Anticipation Hub

The importance of connecting regional and national meteorological and hydrological services with anticipatory action practitioners

For organizations that implement anticipatory action ahead of climate- and weather-related hazards, collaborating with regional and national meteorological and hydrological services (NMHSs; see Box 1) is essential for ensuring that their anticipatory action systems are functional, sustainable and effective.

Forecasts from NMHSs are essential for acting ahead of hydrometeorological hazards such as floods. © j_lloa / Pixabay

There is clear evidence that, where they exist, such collaborations are valued by all partners and help to increase the legitimacy of anticipatory action systems at the local, national and regional levels (**Golding 2022**). Yet despite these examples that demonstrate the benefits, many barriers – both real and perceived – limit this collaboration in some countries. Barriers include: the lack of human and infrastructural capacity to provide hydrometeorological services tailored for use in anticipatory action systems; a lack of sufficient funding for these services (and for anticipatory action systems); differing perceptions of the mandate for NMHSs; and the availability of open-source global forecasts.

This briefing highlights the importance of anticipatory action practitioners and NMHSs working together to develop new anticipatory action systems and to strengthen existing ones. It offers ideas to overcome the challenges to collaboration, highlighting examples of where such collaboration is being deepened and expanded.

Strengthening such collaborations will also contribute towards achieving the ambitions of the Early Warnings for All initiative, which emphasizes the importance of every component of the value chain for early warning systems, and the need for coordination between its four pillars.[1] Collaboration between NMHSs and anticipatory action systems are critical for this coordination, forming a link between hazard observation, monitoring, analysis and forecasts (Pillar 2), the dissemination of warnings (Pillar 3), and preparedness and response capabilities (Pillar 4).

Box 1. What is a national meteorological and hydrological service?

In most countries, the NMHS owns and operates most of the infrastructure that is needed to provide information about the weather, climate, water and other environmental areas that are essential for the protection of life and property, economic planning and development, and for the sustainable exploitation and management of natural resources (**WMO 2007**). However, the extent to which an NMHS is involved in each type of service varies – in some cases significantly – from country to country. In certain places, other regional or global organizations deliver essential services related to meteorology and hydrology, either in terms of research and forecasts, or on a more operational basis. Examples include the World Meteorological Organization's (WMO) regional climate centres, such as the Intergovernmental Authority on Development's Climate Prediction and Applications Centre (ICPAC), the European Centre for Medium-Range Weather Forecasts, and universities that work in these fields.

1 These are: (1) disaster risk knowledge; (2) detection, observation, monitoring, analysis and forecasting; (3) warning dissemination and communication; and (4) preparedness and response capabilities. See: WMO (**nd**).

Why should anticipatory action practitioners work with NMHSs?

NMHSs have a wealth of knowledge and information about local weather systems and conditions. These include the local-level observational records that are essential for the triggers used to initiate anticipatory action; many trigger thresholds are based on meteorological or hydrological data. Involving NMHSs in designing the triggers for anticipatory action, and in the subsequent monitoring of the data used for these triggers, can make these often-complex processes more coherent and robust. NMHSs can provide expert advice on the appropriate triggers to use and provide access to the data needed to monitor these. As most NMHSs are situated within a country's government, they can also help to ensure that anticipatory action systems are coherent with other government structures, notably those responsible for disaster risk management (Box 2).

NMHSs underpin many of the national-level early warning systems that are used to inform at-risk communities of an impending hazard; this information is often disseminated during anticipatory action activations, as well as during other disaster-preparedness efforts. In some instances, NMHSs work with other stakeholders to co-produce early warning information that is specifically tailored towards informing anticipatory action. In Kenya, for example, the ForPAC (Towards Forecast based Preparedness Action) project brought together climate-information producers, researchers, and the users of climate information to develop risk forecasts for floods and drought (**Taylor, Mwangi, Visman et al. 2020**).

Box 2. Using the *dzud* risk map for anticipatory action in Mongolia

In 2020, the Food and Agriculture Organization of the United Nations (FAO) and the Mongolian Red Cross Society used the Mongolian government's *dzud* risk map – created by the country's NMHS, the Information and Research Institute of Meteorology, Hydrology and Environment – to predict the onset of this hazard.[2] The partners supplemented this risk map with additional impact-based forecasts to confirm the triggers and enable an aligned, multi-agency anticipatory action intervention (**FAO, Mongolian Red Cross Society and IFRC 2020**). This collaboration with the NMHS enabled the partners to avoid duplicating efforts and increased the reach of the anticipatory actions carried out, meaning that more people benefitted.

2 A *dzud* is summer drought followed by a severe winter; the combination of these leads to a severe loss of livestock, due to the lack of grazing available followed by cold conditions.

Why should NMHSs work with anticipatory action practitioners?

Anticipatory action provides an opportunity for NMHSs to see their forecasts and early warnings being valued, used and integrated into systems and decision-making processes that make a real difference to people in their country. Unfortunately, in many places there are few incentives for NMHSs to ensure that this practical use of their information happens; their mandate ends with the creation and dissemination of the information, not its subsequent use.

Addressing this is a priority if there is to be greater collaboration with the anticipatory action sector in a country. One way to do so is for anticipatory action practitioners to recognize and highlight the importance of accurate and timely hydrometeorological information in their work; for example, they should acknowledge the use of such information in their activations. They can also use successes to advocate for more NMHSs to play a role in regional and national anticipatory action systems, and call for additional funding for this.

In addition, successful anticipatory actions that mitigate the impacts of a hazard can enhance the reputation of a NMHS, building greater trust in its services and increasing its credibility with the public and other government stakeholders. Jointly produced evidence and success stories can also be used to advocate for stronger policies and increased funding for disaster-risk-reduction and climate-adaptation initiatives.

There is increasing recognition of the importance of NMHSs better understanding their users' needs regarding the hydrometeorological information they create. For example, some NMHSs have mechanisms for the public and organizations to provide feedback on the usability and clarity of their services, which can then ensure their wider uptake. Anticipatory action practitioners can support this, for example by enabling engagement between NMHSs and local communities. This could lead to the development of community-based dissemination strategies and support NMHSs in providing more localized weather forecasts and climate information, which will have an even greater impact.

How can anticipatory action be used for capacity building and to shape research agendas?

Another reason for NMHSs to engage with anticipatory action systems is the potential for small grants or funding. There are sometimes funding opportunities for capacity building for NMHSs, for example during the process of developing triggers for anticipatory action. In 2019, meteorologists from Mali, Uganda and Zambia visited the University of Reading in the UK to learn about impact-based forecasting, funded through the INFLOW project.[3] The World Food Programme also provided ICPAC with funding to build the Uganda National Meteorological Authority's capacity to develop triggers for floods and drought.

Such collaborations can help to identify research agendas and address gaps in both the anticipatory action process and wider weather and climate research. Occasionally, there is funding for NMHSs to develop specific products tailored to anticipatory action, or to support the salaries of a focal person for anticipatory action within the organization.

Anticipatory action system-building also provides opportunities for building the capacity of NMHSs during the process of co-developing triggers. Research agendas can be refined or identified through this, opening up a new potential source of funding for activities, either through direct project funds that bolster a NMHS's funding requests, or proposing joint research and development projects.

What are the barriers to effective collaboration – and ways to overcome these?

Despite the benefits of working together for organizations from both sectors, there are barriers to such collaboration:

- The lack of a 'shared language', particularly technical terms, can make it difficult for the two sectors to communicate with each other unless there is an intermediary organization to support this.
- There is sometimes confusion about the roles and mandates for each organization. For example, roles related to disseminating early warnings are not always clear, incentivized or even included in national laws related to disaster risk management.
- Institutional oversight on the use and usability of forecast information can be limited.
- NMHSs and humanitarian organizations are usually funded by different mechanisms and sources, and on different timelines; this poses a barrier to collaborating on specific, time-bound activities or allocating budgets towards these.
- There are limited conversations, within both the humanitarian and hydrometeorological sectors, about the value of collaboration; this may result in these connections being a low priority.

Encouragingly, there are several ways to overcome these barriers and improve collaboration between the two sectors. One overarching requirement is evidence: to have proof of concept and clear examples of the value of such collaborations. Those highlighted in this briefing provide a step towards this, but more are needed to provide a convincing case for other countries to do the same.

Building inter-organizational relationships and trust are critical, and these need to be present within the different parts of an organization, including senior management and technical experts. A concrete way to establish such relationships is to form memorandums of understanding, which set out how organizations will engage strategically and establish commitments on both sides (see Box 3). Importantly, these go beyond individual collaborations and provide a framework for establishing activities at the organizational level. These agreements work best when they are clear and specific, as this helps to improve interactions and facilitate institutional exchanges.

Box 3. Formalizing collaborations in Bangladesh

Memorandums of understanding – formal, legally binding agreements between two (or more) agencies to institutionalize shared aims and activities – offer a strong model for formalizing collaborations around anticipatory action between NMHSs and humanitarian organizations. In Bangladesh, two NMHSs – the Flood Forecasting and Warning Centre and the Bangladesh Meteorological Department – and the Bangladesh Red Crescent Society signed a memorandum of understanding around anticipatory action. Among other things, this ensured that humanitarian actors were part of a task team on anticipatory action (**Salauddin 2021**).

The Bangladesh Meteorological Department did communicate with humanitarian actors prior to this, but the structures around this – who communicated with whom, when this happened and in what format – were ad hoc. Now, the memorandum of understanding explicitly outlines which positions within each organization are responsible for communicating forecast information, and when. The co-development of triggers for Bangladesh's early action protocols was able to take place in a more coordinated manner, thanks to this formal agreement; it also meant that the process was documented for the future.

Another urgent call is for NMHSs to make their forecasts useful for anticipatory action systems, and to incentivize their staff to get involved. At present, there is rarely an incentive for staff to engage with anticipatory action systems, which means it is often only done on an ad-hoc basis, or if there is a personal motivation for doing so. Managers at NMHSs should consider changing the structure, and adjusting the mandate, of their organizations to encourage this. At the same time, organizations within the anticipatory action sector can continue to

3 Officially the 'Improved Anticipation of Flood on the White Nile' project (**University of Reading 2023**).

advocate for this change, for example by documenting and sharing successful examples of where this has happened and brought positive impacts (Box 4).

Box 4. How the Anticipation Hub and boundary organizations can strengthen collaborations between the anticipatory action community and NMHSs

The Anticipation Hub has an important role to play in strengthening collaborations between NMHSs and the organizations that implement anticipatory action. Through its network of partners around the world, as well as its events (e.g., the global and regional dialogue platforms), it can help NMHSs to reach the relevant organizations in their countries and develop or strengthen in-country collaborations.

In addition, boundary organizations that work across the scientific and political systems can help to deepen these collaborations, once they have been started; the Red Cross Red Crescent Climate Centre has a role to play here. Looking ahead, the Future Leaders Network on Early Warning Early Action[4] – which has more than 300 members active in policy, science and practice for anticipatory action – can help to ensure that there is a reliable supply of highly trained professionals in both humanitarian organizations and NMHSs, all of whom are advocates for the benefits of anticipatory action and the need for strong collaboration between these interlinked sectors.

4 See tinyurl.com/mrtwjbdt

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Icon for forecasts (p.2) adapted from the Noun Project.

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