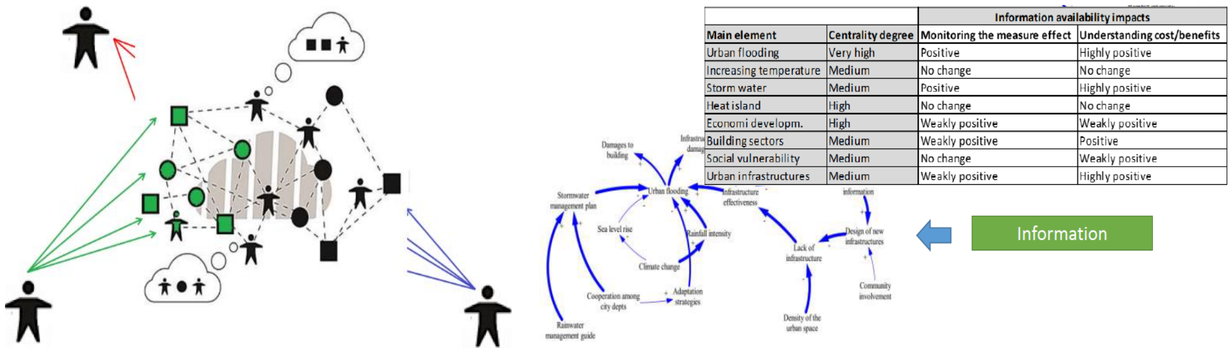

Figure 2 Varied behavioral repertoires for information exchange between urban actors (left) and information exchange mapping (right)

Real world evidence from Helsinki and Bologna

Bologna (Italy) and Helsinki (Finland) are the two cities in EU-MACS, with which in-depth exploration of 'interaction formats' for CS provision have been conducted. Bologna has 390 000 inhabitants (June 2018) and is situated at the southern rim of the large fertile Po Plain. It is a significant university and science centre, incl. climate science. The average annual temperature is 13.6 ºC and average annual precipitation 671 mm. Helsinki, capital of Finland, has 645 000 inhabitants (April 2018) and is part of the Helsinki metropolitan region (~1.25 million inhabitants). It is situated at the Finnish Gulf. Greater Helsinki is a significant university and science centre, incl. atmospheric science. The average annual temperature is 5.9 ºC and average annual precipitation 682 mm.

Helsinki: Next to a climate strategy for the entire Helsinki region (since 2012), Helsinki City drew up a detailed action plan in 2018, in support of the City Council decision which sets a target for becoming carbon neutral by 2035.. Helsinki has adaptation guidelines and a vision of being the most functional city in the world, despite weather and climate change. A climate risk assessment was conducted in 2017 together with the FMI (Pilli-Sihvola et al 2018).

Based on earlier (national) climate change studies three major risks for Helsinki were associated with climate change, being *storm water*, *excess heat* (thermal discomfort), and *winter conditions* (heavy snowfall, slipperiness, spells of extreme cold). For each of these cross-cutting adaptation plans with follow-up plans

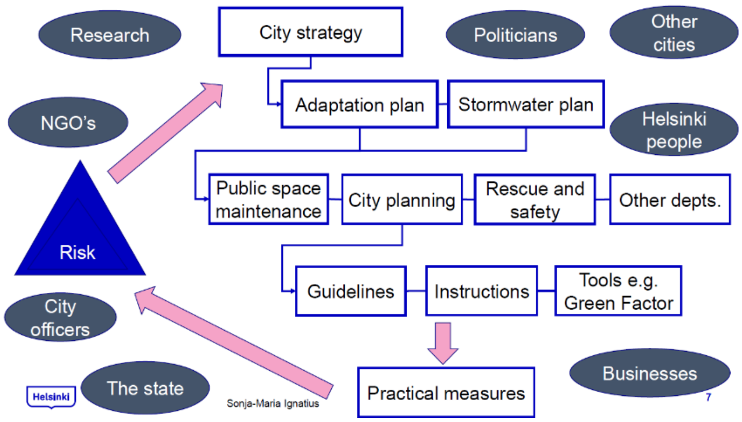

Figure 3 Planning cycle for adaptation to storm water risk in Helsinki

for specific policy and operational areas were developed, embedded in a stakeholder consultation process (Fig.3).

The adaptation planning and its implementation also showed that several indicators and tools were still missing. Inter alia the city developed a Green Factor tool (to assess sufficiency of permeable surface area) and a public on-line Energy & Climate Atlas.

Lessons learnt were:

- High level of commitment of different departments and city leadership is essential
- Strive for integration to city's all actions
- Development of hands-on tools to facilitate implementation – also for non-municipal actors
- Support engagement of people in planning and implementation
- Make co-benefits explicit
- Try to assess indirect and cross-border impacts

Bologna started its adaptation planning with the BlueAp project in 2012, part of the EU LIFE programme. This enabled a scientific underpinning of the climate risks for the city, involvement of stakeholders, and identification and initialization of case studies. Prime climate change enhanced risks for Bologna are: (1) drought and water scarcity, (2) extreme rainfall and storm water management, and (3) heatwaves.

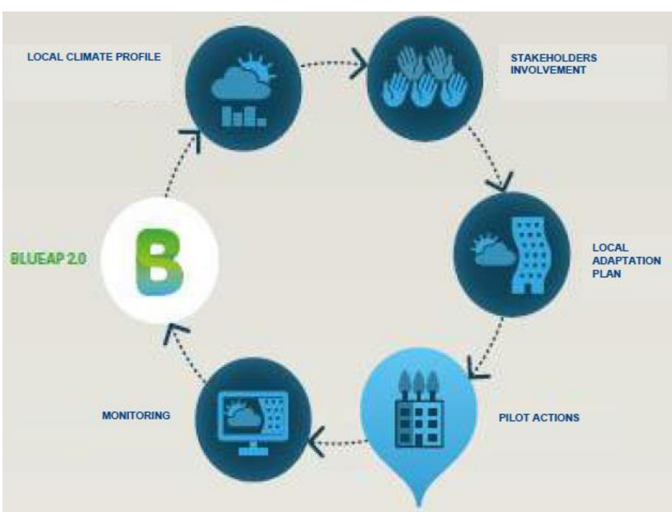

Figure 4 The adaptation development cycle in BlueAp (Bologna)

Two EU-MACS workshops were held in which the city's climate information needs and their use were assessed in conjunction with the evaluation of urban development and urban regeneration plans (by means of MCA), while applying the above mentioned tools. Mutual recognition of diversity in CS needs across city departments support adequate identification and evaluation of adaptation alternatives for the key climate change risks applied to selected development areas.

Lessons learned in Bologna were (see also Barbi et al 2016):

- Urban planners are now facing new challenges dealing with climate risks and urban resilience

- Hence we have to add the need for coping with urban sprawl and regeneration of brownfields
- Renewable urban materials: there is a great expectation on NBS but their benefits are still difficult to evaluate and recognize
- Traditional tools for urban planning are ineffective for dealing with these challenges but standardized new tools are not available.
- Traditional tools have produced a silos approach that needs now to be re-thought (e.g. Green areas are not only for leisure and water retention basins are not only part of the sewage system ...)

3. Testing identified obstacles with a relevant audience

The audience, consisting of participants of the Resilience Cities 2018 Congress, was split in four groups of about 5 to 6 participants each. Participants were typically employed as experts in local or regional authorities or as researchers and consultants dealing with urban resilience. Also a few (master level) students participated. Each group dealt with one question through moderated group discussion. The outcomes of the group discussions were summarized on flap overs and eventually reported back and discussed in a concluding plenary. The 4 questions were:

1. *What is driving the climate adaptation planning in your city* and are climate information services more like an input or an output of the process*?
2. *Do city departments acquire their own climate information or is the city (or region) acting as one entity acquiring such information services – and why is it as it is*?
3. *How did your organisation decide on what climate information services to acquire*?
4. *What are the barriers hampering the uptake of CS? How do you suggest to overcome them*?

*) Participants not representing a city or urban region as such were requested to refer to their municipal clients or study objects when considering the questions.

As to question no.1 typical drivers mentioned were: *experienced extreme events* (reactive approach, learning), *emulation of successful urban adaptation endeavours* (competitive factors, communities of practice), as well as *legal obligations* (national and EU regulations, such as on building norms and the EU Water Directive). Furthermore, after some initial information has been gathered often the *identification (and approximate quantification) of significant benefits* can further contribute to the motivation to devise and implement an adequate adaptation plan. These statements concur very well with what was found during the surveys and exploratory phases of EU-MACS.

On the other hand the term 'climate services' was regarded as not very helpful, as it is too generic. Also this concurs with numerous other stakeholder feedback during the EU-MACS project. It was conceded that the establishment of what information is needed for adaptation planning and its implementation, is complex and usually starts from a position of at best partial informedness. The information need is evolving, in terms of volume, coverage and precision (also of the user requirements). This is should be taken into account in the adaptation planning and also when interaction with providers of CS is started.

CS can be an input to as well as an output of the adaptation planning and implementation. Adaptation planning needs information, hence CS as an input is quite obvious. However, once an adaptation *policy cycle* is established, where implementation does include monitoring, learning from observations and impacts constitute in fact CS as output of the adaptation activity. Furthermore, CS can also be used in very early phases for awareness raising among urban decision makers.

As regards question no.2 on degrees of cooperation in acquisition of CS. The statements were quite *affirmative on the needs to cooperate within and beyond the municipality borders, and both with public and private actors*. Yet, not necessarily all stakeholders need to be involved simultaneously, whereas the practical feasibility of collaborative acquisition and use of CS in an adaptation context also depends on what national regulation allows and how responsibilities are allocated. Collaboration may mean that also more advanced CS become affordable, whereas it may improve access to a wider range of data and skills.

The 3rd question was taken up within a comparative context – looking to both African and European cities. It was stated tha in Africa the emphasis has – so far – been on early warning systems, and even for those a lack of data and of proper institutional context can make actual adoption slow, while adequate embedding of such capabilities in wider disaster risk management structures needs also to be further developed. The group saw that in Europe on the other hand the emphasis seems to be on the long term adaptation efforts, often with better scientific underpinning and more wide spred application of open data principles than hitherto has been the case in Africa. On the other hand seasonal forecasts, e.g. in relation to agricultural decision making, is on the rise in Africa.

Group no. 4 produced an overview of obstacles which concurs very well with the sets identified in EU-MACS, including: *political will and commitment* (awareness and informedness), *economic and technical access* to information and skills, *lack of monetary and/or human resources*, and *complexity to manage interaction with major planning domains* (e.g. infrastructure, urban (re)development). The complexity of the inter-domain coordination may also lead to avoidance of innovations, as these are perceived as adding risks. The remedies of these obstacles reside partly in proper (national) regulation, partly in better sharing of information and experiences, and partly in more pertinent local leadership and sense for integrative solutions.

4. Conclusions

Information sharing among municipal organisations as well as other stakeholders plays a crucial role in effective climate adaption planning, and this applies to acquisition, development and use of climate services. This means that CS providers should realize that the (co-)development of information products needs use profiles for all relevant urban users, when agreeing to deliver or develop CS for or with a city. This may require proper own analysis, such as by means of stakeholder network analysis (SNA).

Truly *anticipatory* climate resilience policy planning appears hard to realize or continue. In many cases more determined resilience programmes get only accepted and implemented after a natural hazard was experienced. The group work with numerous urban or regional representatives admonished that stricter resilience improving measures are only taken after natural hazards occur.

Acknowledgements

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References

Barbi, V., Fini, G., Gabellini, P. (2016). Bologna Resilient City Sustainable Energy and Climate Change Adaptation (bilingual). Commune di Bologna http://www.urbancenterbologna.it/images/quaderni/PAES_LR.pdf

Cortekar, J. 2017. Review and analysis climate service market conditions. EU-MACS Deliverable 1.1, At: http://eu-macs.eu/wp-content/uploads/2017/08/EU-MACS_D13_submitted_14072017.pdf

Giordano, R. Matarrese, R., Portoghese, I., Pilli-Sihvola, K., Harjanne, A., Cortekar, J. (2017), Outlining the Urban CS Playing Field – CS and Risk Management at Urban Level, The Institutional Structures, and the Options for Information Sharing, EU-MACS Deliverable 4.1

Larosa, F. & Perrels, A. (2017). Assessment of the existing resourcing and quality assurance of current climate services. EU-MACS Deliverable 1.2. EU-MACS. At: http://eu-macs.eu/wp-content/uploads/2017/07/EUMACS_D12_EXISTING-RESOURCING-AND-QUALITY-AS-SURANCE-OF-CURRENT-CLIMATE-SERVICES.pdf

Perrels, A. Stegmaier, P., … (2018), *Overall Effects of Market Development Approaches and Related Innovations,* EU-MACS Deliverable D5.1, forthcoming

Pilli-Sihvola, K., Haavisto, R., Leijala, U., Luhtala, S., Mäkelä, A., Ruuhela, R., Votsis, A. (2018). Sään ja ilmastonmuutoksen aiheuttamat riskit Helsingissä (Weather and Climate Change induced Risks in Helsinki). Helsinki City,

Williamson, O.E. and Cheng, G. (2014). *Contract, Governance and Transaction Cost Economics*, World Scientific Publishing, 2017

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Attachments:

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