

Why popular support tools on climate change adaptation have difficulties in reaching local policy-makers: Qualitative insights from the UK and Germany

Christoph Clar  | Reinhard Steurer 

Institute of Forest, Environmental, and Natural Resource Policy, BOKU – University of Natural Resources and Life Sciences, Vienna, Austria

Correspondence

Christoph Clar or Reinhard Steurer, InFER – Institute of Forest, Environmental, and Natural Resource Policy, BOKU – University of Natural Resources and Life Sciences, Vienna, Feistmantelstraße 4, 1180 Vienna, Austria.
Email: christoph.clar@boku.ac.at; reinhard.steurer@boku.ac.at

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Abstract

Policy support for climate change adaptation has grown rapidly and respective tools (such as online guides and handbooks) have been documented and categorized repeatedly in recent years. Nevertheless, we still know little about how relevant their target groups find them for their work. We aim to address this gap with case studies on two well-known support tools: the “Adaptation Wizard” from the UK and the “Klimalotse” from Germany. After showing how adaptation support tools have spread in recent years, we analyze qualitatively how relevant regional and local policy-makers concerned with adaptation find the two tools. One of our main findings is the following discrepancy: while both tools offer support in developing and implementing comprehensive adaptation plans, local policy-makers find this irrelevant and expect support in coping with imminent climate change impacts, for example, by single adaptation measures. Consequently, the local policy-makers we interviewed hardly use the two tools but seek more specific support, in particular regarding vulnerability and cost–benefit assessments. We conclude that policy support tools lack relevance when their well-intended attempt to enlighten target groups is too remote from what the latter expect.

KEYWORDS

Adaptation Wizard, climate change adaptation, Klimalotse, knowledge brokerage, policy guidance, policy guidelines, policy support, policy support tools

1 | INTRODUCTION

Adaptation to climate change has become a key concern not only for researchers and policy-makers, but also for those who aim to bridge these two worlds, that is, researchers themselves, policy consultants, and other intermediaries such as think-tanks and environment agencies. Generally, boundary-spanning activities between science and policy-making are referred to as knowledge brokerage (Tang & Dessai, 2012) or decision support (Gibson et al., 2017). In the climate change context, “climate services” became common (see, e.g., Brasseur & Gallardo, 2016; Lourenço, Swart, Goosen, & Street, 2016; Vaughan & Dessai, 2014). While knowledge brokerage is concerned with interactions between science and policy-making that aim to improve both worlds, climate services are concerned with “providing climate information in a way that assists decision-making by individuals and

organizations” (WMO, 2014, p. 2). Although many climate services represent one-way communication from science to practice, the World Meteorological Organization (WMO) adds in its definition that climate services should resemble two-way knowledge brokerage in the sense that they “must respond to user needs” (WMO, 2014, p. 2).

Although the rapid growth of climate services has been documented repeatedly since the late 1990s (Máñez, Zölch, & Cortekar, 2014; Moser, 2009; Oswald, 2011; Reinecke et al., 2013; UNFCCC Secretariat, 1999; Vaughan & Dessai, 2014) we still do not know whether they address user needs, or how effective they are in supporting adaptation policies (Reinecke et al., 2013, p. 2f; Webb, McKellar, & Kay, 2013; Vaughan & Dessai, 2014, pp. 588, 597; for an exception see Porter, Demeritt, & Dessai, 2015). Consequently, the refinement of existing support tools and the development of new ones build mainly on general insights from the adaptation literature and scholarly experiences, but rarely on systematic

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assessments or in-depth case studies of climate services: Among the 88 support tools included in our survey (see Section 3), only five have been assessed systematically: two externally¹ and three internally². Scientific publications on the effectiveness of support tools are similarly rare³.

The present article addresses this gap by answering the following two research questions:

- How do climate services aim to support climate change adaptation at the local level?
- How relevant do local administrators find selected climate service tools for their work?

We answer these questions by taking stock of a broad variety of climate services, and with qualitative case studies on two prominent examples of standardized policy support: the “Adaptation Wizard” from the UK and the “Klimatolse” from Germany. We selected these two support tools for several reasons. First, they both address adaptation comprehensively for all sectors affected by climate change. Second, they both target in particular local administrations, a key governmental level that often needs support in coping with the complexities of climate change adaptation (Picketts, Déry, & Curry, 2014; Porter et al., 2015, p. 412). Third, they are both well known among adaptation experts and serve as role models for other tools worldwide. For these reasons we are confident that our findings are relevant well beyond our case studies.

The two cases combine analyses of and material on the support tools, internal reviews⁴, scholarly literature and 14 interviews (13 via Skype or telephone, one by e-mail) that took on average 45 min. The interviews were conducted in English and German between December 2014 and February 2015. For each case, we interviewed a representative of the tool provider not directly involved in their development (i.e., an expert from the UK Climate Impacts Programme (UKCIP) for the Wizard, and one from the German Umweltbundesamt for the Klimatolse), experts who developed the tools (two from UKCIP, one from the German think-tank Adelphi Research), two regional adaptation experts who know regional as well as local adaptation well⁵, and

local actors responsible for climate change adaptation from three different communities (for an overview, see Appendix 2). We focused the case studies on small- and medium-sized communities with fewer than 350,000 inhabitants because they often need support to overcome their limited adaptive capacities. Because it was difficult to find local actors who knew the respective tool well enough to be interviewed, we did not apply further selection criteria. The communities selected for the UK have between 200,000 and 350,000 inhabitants. Two of them are located in England's Midlands region and one in Scotland, and all three are well known as frontrunners in climate change adaptation. The communities selected for Germany have between 10,000 and 85,000 inhabitants, are scattered across Germany (i.e., in Baden-Württemberg, Brandenburg and Hessen), and as with those in the UK they are all exceptionally active in climate change adaptation (for further details on the selection process, see Sections 4 and 5). The interviews were conducted based on group-specific interview guides (for a sample guide see Appendix 3). We transcribed the interviews and we analyzed them systematically by using the software MAXQDA. This helped us with grouping the statements of our interview partners into subcategories⁶, and with interpreting them qualitatively (also by comparing different groups of interviewees). When we refer to interview statements we indicate this with an interview code (for details see Appendix 2).

The following section introduces key concepts, tools and typologies related to climate services. Section 3 summarizes our stock-taking of 88 decision support tools. Sections 4 and 5 summarize our two case studies. After introducing the tools we review how the needs of local authorities have been taken into account in developing the tools, how relevant regional and local actors find them, and what improvements they suggest. In the concluding Section 6 we compare and summarize our findings and draw policy-relevant conclusions.

2 | CLIMATE SERVICES AS DECISION SUPPORT: INSTITUTIONS, ACTIVITIES AND RELEVANCE

Decision support tools have spread virus-like and the literature on science-policy interfaces has exploded in recent decades. The following three basic insights of this research stream helped us to frame our case studies. First, despite the countless proclamations of a knowledge-based society and subsequent calls for evidence-based policy-making, it became increasingly clear that knowledge does not transfer easily between science and policy-making for several reasons. Second, science-policy scholars recognized that the rare direct use of scientific knowledge in policy-making represents neither a pathology of policy-making nor a misuse of science. They recognized this as the normal condition of knowledge societies because policy-making is not primarily about solving problems based on scientific evidence, but rather a messy political power struggle between different types of evidence,

¹The online tool “WASKlim-DSS” from the Federal Environment Agency Germany (Scherzer, Grigoryan, Schultze, et al., 2010) and the “Capacity Development Package” from the Union of the Baltic Cities UBC (CHAMP, 2012, p. 7).

²The UKCIP Adaptation Wizard (UKCIP, 2015), the German “Klimatolse” (Kind et al., 2015), and the “Adaptation Compass” (<http://www.future-cities.eu/en/events-meetings/joint-evaluation-session-future-cities/>, accessed at November 5, 2014) have been reviewed internally in parallel to our research.

³We found a special issue of the *European Journal of Agronomy* on “Decision Support for Agriculture under Climate Change” (<http://www.sciencedirect.com/science/journal/11610301/52/part/PA>, accessed December 2, 2015), and two Master Theses (Oswald, 2011; Roth, Birner, Henriksen, & Schaller, 2014).

⁴The UK Climate Impacts Programme (UKCIP) developed the Adaptation Wizard and was a partner in the research project that led to this publication. Two UKCIP representatives gave us feedback on the analytical framework behind the present article, conducted an internal review we use as a source of information, helped us find local interview partners, were among our interview partners and gave us critical feedback on preliminary drafts. To guarantee the independence of the research summarized here they were not involved in the analysis and interpretation of our data.

⁵For the UK we interviewed regional representatives of the Climate UK network (see <http://www.climateuk.net/network>; accessed January 7, 2016). For Germany we interviewed representatives of so-called “Klimzug” regions (<http://www.klimzug.de/en/160.php>; accessed January 7, 2016).

⁶The subcategories used in the interview analysis were: problems with adaptation in general, existing support for local authorities, development of support tools (motivation, expectations/requirements, knowledge base/knowledge about target groups), relevance of support tools (expectations met, benefits for municipalities, problems in using them), additional support services related to tool.

values, ideologies and economic interests held by a broad variety of actors (Meadowcroft & Steurer, 2013; Pregernig, Hogg, & Nordbeck, 2012). Third, to improve the knowledge-base of policy-making, researchers must take the needs and expectations of policy-makers into account, and they have to communicate their findings convincingly (Meadowcroft & Steurer, 2013; Pregernig, 2005). Not surprisingly, this third point plays a key role in the context of climate change services: numerous sources emphasize that adaptation support tools should be demand driven by taking user needs into account (European Commission, 2015; Lourenço et al., 2016; WMO, 2014).

Climate services come in many forms (Jones, Patwardhan, Cohen, et al., 2014); in general there are institutions and activities (Reinecke et al., 2013). The former (sometimes also referred to as “boundary organizations”) usually conduct policy-relevant research, and they aim to facilitate two-way communication between science and policy-making (Cash & Clark, 2001; Dannevig & Aall, 2015; Hoppe, Wesselink, & Cairns, 2013; Miller, 2001; Reinecke et al., 2013, p. 4). Prominent examples of climate service institutions are national/federal environment agencies such as the German Umweltbundesamt and climate change research centers such as UKCIP (Bauer, Feichtinger, & Steurer, 2012). These and many other public or private institutions provide a broad range of climate services, among them compilations of scientific data, policy analyses and evaluations, networking and consulting services for policy-makers, public awareness activities and last, but not least, standardized decision support tools (Reinecke et al., 2013). We focus on the last of these because their support potential goes far beyond activities focusing on individual policies (such as policy analyses and evaluations) or single policy-makers (such as consulting and networking). If guidelines are well known among and relevant to target groups, they can support a broad range of adaptation decisions. Because various activities often complement each other, we are also interested in how far standardized tools are accompanied by other forms of decision support (such as individual consulting or trainings).

That climate services have been documented and categorized but rarely assessed systematically may be due to the difficulties of such assessments (Pregernig, 2005). To ease the task, scholars often use “interim criteria for effectiveness of scientific policy advice,” such as saliency/relevance, credibility and legitimacy/fairness (Reinecke et al., 2013, p. 4). We use the interim criteria of “saliency/relevance” because it is closest to our research interest. However, even such “proxy assessments” are tricky for at least two reasons. First, different target groups usually have different expectations (Kalafatis, Lemos, Lo, & Frank, 2015; Kirchhoff, Lemos, & Dessai, 2013; Lemos, Kirchhoff, & Ramprasad, 2012; Moss, 2016). Second, although user needs are important for developing policy-relevant climate services (see above), they may not necessarily concur with “better policy-making.” Potential users may simply expect that support tools should ease instead of intensify their work, and tools that simply mirror these expectations run the risk of losing their “enlightenment potential,” that is, their aspiration to facilitate innovative procedures and solutions that go beyond expectations (Sarewitz & Pielke, 2007; Weiss, 1999). Thus, a key challenge for developing adaptation support tools is to find a balance between simply meeting target group expectations and enlightening them at the same time. Because this balancing act is not understood

well, it is at the core of the present article. The following section briefly characterizes the proliferation of adaptation policy support tools in recent years, and it shows how our two cases fit into this picture.

3 | TAKING STOCK OF ADAPTATION SUPPORT TOOLS

In an online search conducted in October 2014 we gathered 88 adaptation support tools based on three selection criteria.⁷ The remainder of this section characterizes the tools with regard to types of support, publication dates, origin, target groups and additional support services related to the tools (for an overview of the 88 tools, see Appendix 1).

As shown in Section 2, decision support comes in many forms and shapes. The 88 tools can be clustered into three partly overlapping groups:

1. Forty-five of the 88 tools represent simple guidelines or handbooks suggesting a fixed workflow. Thirty-three of them provide comprehensive guidance on adaptation in general (e.g., on how to develop an adaptation strategy) and 12 on specific aspects of adaptation (e.g., on how to conduct risk assessments or scenario analyses).
2. Sixteen of the 88 tools are interactive policy support tools, that is, they give their different target groups flexible support on how to prioritize, formulate, implement and/or monitor adaptation policies. Most of them provide support for the assessment of adaptation options and subsequent decision-making.
3. Sixty-one of the 88 tools (also) compile information on climate change impacts, options and good practices (38) or give overviews of other support tools (23). These compilations are often part of guidelines.

The Adaptation Wizard and the Klimatote are guideline-like support tools that are available online and that are accompanied by additional resources such as information on climate change and more specific decision support tools.

Although first adaptation policy support tools already existed in the 1990s (UNFCCC Secretariat, 1999), the proliferation of new tools boomed only from 2007 onwards and peaked in 2011. Since then, we found a sharp decrease in the proliferation of new tools (Figure 1).

⁷(1) The tools have been published between 2004 and October 2014 (a period during which the adaptation policy field has evolved rapidly). (2) They aim to support adaptation policy-makers with written material (such as handbooks or guidelines) in English or German (these were the language skills the project team was able to cover). (3) They have been commissioned or developed by one of the following three groups: (a) Organisation for Economic Co-operation and Development (OECD) countries with an adaptation strategy in place (i.e., Australia, Austria, Canada, Germany, Switzerland and the UK); (b) international governmental organizations (OECD, European Union and United Nations) and international consortia of governmental and nongovernmental partners (e.g., the Global Environment Facility (GEF), Local Governments for Sustainability (ICLEI), the Union of the Baltic Cities (UBC), Oceania, and SEAP-Alps); (c) nonstate actors such as nongovernmental organizations and think-tanks. We searched support tools by using keywords such as “guide,” “guideline,” “guidebook,” “guidance,” “framework,” “handbook,” “support,” “tool,” “toolkit,” “toolbox” in combination with climate change and/or adaptation in English and German.

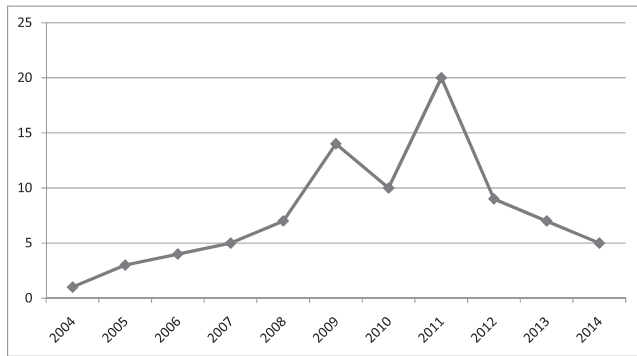


FIGURE 1 Number of support tools by date of publication

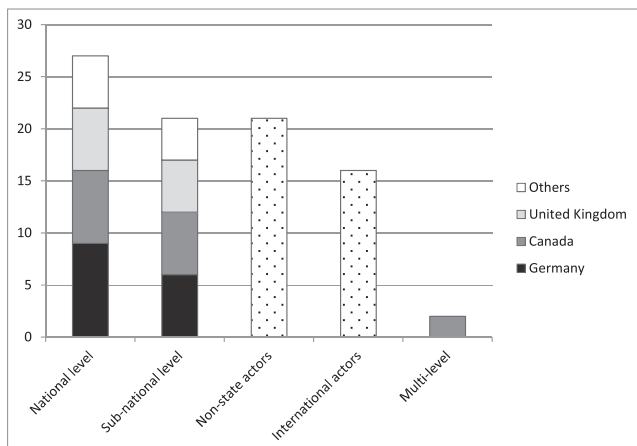


FIGURE 2 Number of support tools by origin⁸

While the Adaptation Wizard (published in 2004) was among the first tools, the Klimatolse (published in 2010) falls into the peak period. Most of the 88 tools covered in our survey have been published by governments (mainly national, but also subnational governments), followed by nonstate actors and international organizations (Figure 2). Although national governments are overall the most active tool developer, most of their tools have been developed by private think-tanks, consultancies and research institutes. This also applies to our two case studies: they were both developed by research institutes, supported by national/federal funds. The key target group of most support tools is the public sector: While about 10% of the tools do not identify a target group, about 50% aim exclusively or mainly at public administrators, and about 40% (including our two cases) target public and private actors. Among those targeting the public sector, 78% explicitly mention local authorities as a target group. This applies to all tools commissioned by national governments (if they identify target groups). Thus, adaptation support seems to be top-down driven, and our two cases are no exception to this rule: while national governments are among the key sponsors, local authorities are a key target group. Regarding sectors, about 70% of the tools (among them our two cases) target multiple sectors, whereas 30% focus on a particular sector. Among the sectors targeted most often are water management (eight), spatial planning (six), risk management (five) and infrastructure (four).

⁸Color code-legend applies to national, subnational and multilevel support tools.

Policy support tools are usually designed as stand-alone instruments. Thus, only six of the 88 tools are accompanied by additional support services such as workshops. The accompanying services either aim to facilitate the use of a tool⁹, or they aim to facilitate climate change adaptation in general in combination with support tools. The latter applies, for example, to the Adaptation Wizard.

4 | CLIMATE CHANGE ADAPTATION WIZARD

In 1997, the UK was among the first countries to launch a government-sponsored program focusing on climate change impacts and adaptation (i.e., UKCIP; see Bauer et al., 2012)¹⁰. In 2003, UKCIP and the UK Environment Agency published a “Risk, uncertainty and decision-making framework” (Willows & Connell, 2003). While the framework was praised as academically sound, it was also criticized as too theoretical and technically demanding for the target groups (Brown, Gawith, Lonsdale, & Pringle, 2011, p. 9; see also UKCIP, 2011, p. 24; West & Gawith, 2005). Consequently, UKCIP developed the framework further and launched an online adaptation support tool in 2004: the Adaptation Wizard (since revised three times). Because it was the first such tool in Europe, it served as a model for many other tools around the world, including the German Klimatolse (Kind, Mohns, & Sartorius, 2011, p. 79; see Section 5). The Wizard is not the only adaptation support tool UKCIP is offering. It is a comprehensive framework that aims to link several other tools and resources. Because local authorities are key actors for climate change adaptation in the UK (Porter et al., 2015, p. 412), they are one of the key target groups of the Wizard.

The Wizard was developed in a period when successive UK governments took “a number of steps to promote adaptation and develop the capacity of LAs [local authorities; the authors] and other public and private sector organizations to use climate science for adaptation planning and decision-making” (Porter et al., 2015, p. 412). Among these steps were additional funds for UKCIP, support for regional climate change partnerships (Bauer & Steurer, 2014a, 2014b), and regulatory measures such as the National Indicator 188 from 2007 (requiring local authorities to report on adaptation activities) and the Climate Change Act from 2008. However, the political framework conditions changed fundamentally around 2010 (Gillard, 2016). After major budget cuts for local authorities (Lowndes & Pratchett, 2012) and the abolition of National Indicator 188 in 2011, adaptation was no longer a local policy priority (Porter et al., 2015, p. 416f). In addition, the UK Environment Ministry Defra (Department for Environment, Food and Rural Affairs) transferred financial and political support from UKCIP to the Environment Agency's Climate Ready Service, a program terminated in March 2016¹¹. Against

⁹See, for example, http://www.future-cities.eu/news/news-detail/?tx_ttnews%5bttnews%5d=68%26tx_ttnews%5bbackPid%5d=2%26cHash=e5cb700312 or <http://www.aceg.org.au/news/local-resilience-climate-change/>; both accessed November 4, 2014.

¹⁰In 2011, UKCIP was deprived of government funding and became an independent institution hosted by the Environmental Change Institute at the University of Oxford (<http://www.ukcip.org.uk/>; accessed February 11, 2015).

¹¹UKCIP (2015) and <https://www.theguardian.com/environment/2016/apr/14/environment-agency-closes-climate-change-advice-service>; accessed at July 26, 2016.

this background, the remainder of this section shows that small communities, in particular, lost interest in both, adaptation and the Wizard.

How does the Adaptation Wizard aim to inform local adaptation? Based on dialogue with a small group of potential stakeholders and the limited scientific literature available in the mid-2000s, the Wizard outlines an ideal-typical risk-based planning process and suggests various resources for each stage of that process. As UKCIP emphasizes, the Wizard does not generate adaptation strategies at the push of a button but it aims to empower its users to develop them (NUK1; Kind et al., 2011, p. 78; UKCIP, 2015). In Stage 1, the Wizard shows how to identify adaptation objectives, assemble a team and establish internal procedures for subsequent policy-making processes. In combination with the Local Climate Impacts Profile (LCLIP, a tool launched in 2006), Stage 2 of the Wizard supports users in assessing their vulnerability to climate impacts (UKCIP, 2011, p. 34). In Stage 3, the Wizard provides links to information on potential future climatic change and helps users to assess their relevance. It also informs about different types of risk, socioeconomic scenarios and potential costs of climate impacts. In Stage 4, the Wizard guides through the selection of adequate adaptation strategies and options. Stage 5 finally proposes several monitoring and reviewing tools to assess implementation. Clearly, the five stages of the tool prescribe a comprehensive process of adaptation planning going far beyond the implementation of single adaptation projects.

When the Adaptation Wizard was launched, UKCIP opened a help desk that offered additional information on climate sciences.¹² It promoted the Wizard through adaptation workshops held across the UK in cooperation with regional partnerships of Climate UK (NUK1, NUK2), but it never provided individual support for using the Wizard. Between 2007 and 2010, National Indicator 188 played a key role in familiarizing local authorities across the UK with climate change adaptation (NUK1, LUK1, LUK2), and it spurred local demand for respective support (Shaw, Colley, & Connell, 2007; see also Kind et al., 2011, p. 66;).¹³ Although local authorities received most of the support from regional actors (including regional partnerships; see Bauer & Steurer, 2014a, 2014b), they also made use of the workshops offered by UKCIP. If the Wizard was ever relevant to local authorities, it was during this period of mandatory reporting on adaptation (NUK1, NUK2).¹⁴ However, the above-mentioned changes of the political framework conditions affected both the demand and the supply side. Because local budgets were cut and the National Indicator 188 was abolished in 2011, local adaptation processes faded and demand for respective support declined accordingly (NUK1, RUK1, RUK2, LUK1, LUK2). UKCIP not only lost financial and political support, but also lost the remit to support local authorities in climate change adaptation. This is the background against which several of our regional and local interviewees called for more guidance from national authorities (including a revival of legal obligations) on how to facilitate adaptation locally (NUK1, RUK1, RUK2, LUK2).

¹²<http://ukclimateprojections.metoffice.gov.uk/22537>; accessed July 26, 2016.

¹³<https://www.gov.uk/climate-change-adaptation-information-for-local-authorities>; accessed February 12, 2015.

¹⁴This is difficult to say because UKCIP gave open access to the Wizard without prior identification so that no one is discouraged to use the tool (NUK1). A German interview partner reported similar considerations for the Klimalotse (NG1).

4.1 | Needs-based tool development

UKCIP had considerable freedom in developing the Wizard because Defra had no clear expectations (NUK1). The starting point was the mixed reception of the “Risk, uncertainty and decision-making framework.” Adaptation experts recognized its conceptual merits but criticized that it was too complex and abstract to be used by practitioners. UKCIP staff recognized that the new support tool had to be simpler and should be broken down in stages so that users can access more directly what they need. Thus, each of the five stages introduced above can be accessed individually, but “the nature of the Wizard is that one stage informs the other” (NUK1).

UKCIP representatives said that they were informed about the needs and expectations of the target groups when developing the Wizard, mainly because they involved some adaptation experts (NUK1). In addition, the tool developers had extensive experience with local adaptation, and they knew the few studies on adaptation policy-making at the time. The same applies to the two revisions of the Wizard in 2008 and 2010. According to UKCIP, the revisions aimed “to reflect learning and experience acquired with practical application of the Wizard, and to keep pace with the rapidly evolving literature and experience of adaptation in action in the UK and internationally” (UKCIP, 2015, p. 2; see also UKCIP, 2011). This implies that the developers regard the Wizard also as a tool that brokers recent academic knowledge to policy-makers. But how relevant do local policy-makers find the tool?

4.2 | Relevance of the Adaptation Wizard

UKCIP's internal review of the Adaptation Wizard highlights the considerable attention the tool received worldwide.¹⁵ While this is its key success, the primary goal of the Wizard was not to gain global attention but to support adaptation through public and private organizations in the UK (UKCIP, 2011, p. 23f). Because meaningful data about the use of the Wizard are rare, it is impossible to prove “UKCIP's experience” suggesting that “the Wizard has proved a flexible and robust framework that is sufficiently structured to set out a process for people to follow, but sufficiently flexible to enable users to fine-tune the tasks and activities involved to meet the needs of their organisation and the way they work” (UKCIP, 2015, p. 14). We found that the Adaptation Wizard seems to be more relevant to adaptation experts and scholars around the world than among local authorities in the UK. First, we derive this finding from the difficulties we had in finding local policy-makers who were familiar with the Wizard. Although several national and regional gatekeepers supported us in our search for local interview partners, we could not find a single local administration which had used the Wizard extensively. We only found a few who had used the Wizard in small projects. However, they either did not respond to or turned down our interview requests, for instance because it was “too long ago [. . .] to provide you with anything

¹⁵UKCIP names four support tools that were inspired by the Adaptation Wizard, namely the European Adaptation Support Tool, the German “Klimalotse,” the Slovenian “Cegnar,” and the Australian “Climate Adaptation Wizard”; see <http://www.ukcip.org.uk/decision-making-for-adaptation/#.Vo6Cs1KZPQI>, accessed July 1, 2016. In addition, it was used among local authorities in other countries, such as Portugal (NUK1).



meaningful" (e-mail response). Clearly, our difficulties in finding local interview partners who used the Wizard are for several reasons, among them the fact that the Wizard was launched back in in 2004 and was obviously beyond its peak performance, a high level of staff turnover in local administrations¹⁶, and a lack of data about tool users. These difficulties already that the Wizard no longer plays an important role in facilitating local climate change adaptation in the UK. However, to determine which features of the Adaptation Wizard appeal to local authorities we interviewed local representatives who at least knew the Wizard. We asked them why they did not use it, whether they used other support tools and what kind of support they wanted.

While those who have developed the Wizard state that it provides valuable knowledge on climate change impacts and adaptation options (NUK1, NUK2), other interviewees suggest that key target groups of the tool see it more critically. Representatives of Climate UK regional partnerships, for example, reported that local authorities never used it extensively, either before or after the abolition of National Indicator 188 (RUK2, confirmed by an e-mail from the Local Government Association). This was mainly due to the Wizard being "sort of complicated and academic" (RUK2) or "a bit too heavy on the theory" (RUK1). This critique is confirmed by local interviewees who understand the tool as providing extensive guidance on how to develop comprehensive adaptation strategy processes. For them, this approach is incompatible with the most common concerns of local authorities: they usually search for pragmatic ways to deal with particular and urgent climate change impacts on a project basis, not for guidance on how to develop comprehensive adaptation processes (LUK1, LUK2; see also below). In this vein, some interviewees also criticized that parts of the Wizard demand too much input from users. If, for example, users want to learn something about their community's vulnerability to climate change, the Wizard requires them to provide extensive data on severe weather events they often do not have (LUK1). On the positive side, local interviewees reported that the Wizard and related tools (see below) sometimes helped to "start a conversation" with stakeholders (LUK1, LUK3), and to raise awareness for climate change adaptation among the public (LUK2). In sum, however, regional and local interviewees did not regard the Wizard as a helpful tool.

When asked about how to improve the Wizard, several regional and local interviewees mentioned their needs in general, and they referred to experiences with more specific support tools, such as UKCIP's LCLIP (part of the Wizard's tool portfolio¹⁷) and the Severe Weather Impacts Monitoring System (SWIMS¹⁸). LCLIP helps to translate information on extreme weather events into likely impacts. SWIMS helps to estimate their costs and to prioritize adequate adaptation actions. Both tools are comparatively simple to use¹⁹ and produce outputs that are relatively

easy to apply (e.g., short reports, briefing notes, presentations). According to our interviewees, they both helped to meet the national reporting requirements in place until 2011 (RUK1) and (still) help communities to facilitate climate change adaptation (RUK1, LUK2, LUK3). Because these tools serve different purposes from the Wizard, we explicitly asked local interview partners what they expect from a comprehensive support tool like the Wizard. Instead of guidance through a multistage process they highlighted hands-on support on how to address particular adaptation challenges (such as conducting risk assessments and cost-benefit analyses) within existing administrative structures and routines in their day-to-day work (RUK1, LUK1, LUK2). While they did not rule out that some local authorities may want to develop comprehensive adaptation processes in line with the Wizard approach (RUK1, LUK2), they were certain that most communities focus their limited resources on imminent climate change impacts and single adaptation projects.

Overall, we conclude that the Wizard is not (or is no longer) highly relevant for facilitating local climate change adaptation in the UK, mainly because its comprehensive multistage approach proved to be incompatible with the needs of (small) communities. Clearly, they do not ask for comprehensive guidance as offered by the Wizard but for hands-on support on a project basis. As shown above, this incompatibility also emerged from profound changes in national framework conditions. Because the abolishment of local reporting requirements and budget cuts made local adaptation increasingly difficult, most of our interview partners emphasized that they (and their colleagues) are not capable of setting up comprehensive, long-term adaptation strategies as suggested by the Wizard (RUK1, RUK2).

5 | KLIMALOTSE

The Klimalotse is an interactive online guidance tool (also available offline²⁰) hosted by the German Federal Environment Agency UBA (Umweltbundesamt) since 2010, and revised in 2014. It was funded by UBA, developed and revised by the think-tank Adelphi Research (Kind et al., 2011). As its development was inspired by the Adaptation Wizard (Kind et al., 2011, p. 79) and those responsible for the tool exchanged ideas and experiences with UKCIP, its approach is very similar to the UK role model: the Klimalotse also guides public and private actors of all levels and sectors through a comprehensive adaptation process consisting of five modules (Kind et al., 2011, p. 95). Because the tool aims to address all actors irrespective of their adaptation expertise, its modules proceed from basics to advanced support (Kind et al., 2011, p. 92). Module 1 introduces the tool and adaptation in general. Module 2 provides an overview of past and likely future climate change impacts. Module 3 helps to identify and assess risks and opportunities related to climate change. Module 4 helps to identify and evaluate adaptation actions, and Module 5 guides through formulating and implementing a comprehensive adaptation strategy. In contrast to the Wizard, the Klimalotse allows users to choose between three different modes that differ in terms of time and expertise required. Mode 1 aims to provide an overview of climate change impacts in 30 min. Mode 2 aims to provide the user with basic knowledge and guidance on dealing with impacts of

¹⁶<http://www.desmog.uk/2016/08/15/exclusive-councils-across-england-have-slashed-climate-change-staff-after-funding-cuts-analysis-reveals>; accessed September 9, 2016; see also Porter, Demeritt, and Dessai (2015, p. 416f) and Lorenz et al. (2016).

¹⁷<http://www.ukcip.org.uk/wizard/current-climate-vulnerability/lclip/>; accessed at March 18, 2015.

¹⁸<http://climateuk.net/resource/severe-weather-impacts-monitoring-system-swims/>; accessed March 18, 2015.

¹⁹UKCIP estimates 7–11 weeks for the preparation, evidence gathering and reporting required for using the LCLIP tool; see <http://www.ukcip.org.uk/wizard/current-climate-vulnerability/lclip/#.Vopjir-ZO70>, accessed January 4, 2016.

²⁰https://www.umweltbundesamt.de/sites/default/files/medien/515/dokumente/klimalotse_offlineversion.pdf; accessed February 10, 2015.

climate change in 2–3 hrs. Finally Mode 3 supports users in developing a comprehensive adaptation strategy in 6 hrs to several days.²¹

Neither UBA nor Adelphi offer free support for Klimalotse users. UBA promoted the tool at various events but does not have the means to provide (or finance) additional support.

5.1 | Needs-based tool development

As in most other countries, many local actors across Germany (in particular those from small- and medium-sized municipalities) struggle with climate change adaptation and need some kind of support (all interviewees). While adaptation strategies at the national and state levels have spread quickly in recent years, local adaptation frameworks remain rare (RG1; see also the research project KoBe²²). Because UBA often faced local requests for support (in particular after it founded the *Competence Centre Climate Impacts and Adaptation/KomPass* in 2007)²³ but was not able to meet this demand on an individual basis, it decided to develop a tool similar to the *Adaptation Wizard* in the UK (NG1). It should support mainly local actors in identifying climate change impacts and adequate adaptation.

Apart from learning from UKCIP experiences with the *Wizard* (NG2), tool developers tried to gain an idea about local expectations by inviting respective representatives to a workshop, and by interviewing eight of the almost 20 participants beforehand. Later, local representatives were also invited to test the various modules of the *Klimalotse* in a workshop and online. Those invited to give feedback were not new to climate change adaptation but have been in touch with either UBA or Adelphi before. Following this preparatory work, the tool developer had the idea that local administrations expect a support tool that provides them with (i) detailed information on climate change impacts, (ii) concrete examples of climate change risks and possible adaptation options, (iii) information on cost–benefit relations, and (iv) guidance on how to overcome communication challenges (NG2). When the *Klimalotse* was revised in 2014, the tool developers conducted a further ten interviews with local actors to learn what they expect from a revised *Klimalotse* (Kind, Protze, Savelsberg, et al., 2015). Although Adelphi also tried to reach those who faced relatively high climate change risks (mainly flooding) but were not yet familiar with adaptation, nine of the ten interviewees were, again, rather active on adaptation (for details on the revision process see below).

5.2 | Relevance of the Klimalotse for local policy-makers

Despite the tool developer's efforts to better understand target group expectations, our findings on how relevant local administrators find the *Klimalotse* resemble those for the *Wizard*. Although the original tool targeted in particular small businesses and local administrators, we were (again) not able to find local interview partners who knew the

Klimalotse well. Again, our search was hampered by a lack of data on who uses the tool. When we asked adaptation experts involved in regional adaptation strategies in Germany²⁴ for relevant contacts they suggested that most local authorities neither know nor use the *Klimalotse* (or other support tools). One of the regional experts we interviewed reported that even those who know the *Klimalotse* do not use it as stepwise guidance toward a comprehensive adaptation strategy (i.e., Mode 3) but, if at all, as an information source (i.e., Mode 1; RG1). The website of a research project on local adaptation in Germany (KoBe, see footnote 21) finally led us to local authorities who were very active in climate change adaptation, and they at least knew the *Klimalotse*. We interviewed three of them and found that they preferred the “*Stadtklimalotse*”²⁵ over the *Klimalotse*. Similar to the more specific tools we found in the UK (among them LCLIP, see Section 4), the “*Stadtklimalotse*” does not support the development of a comprehensive adaptation strategy but the identification and implementation of concrete adaptation measures in urban environments. This reiterates what we have found already for the UK: administrators from small- and medium-sized communities neither demand nor extensively use support tools that guide them through comprehensive adaptation processes. Instead, they prefer more specific project-based support.

While providers and developers of the *Klimalotse* regard the tool as an appropriate response to local needs (NG1, NG2), the regional and local actors we interviewed were more critical. First, they criticized that the tool failed to reach local authorities who are not already working on climate change adaptation, inter alia because neither existing networks and communication channels (RG2, LG3) nor personal contacts (LG1) were used systematically to disseminate the tool. Second, four interviewees suggested that the *Klimalotse* is an overly abstract, complex and demanding tool that aims to guide users through comprehensive adaptation processes instead of informing hands-on about local adaptation. They believe that this scares off many potential local users because most of them are not interested in developing comprehensive adaptation strategies (NG1, LG2, RG2, RG1). Others noted that even the few municipalities interested in developing comprehensive adaptation strategies are usually unable to implement the demanding *Klimalotse* framework because they lack the necessary resources (NG1, NG2, LG2, LG3). As two interviewees put it, using the *Klimalotse* implies not less but more work only a few municipalities can afford (LG2, LG3). Third, several of the regional and local interviewees pointed out that the *Klimalotse* is regarded as an environmental policy tool irrelevant for other sectors. As long as the dissemination of the tool relies mostly on environment-related actors and networks it is unlikely to appeal to nonenvironmental sectors relevant for adaptation (LG1, LG2).

Although our interviewees did not use the *Klimalotse* extensively, they were able to identify a few strengths. First, they assumed that other local actors who were unfamiliar with but interested in adaptation might value the step-by-step introduction provided by the tool (NG1, NG2, LG1, LG2). Second, they assume that those who have worked on adaptation before find some support for assessing their

²¹<http://www.umweltbundesamt.de/themen/klima-energie/klimafolgen-anpassung/werkzeuge-der-anpassung/klimalotse#strap-8674>; accessed January 4, 2016.

²²<http://www.umweltbundesamt.de/themen/klima-energie/klimafolgen-anpassung/anpassung-auf-kommunaler-ebene/kommunen-befaeihigen>, accessed January 4, 2016.

²³<http://www.umweltbundesamt.de/themen/klima-energie/klimafolgen-anpassung/kompass>; accessed March 25, 2015.

²⁴<http://www.klimzug.de/en/160.php>; accessed January 6, 2016.

²⁵<http://www.stadtklimalotse.net/> (accessed July 7, 2016)—a tool developed on behalf of the Federal Ministry of Transport, Building and Urban Development and the Federal Institute for Research on Building, Urban Affairs and Spatial Development.

vulnerability to climate change (NG2), or they use the tool to better structure applications for federal funding (NG1, NG2, RG1). Third, those who address adaptation by joining research projects use the tool to consolidate their adaptation efforts once the projects are terminated (NG1).

Although, in particular, local interviewees doubted that online tools can facilitate local adaptation, they made several recommendations on how to improve the Klimalotse and other support tools. First, they called for less theoretical and more practical support that can be understood easily by local administrators (LG3), among them easy-to-use blueprints for cost-benefit analyses (LG1), self-assessments and benchmarking tools that help to prioritize and justify single adaptation projects (LG1, LG2²⁶). Second, they expect knowledge brokerage not only from science to policy-makers but also among the latter, for example, by exchanging good adaptation practices (LG2, LG3). In addition, one local actor argued that support tools should be disseminated in particular to those local policy-makers who are not already familiar with the issue, for example, through on-site trainings that use existing networks (LG3).

Our findings summarized above do not reflect the revision of the Klimalotse because it has been completed after we conducted our interviews.²⁷ The revised Klimalotse launched in May 2015 focuses exclusively on municipalities, points more clearly to the different modes (ranging from developing a comprehensive adaptation strategy to supporting single adaptation measures), provides more target group-oriented information, and offers insights into various good adaptation practices. Clearly, several of these innovations address the critique summarized above, but we cannot say whether this makes the tool more relevant for local administrators.

Overall, the conclusions we draw here are similar to those drawn for the Wizard (see Section 4). First, we conclude that the original Klimalotse has had difficulties in reaching its key target group (i.e., small- and medium-sized communities). Second, it seems that many of those it reached did not find the tool relevant for their work because they were not interested in (or not capable of) developing comprehensive adaptation frameworks they associated with the Klimalotse before its revision. Consequently, local administrators interested in climate change adaptation tended to use other tools (such as the Stadtklimalotse).

6 | COMPARISON AND CONCLUSIONS

With the rise of climate change adaptation as a complex, multisectoral challenge that often overstrains policy-makers (in particular local ones), the demand for and the supply of various climate services increased. As our survey shows, written policy support mushroomed during the 2000s and peaked around 2011. Because little is known regarding to what degree these tools are used by local authorities, we aimed to produce respective evidence for two well-known tools: the Adaptation Wizard from the UK and the Klimalotse from Germany. Because the latter was inspired by the former, it is no coincidence that the two tools have

several characteristics in common: (i) they are both interactive decision support tools based on current scientific knowledge, developed by research institutions that received governmental funding; (ii) their scope is national and they target in particular local authorities; and (iii) they both aim to guide policy-makers through the development of comprehensive adaptation plans/strategies that address multiple sectors.

As shown above, the two climate services are similar not only in terms of characteristics but also regarding weaknesses: they both have similar difficulties in reaching local policy-makers, and the following two points stand out. First, both tools struggled with the typical paradox of online policy support: they reached those who were already familiar with or sought help on adaptation, but they were unable to reach those unfamiliar with adaptation. Unfortunately, the latter are usually those who need support the most. Second, both (original) tools are not attuned to the needs of local authorities: while the latter ask for hands-on support in developing concrete adaptation projects, the tools promote mainly comprehensive multistage adaptation processes. Consequently, the regional and local actors we interviewed do not find the two tools relevant for their work. This brings us back to the basic challenge of policy support introduced in Section 2, that is, to meet the needs of target groups and to enlighten them at the same time.

Based on the empirical data of our two cases we conclude that both tools clearly go beyond what local actors expect, but that they nevertheless fail to enlighten them because what the tools promote appears to be incompatible with the adaptation capacities of small communities. This suggests that enlightening policy support must not ignore but build on the needs and capacities of target groups. They can be enlightened only if support tools take into account where they stand and where they are willing to follow. In addition, the UK case also highlights that support tools are not stand-alone products. The relevance of support tools certainly depends on how good tool characteristics mirror target group needs, but it also depends on accompanying (national) policies that shape the demand for enlightening support. As shown in Section 4, communities were interested in adaptation support (not necessarily the Wizard) as long as National Indicator 188 required them to report on local adaptation, and once this requirement ceased to exist their interest in adaptation faded. This implies that adaptation policy support tools do not have the power to promote comprehensive adaptation processes (at least not in small communities), unless they are accompanied by adequate national (or regional) policies (for a similar conclusion on the use of climate projections in local adaptation planning in England and Germany, see Lorenz, Dessai, Forster, & Paavola, 2016). If support tools are too remote from target group needs (also because accompanying policies shaping these needs are not in place), they perpetuate the notorious dilemma of decision support, namely that policy-makers find respective tools irrelevant for their work while scientists complain that their outputs remain unused (Reinecke et al., 2013, p. 3, who reference Cash et al., 2002). As Lourenço et al. (2016, p. 14) put it, "climate services are still very much framed from the supply side," and they "need to move from science-driven and user-informed to demand-driven and science-informed practices." Close collaboration between support tool providers/developers and potential users are likely to improve not only the contents of support tools but also their uptake among target groups.

Because our findings are based on two qualitative case studies and a limited amount of interviews, they cannot be generalized on empirical

²⁶See, for example, the instruments of the European Energy Award: <http://www.european-energy-award.de/european-energy-award/instrumente/>, accessed March 12, 2015.

²⁷<https://www.adelphi.de/de/news/neuaufgabe-des-klimalotsen-f%C3%BCr-kommunen-ma%C3%9Fgeschneiderte-klimaanpassung-leicht-gemacht;> <https://www.umweltbundesamt.de/themen/klima-energie/klimafolgen-anpassung/werkzeuge-der-anpassung/klimalotse#>; both accessed July 27, 2016.

(or statistical) grounds. However, for the following reasons we are confident that they can be generalized on analytical grounds (Yin, 2003, p. 32f) for most of the small communities in the UK and Germany. First, our cases can be generalized analytically because of our case selection. We intentionally covered small communities that are rather active in adaptation policy-making. Because even they did not know the tools well, we believe that those doing less on adaptation do not know (let alone use) them at all. This applies in particular to small communities because they usually lack (personnel and financial) resources for comprehensive adaptation planning. Second, we obtained evidence going well beyond the cases we have covered, and it fully confirms our findings. On the one hand, all the regional intermediaries we interviewed in the two countries confirmed the generalizability of our findings for small communities. On the other, one of the authors has conducted additional case studies on climate change adaptation in other small municipalities in Germany, which also confirm the findings summarized here (Steurer & Buschmann, in press). Because we cannot generalize our findings to larger cities, future research should explore how far adaptation capacities as well as support needs vary with municipal size, and how climate services can take these variations into account.

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ORCID

Christoph Clar  <http://orcid.org/0000-0003-3556-8256>

Reinhard Steurer  <http://orcid.org/0000-0002-5000-7046>

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SUPPORTING INFORMATION

Additional Supporting Information may be found online in the supporting information tab for this article.

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APPENDIX 1

Overview of adaptation policy support tools developed between 2004 and 2014.

A detailed overview of the tools covered in our survey (including titles and links) can be downloaded from: [please insert link]

APPENDIX 2

Overview of interview partners

| Role | Governmental level | Date | Reference |
|--------------------------------|--------------------|----------|-----------|
| UK | | | |
| Provider and developer of tool | National (N) | 12/11/14 | NUK1 |
| Provider of additional support | National (N) | 1/26/15 | NUK2 |
| Intermediary/expert | Regional (R) | 2/26/15 | RUK1 |
| Intermediary/expert | Regional (R) | 2/26/15 | RUK2 |
| Local council | Local (L) | 2/26/15 | LUK1 |
| Local council | Local (L) | 2/27/15 | LUK2 |
| Local council | Local (L) | 2/2/15 | LUK3 |
| Germany (G) | | | |
| Provider of tool | National (N) | 1/20/15 | NG1 |
| Developer of tool | National (N) | 2/16/15 | NG2 |
| Intermediary/expert | Regional (R) | 2/16/15 | RG1 |
| Intermediary/expert | Regional (R) | 2/19/15 | RG2 |
| Local council | Local (L) | 2/17/15 | LG1 |

(Continued)

| Role | Governmental level | Date | Reference |
|---------------|--------------------|---------|-----------|
| Local council | Local (L) | 2/25/15 | LG2 |
| Local council | Local (L) | 2/9/15 | LG3 |

APPENDIX 3²⁸

Interview guide template²⁹

Expectations/needs

- When you think of different government actors (national government, provinces/Länder, municipalities): Who struggles most with adapting to climate change? Why? What are the main obstacles to adaptation?
- Who should help them (whom)? And how?
- How does the Adaptation Wizard fit into what you just said? What is its key purpose? Does it address the most urgent needs (of municipalities)? Does it provide important expertise?
- What triggered the development of the Adaptation Wizard? Why was it developed in the first place? (motivation?)
- *For developers only:* What were the expectations and requirements of Defra?
- What were your (own) expectations?
- On what knowledge-base did you develop the Adaptation Wizard (scientific studies, knowledge sharing.. .)? What did you know about the needs and expectations of the target group(s), in particular about municipalities? How did you incorporate the expectations of municipalities (and other target groups) in your work?

Assessment

- Did the implementation of the Adaptation Wizard meet your (your organization's) expectations?
- How did the Adaptation Wizard help communities to adapt to climate change? What has been the main value/benefit for the municipalities who used the Adaptation Wizard? How do you know (general impression, singular success/impact stories, personal contacts, evaluation)?
- UK: The Wizard is designed as a framework for all the other adaptation tools from UKCIP. It supports the user of these tools in going through the specific steps of an ideal-typical "risk-based planning process" and provides further complementary tools (templates, lists, etc.). . .
 - o ... did you have this process in mind in the first place?
 - o How did the interplay with the other tools work for municipalities?

²⁸To be hosted online.

²⁹This template was used for interviews with tool providers and developers in the UK. We used a slightly different template for interviews with regional adaptation experts and local actors. Furthermore, each interview guide was adapted to specific characteristics of the case and the interview partner. For the German case, interview guides were translated into German.

- UK: According to the webpage <http://ukcip.org.uk> the Wizard aims to support decision-makers between the stages of "decision making" and "implementation". . .
 - o ... was it designed to guide exclusively during these stages of policy-making?
 - *If yes:* Why? Do target groups/municipalities need no help in the identification of problems and objectives, agenda setting, monitoring phases? Are these steps covered by other tools? Is it good to cover different steps in the adaptation process with different tools?
 - *If no:* what about the other stages (see above)?
 - o Lack of awareness about climate change impacts is a major obstacle to climate change adaptation, in particular in municipalities. Did the Adaptation Wizard deliberately avoid/ignore this obstacle? Is it addressed with other guidelines/tools?
- What were the major difficulties in implementing the Adaptation Wizard?
- What were the major difficulties in using the Adaptation Wizard?
 - o Was it a problem for the users at the local level that the Adaptation Wizard was designed by and has been provided by national authorities?
 - o Did problems occur because the Adaptation Wizard aims at guiding climate change adaptation in multiple sectors?
 - o How did you address these difficulties? Did you improve/update/modify the Adaptation Wizard?
 - *If yes:* What did you change/modify based on what experiences?
 - *If no:* Why not?
- Is the use of the Adaptation Wizard connected/linked to any further support services (workshops, expert assistance, etc.), financial support, and so on?[Is the Wizard meant to support the other UKCIP tools? Does/did the Wizard need any support, such as awareness raising, promotion, etc.?]
 - o *If no:* Why not? Not necessary? What kind of support would have improved the performance of the Adaptation Wizard?
 - o *If yes:*
 - What kind of support? How did you organize ____?
 - What worked particularly well to support the use/implementation of the Adaptation Wizard?
 - What were the challenges of supporting the use of Adaptation Wizard?

Recommendations and conclusion

- In case you could start over again:
- What would you do the same way?
- What would you do differently?
- To what degree are your experiences transferrable to other contexts/countries?
- How can a nationwide guideline/tool support very diverse communities in coping with very different climate change impacts?
- How will/should the future of nationwide adaptation guidance look like?