Adaptation decision-support tools and platforms

About the WASP and the Policy Briefs

- The *Science for Adaptation Policy Brief Series* is an initiative of the World Adaptation Science Programme (WASP). The briefs target researchers, policymakers and practitioners to help them bridge the science-policy-action interface.

- The WASP is led by the United Nations Environment Programme (UNEP), the World Meteorological Organization (WMO), the United Nations Framework Convention on Climate Change (UNFCCC), the Intergovernmental Panel on Climate Change (IPCC) and the Green Climate Fund (GCF). Its Secretariat is hosted at UNEP, Nairobi. The current Chair of the WASP is Mr. Youssef Nassef at the UNFCCC, Bonn.

- WASP's mission is to ensure researchers, policymakers and practitioners have the knowledge and capacity necessary to underpin effective adaptation to climate change.

Key messages

- Decision support for adaptation should be useful (relevant, comprehensive and reliable) and usable (accessible, authoritative, attractive and engaging).

- Failure to deliver successful decision support can arise because of misalignment between the expectations of users and what developers can deliver, misunderstanding and misrepresentation of user needs and capabilities by developers, and inappropriate application by users.

- Success can only be achieved through intensive engagement between developers and intended users at all stages from planning to implementation, evaluation and updating. This engagement may take the form of consultation, co-design and co-production, with the adaptation community contributing their real-life experience.

- Success requires long-term monitoring and evaluation of the effectiveness of decision support resources and tools as a basis for continuous learning and improvement to retain policy and practice relevance. In turn this requires sustained human and financial resources beyond the initial development phase.

What are decision-support tools and platforms?

Effective adaptation to climate change requires support for sound decision making and good practice. Over the past two decades, a proliferation of decision-making resources and tools has emerged to address this need (Street *et al.* 2019). Generally delivered online, these range in sophistication from simple climate data delivery platforms to complex risk management frameworks providing data, guidance, tools and adaptation enablers (such as case studies and virtual or live engagements) to support adaptation (Palutikof, Street and Gardiner 2019). Most commonly they will be in some way targeted – at a geographic environment such as coasts or mountains, at a sector such as agriculture or infrastructure, or at particular user groups such as local government. They may be designed to be used by the designer/developer, or by a client, or by a third party such as a consultant.

These decision support resources go by many different names, which can lead to confusion. In Box 1, we introduce and define the terms used in this document.

Decision Support Tools: Methods and other knowledge resources that facilitate decision-making for adaptation to climate change. They may be free-standing, or components of Adaptation Platforms. Examples:

- Tools for assessing biophysical impacts, vulnerability or risk;
- Tools for costing adaptation options such as cost-benefit analysis;
- Tools for data visualisation, such as a GIS-based tool; and
- Guidance on identifying and assessing adaptation options and on monitoring and evaluation.

Adaptation Platforms: Enabling environments, equipping decision-makers with the data, tools, guidance, and information needed to adapt to a changing climate. Content is commonly, but not necessarily, delivered online and may include facilitation of knowledge and capacity building through networking, for example via face-to-face or online forums, and peer-to-peer learning opportunities, for example workshops and case studies on adaptation planning and implementation.

Decision-Support Framework (also known as a decision support system): A risk management framework for climate change adaptation together with the decision support tools necessary to implement the framework. The tools may include case studies demonstrating the application of the framework.

Climate Services: Covers the transformation of climate-related data – together with other relevant information – into customised products such as projections, forecasts, information, trends, economic analyses, assessments (including technological assessments), counselling on best practices, development and evaluation of solutions and any other services in relation to climate that may be of use for the society at large. As such, these services include data, information and knowledge that support adaptation, mitigation and disaster risk management.[1]

A typical adaptation platform has four parts:

- An overarching risk assessment and risk management framework to guide the user through the different stages of adaptation planning and implementation.
- Data and information to support adaptation, tailored to the needs of the user. For example, a platform for coastal managers will have in-depth information about future sea-level rise.
- Tools to support planning and decision-making, such as for costing adaptation options and monetary and non-monetary valuation of avoided impacts.

- Adaptation 'enablers', which might include case studies, online forums and guidance on community engagement and consultation.

The inter-relationships of these components are shown in Figure 1. Together, they are intended to provide the user with everything required to undertake adaptation, from scoping the challenge through to monitoring and evaluating adaptation outcomes.

Figure 1: Components of a typical adaptation platform and decision-support framework. After: Palutikof Street and Gardiner (2019).

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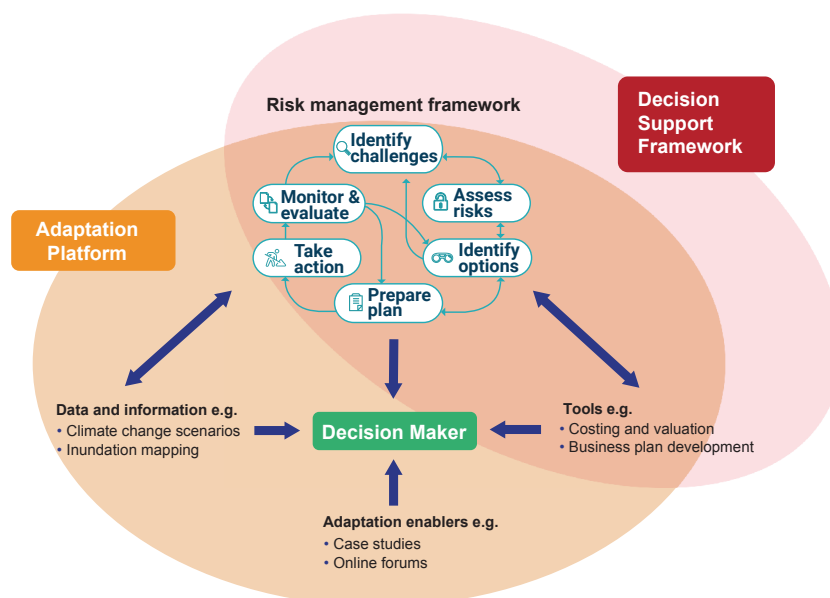
1. There are many definitions of climate services, however, this definition (EC 2015) best fits in the context of this paper.

Characteristics of 'good' adaptation decision support

'Good' adaptation decision support should be both **useful** and **usable.**

To be **useful,** a resource must be *relevant, comprehensive* and *reliable.* **Relevance** involves delivering information targeted to the requirements of the user, consistent with their decision-making process and capabilities. Content should be **comprehensive** so that the user can find everything needed in order to move forward with adaptation, rather than having to search between different resources. Finally, **reliability** implies that the information should be demonstrably accurate and up to date, so that the user can have confidence that decision-making based on the content of the decision support resource will stand up to scrutiny, even in a court of law.

To be **usable,** a resource should be *attractive, accessible* and *authoritative.* An **attractive** resource will encourage users to explore, learn and re-visit, activities which promote learning and understanding. **Accessibility** implies ease of navigation. Developers are usually so familiar with their resource that

navigation around the site is second nature – the same is not true for users. Testing by users at all stages of development is essential if ease of navigability is to be achieved. Without it, a resource will soon fall into disuse. **Authoritativeness** is linked to reliability – users need to be assured that information in their decision support resource is cognizant of the latest relevant legislative and regulatory contexts, and that adaptation is framed in terms of the latest reputable climate science.

All these characteristics of 'good' decision support imply that developers have good knowledge and understanding of their audience. The ways in which 'useful' and 'usable' are defined will change depending on the nature and needs of the users – what level of understanding do they start from, what level of support do they require. It is essential that developers work with representatives of their user group(s) at all stages of design, build and evaluation. Such co-production can be time consuming and may be difficult to achieve given the competing demands on the time of user groups, but nevertheless is essential.

Challenges to successful decision support

The challenges to achieving successful decision support for adaptation are both intrinsic and extrinsic.

Intrinsic challenges relate to the potential for misalignment between the expectations of users and what developers can deliver, as well as a failure to deliver to user requirements. As already touched on, if developers fail to engage adequately with their user community, it is highly likely that they will fail to understand what is required in terms of levels of understanding and experience, and user decision-making processes and goals.

Users themselves can contribute to these intrinsic challenges by having unrealistic expectations -- that adaptation platforms will provide instant solutions. Even a tool or platform that is focussed on a particular sector or location will require some commitment of time and thought if it is to be useful and used appropriately. Furthermore, if users have limited ability to engage, or are unwilling to accept some degree of 'ownership' in the process, this can challenge the ultimate success (real and perceived) of any decision support resource (Palutikof, Street and Gardiner 2019). The need for commitment may be circumvented by hiring a consultant, but this has the strong disadvantage that the opportunity to build in-house experience and knowledge is lost.

A final intrinsic challenge is that, despite the widespread availability of decision-support resources, there is limited understanding of their effectiveness – the extent to which they are being used, by whom and for what purpose; and the extent to which they are useful (Palutikof, Street and Gardiner 2019). This challenge stems from the lack of long-term monitoring and evaluation that can be used to develop a performance

database so that we can better understand what does and does not work and why.

Extrinsic challenges can be related to lack of sustained financing and policy relevance. Construction of a decision support resource is, on paper, a relatively straightforward undertaking. However, without on-going support (in terms of financial and human resources) it is likely that little use will be made of the resource after its release for operational use. There needs to be a long-term commitment by funding agencies to finance regular review, updating and addition of new content; provision of training and advice to users; and performance evaluation.

Extrinsic challenges to success also arise where there are changes in the policy context within which adaptation decision makers operate. It takes time to develop a decision support tool or adaptation platform, of the order of years. Within that time period, the policy framings may change to the extent that the original design of the resource is no longer well targeted at user needs – it is no longer fit for the intended purpose. For example, at the present time in Europe, the requirements on local authorities to adapt mean that the need is for targeted support for modest interventions rather than for comprehensive system-wide decision support resources such as suggested by the Adaptation Wizard in the UK and the Klimalotse in Germany and as appears to be suggested by the recently introduced European Green Deal (Palutikof, Street and Gardiner 2019). Developers need to be aware of the evolving policy context and users' needs and capabilities and be prepared to adapt their design and development processes accordingly.

Addressing the challenges

The challenges outlined above raise the following questions:

- Are existing decision-support resources and tools 'effective' – to what extent are they useful to practitioners and to what extent are they used?
- Are today's decision-support resources an early generation, meeting the needs of adaptation practitioners on a steep learning curve and soon to be replaced?
- Will maintenance and incremental improvement of today's resources allow them to evolve to better address user needs or are new approaches needed?

In addressing these challenges and questions, developers will need to pay close attention to the rapidly evolving field of adaptation, and to the emerging needs and capabilities of adaptation and resilience-building communities. Doing so requires a design – construct – implementation process based on continuous learning and improvement, and consisting of:

- Tailoring content, design and functionality to match the capabilities and needs of the intended users: decision-driven and science-informed decision-support resources and tools;
- Comprehensive, independent and sustained monitoring and evaluation of the application of existing decision-support resources (understanding how and why practitioners make use of them) to enable learning and

inform updating and the development of new resources (Palutikof, Street and Gardiner 2019);
- Developing partnerships that enhance the 'ownership' by users and user communities of decision-support tools and adaptation platforms, with the aim of enhancing and sustaining the relevance and utility of these resources; and
- Understanding the factors that motivate practitioners to undertake adaptation planning (such as policies, regulations and standards defining the required actions, financial incentives, and social pressures), and that enable or act as barriers to implementation of the resulting plans.

Critical to this process is ongoing and representative involvement/engagement of practitioners supported by sustained funding. Together, these can provide the necessary relevance, legitimacy and credibility, as well as build confidence within the practitioners' communities. As such, funding agencies need to accept that adaptation decision support resources require long-term funding (more than just delivered through a project). Such funding will enable the required engagement and regular updating as science, risk management methods and adaptation options evolve. Long-term funding can also facilitate capacity building that is critical to supporting continuous learning and improvement and the pickup of updated and new resources and tools (Palutikof, Street and Gardiner 2019).

Looking to the future

Providing and sustaining relevant, usable, legitimate and credible information and guidance to those making decisions will require ongoing transdisciplinary research and innovation. Providing such is challenged by tensions between:

- The needs and goals of funding bodies and of practitioners;
- What practitioners need and can use to support their adaptation activity, and what adaptation platforms deliver (Palutikof, Street and Gardiner 2019);
- The expectations of users, developers, and funders regarding the extent to which tools and adaptation platforms can be designed to provide support.

Experience suggests that an essential mechanism for making progress is providing forums in which all of those involved with decision support (developers, funder and users) can come together. At these forums, these communities could compare and learn from current approaches, share knowledge and best practices and innovations, learn and work together on common and emerging challenges and ultimately deliver the best support possible for climate adaptation and resilience. Recent engagement opportunities at international conferences such as Adaptation Futures and through targeted international workshops have confirmed the benefits of these forums to their international participants. Areas of recent interest and activity include:

- Developing and implementing effective strategies for co-production of decision support resources, involving

- relevant practitioners at all stages of development, implementation and evaluation in meaningful ways;
- Developing the content and capacity of decision support resources to match the evolution of adaptation policies and actions, including how these resources can adjust and retain their policy and practice relevance as the user base broadens;
- Linking climate change adaptation, disaster risk reduction and the sustainable development goals;
- Embedding innovations (e.g. using GIS, AI and other technologies) to increase functionality and user-friendliness, including more attention to navigability, accessibility, legitimacy and relevance;
- Providing examples of good practice related to supporting evolving user requirements;

- Supporting a myriad of users (e.g. national to local governments, communities, business, industries, indigenous peoples, etc.), with different capacities and decision-making cultures, including in the context of an increasingly sophisticated and broadening practitioner community;
- Evaluation, and quality assurance and quality control (QA/QC), to support updating and revision (content, functionality);
- Demonstrating added value from the decision-makers' and funders' perspectives; and
- Sustaining the viability of decision support resources in the long-term once the initial funding for development is exhausted and fostering use.

Existing and emerging research and innovation gaps

Addressing the existing challenges will require research and innovation including:

- Evaluation to understand the extent to which decision support resources effectively fulfil the needs of adaptation practitioners, and as a basis for updating and improvement. This will require development of evaluation mechanisms and metrics, including means to support co-evaluation engaging existing and potential users, with the objective of making a real and continuing difference to the effectiveness of the adaptation planning process and the resulting actions.
- Objective comparative evaluation of the relative performance of decision-support resources – what works best in supporting which practitioners addressing what problems. Answering these questions should guide practitioners in making informed choices in the selection and application of decision support resources. Application of different decision-support resources to similar problems will provide better understanding of the utility and robustness of different approaches, and point to areas needing further development.
- Exploration of business models to sustain decision support systems in the long-term, including evaluation, updating and further development of knowledge and guidance resources.

- Exploration of mechanisms (e.g., communities of practice) that would support/enable cross-fertilisation of ideas within and between the communities of developers and practitioners.

Source: https://www.shutterstock.com/image-photo/happy-thai-female-farmer-harvesting-rice-756191968

Further reading: examples of 'good' decision-support tools and resources

From the United States, the *Climate Resilience Toolkit* (https://toolkit.climate.gov/), a comprehensive collection of guidelines, tools and case studies to support adaptation, with links to experts and training courses. For more information, see Gardiner EP, Herring DD, Fox JF (2019) The US Climate Resilience Toolkit: evidence of progress. Climatic Change 153:477-490.

From Germany, the *Klimalotse* has a target audience of decision makers at local and regional levels. After a number of years of successful operation, an evaluation was made and government funding was provided to carry out an update. For more information, see Hasse C and Kind C (2019) Updating an existing online adaptation support tool. Climatic Change 153:559-567.

From UKCIP, the *Wizard* (https://www.ukcip.org.uk/wizard/about-the-wizard/) provides a framework and resources to help generate information to inform development of an adaptation strategy and was tested and co-developed with intended users to provide a robust adaptation resource.

From the Netherlands, the *Knowledge Portal for Spatial Adaptation* was released in 2014. It is an example of good practice in practitioner engagement and co-production of knowledge. For more information, see Laudien R, Boon E, Goosen H, van Nieuwaal (2019) The Dutch adaptation web portal: seven lessons learnt from a co-production point of view. Climatic Change 153:509-521.

From Australia, *CoastAdapt* (coastadapt.com.au) is a comprehensive adaption platform focussed on the adaptation needs of coastal managers, especially in local government. See Figure 1 caption for suggested further reading.

References

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