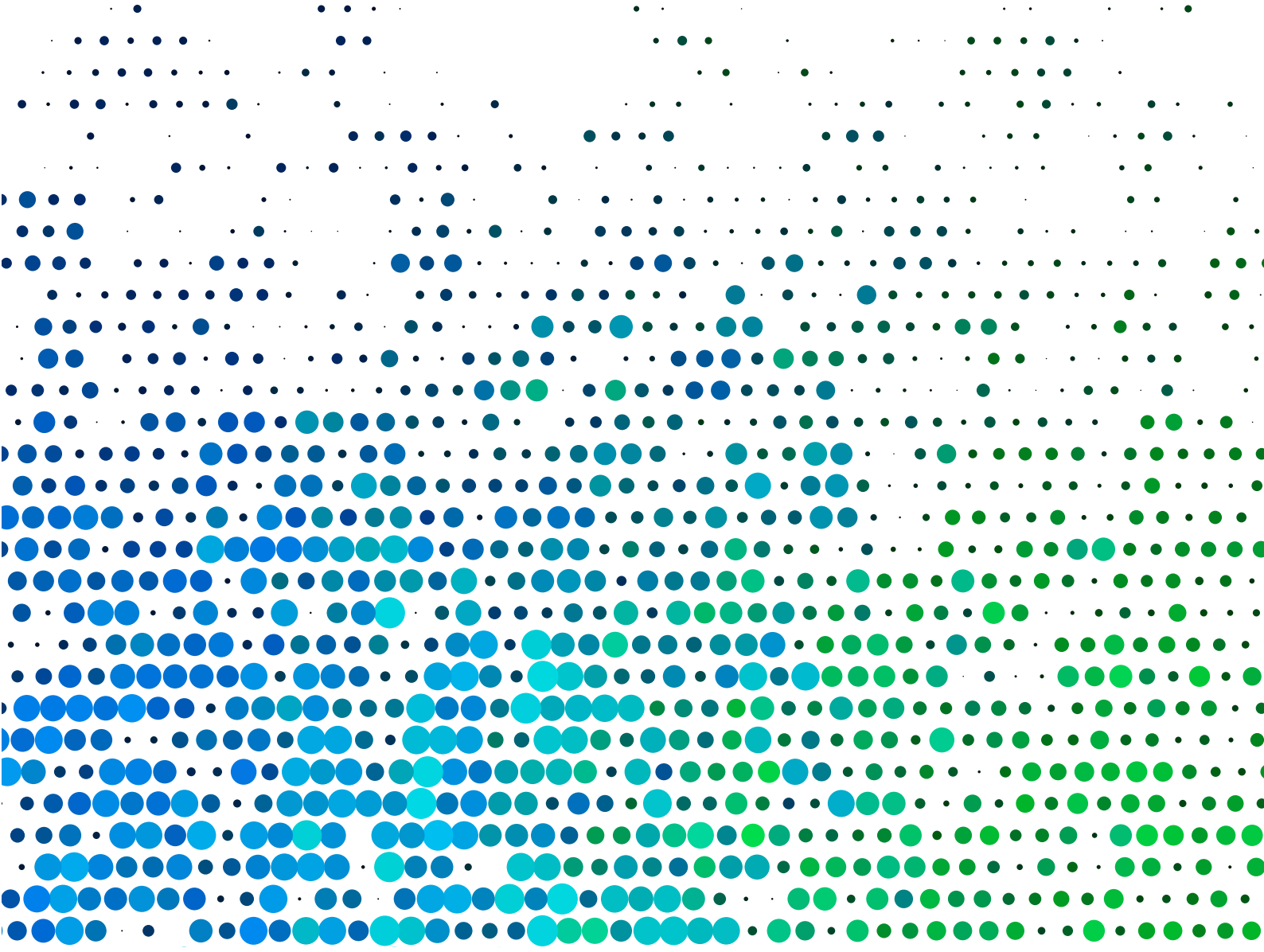
Collaborating with National Meteorological and Hydrological Services

A National Society guide to getting started



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This document is a tool for National Red Cross and Red Crescent Societies to explore how to better collaborate with their National Meteorological and Hydrological Services. A review of a guide first published in 2018, this new version reflects on frequently asked questions and provides thoughts and resources to answer them.

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What are national hydrometeorological services?

National Meteorological and Hydrological Services (NMHSs) are the nationally mandated institutions tasked with delivering critical weather, climate and water services. They monitor atmospheric and hydrological conditions, forecast potential hazards, and sometimes (but not always) have a mandate to issue weather-related warnings. NMHSs are key players in disaster risk reduction and climate adaptation, collaborating globally and regionally through data exchange and integrated observation systems. Their mandates also include advancing multi-hazard early warning systems and contributing to sustainable development goals (WMO, 2017).[1] The extent to which an NMHS is involved in each topic varies considerably from country to country, as does the way it is organized and operates.

Structure and organization

Collectively referred to as National Meteorological and Hydrological Services (NMHSs or Hydro-Met), national government meteorological (or 'Met') services and national level hydrological (or 'Hydro') services are the legally mandated institutions responsible for providing reliable and timely meteorological, hydrological, and climatic products and services in a country. Depending on the country, they act as a governmental or autonomous institution. Most NMHSs are members of the World Meteorological Organization (WMO), which coordinates global efforts in meteorology, hydrology and climatology by facilitating the exchange of high-quality observational data for global weather forecast models, fostering international collaboration and building capacity through training and resources.

WMO designates regional or specialized centres for specific coordination activities. Global Climate Monitoring Centres provide key inputs to generate climate indicators to describe the status of the global climate. Regional Specialised Meteorological Centres (RSMCs) are WMO centres of excellence that create regional products and Regional Climate Centres (RCCs) provide long-range forecasts that support regional and national climate activities. While these centres play a role in connecting and guiding NMHSs across larger regions, they do not have a mandate to issue public warnings within individual countries (e.g. through issuing warnings). Some regional centres, like ICPAC, the IGAD Regional Climate Center for Eastern Africa have a long history of engagement with National Societies in the region and hold a memorandum of understanding with the International Federation of Red Cross and Red Crescent Societies (IFRC).

1 For more details, refer to WMO's official guidelines and recent reports:

- Guidelines on the Role, Operation, and Management of NMHSs. https://library.wmo.int/viewer/55823/#page=15&viewer=picture&o=bookmark&n=0&q=
- WMO White Paper on Future NMHS Roles. https://wmo.int/media/announcement/wmo-open-consultative-platform-white-paper-2-future-of-national-meteorological-or

Roles and mandates

National Hydrometeorological Services is a catch-all term, which encompasses any meteorological and hydrological functions at the national level. However, their organization, roles and responsibilities can vary significantly between countries. In some nations, meteorological and hydrological services operate as distinct entities, sometimes even housed in different ministries or cities. Even when integrated within the same institution, differences in operations and services can arise due to varying funding levels, internal capacity and ability to support new initiatives.

Meteorological services are generally responsible for weather and climate forecasts (e.g. daily, weekly, monthly, sub-seasonal and/or seasonal for key aspects such as temperature, rainfall and weather hazards such as tropical cyclones and heat waves). Originally, they exist mainly for monitoring and forecasting at airports. Without those services, countries would not be allowed to have aviation. Hydro services are generally responsible for monitoring and managing water once the precipitation has fallen (e.g. surface water in lakes and rivers, as well as groundwater resources). Given the interlinkages between weather, climate and water, the two services often work closely with each other — including on shared hazards such as drought – and are sometimes housed in the same building or overarching agency.

Note that the roles of other national agencies are often intertwined with NMHSs mandates. For instance, civil protection and disaster management agencies can be responsible for disseminating early warning information and coordinating national emergency response. Seismological agencies often work at technical levels closely with NMHSs (or sometimes sit under the same umbrella organizations), as do Ministries of Water and Irrigation, Agriculture and beyond.

Regular activities

The activities of NMHSs vary significantly between countries, depending on capacity, mandate and the general landscape of government agencies. In general, these activities are most common and regularly conducted:

- monitor weather, water and climate using various tools, including:
  - automatic and manual stations and gauges
  - remote-sensing technologies (e.g. radars, satellites)
- collect and store important historical and real-time data
- develop and disseminate official forecasts at different time intervals:
  - sub-daily
  - daily
  - weekly
  - sub-seasonal
  - seasonal
  - climate forecasts
- issue "special bulletins" or advisories during extreme weather events
- information provision for various government sectors such as agriculture, shipping, aviation etc.
- contribution to climate reports and other policy-relevant publications
- conduct real-time monitoring and communicate information to relevant government authorities.

When it comes to early warning of extreme weather, things can get a bit complicated. Some NMHSs have the mandate to deliver them either directly to the public or to government levels. However, in some countries, this mandate lies with the civil protection or disaster management authorities. In others, early warning can remain an unfunded mandate, whereby there is an expectation that these will be disseminated by the NMHS, but it is not necessarily codified. It is critical to understand the specific roles of the NMHS in your country. You can find this out from their website, from national legislation or simply by talking to them.

Other activities

In addition to their regular activities, NMHSs conduct research related to weather and climate, and sit on various government initiatives related to disaster risk reduction and climate change adaptation. Their services are often requested by different government ministries to assist certain portfolios, and they commonly work with non-governmental and private institutions to improve their monitoring and forecasts. In the area of climate change, NMHSs oversee the maintenance of long weather records, and the monitoring of climate trends at national and local levels, sometimes collaborating within a national framework for climate services to facilitate and promote climate change adaptation and mitigation. NMHSs also have relationships with regional bodies and hold international collaborations on transboundary hydrometeorological issues.

Why should we collaborate with our NMHS?

There are many reasons why you should work with your NMHS and explore the wealth of opportunities that can emerge to fulfil your mandate and goals.

You have related mandates and you are counterparts in many areas

In your auxiliary role to the government, you are uniquely positioned to work with various government agencies – NMHSs are likely to be your counterparts in many coordination mechanisms already.

You probably sit together in national technical working groups for anticipatory action or in various structures for disaster response and climate change adaptation.

Your mandates have the same objective: to help communities prepare for, respond to, and mitigate the impacts of disasters, ensuring a coordinated approach to saving lives and reducing suffering during extreme weather events and long-term climate change. NMHSs hold a wealth of information and tools, which are critical for effective early warning, anticipatory action and climate change adaptation that you support. You have in-depth knowledge and expertise about the use and usability of their products, and hold key information about vulnerability, exposure and the impact of disasters, which they need to create more usable and effective tools for your decision-making.

Both portfolios have concrete opportunities and intersections to explore more deeply

Your work intersects primarily in areas of disaster preparedness, anticipatory action and early warning, emergency response, and long-term disaster risk reduction (see more detailed list below). Key areas of engagement include:

- anticipatory action
- emergency operation centres
- contingency planning
- early warning
- disaster preparedness and response
- risk analysis
- climate-smart programming
- any climate-related research
- capacity building related to climate science and knowledge
- climate and disaster risk management policy.

Collaboration holds many benefits

Collaborating closely has clear value for both organizations and concrete benefits, among these:

- The access and timely use of weather and climate information is what makes it valuable, and you can help NMHSs see how their work guides decision-making. For instance, you can help ensure that the communication of forecasts is simplified, context-specific and delivered in the right language at the right time.
- The strong community focus of your work can help raise public awareness of weather forecasts, alerts and early warning systems, bridging national and community-level efforts. You can help NMHSs identify the best channels for reaching vulnerable groups and, where necessary, assist in translating advisories into locally understood languages.
- Establishing feedback mechanisms on the value and accuracy of forecasts can strengthen links with communities and enhance the relevance of NMHS services. Consider offering insights, reports on early warning systems or community feedback on hazard communication for after-action reviews and the like.
- Knowledge of vulnerability, exposure and impacts that you hold within your National Society can be highly valuable for NMHSs wishing to develop impact-based forecasting. To learn more, you can explore this impact-based forecasting guide.
- NMHSs often rely on volunteers for rural data collection. Your volunteer network could extend their reach into remote areas. For instance, Red Cross Red Crescent volunteers can monitor river levels or take temperature readings during heatwaves.
- National Societies can serve as a bridge between NMHSs, NGOs and other organizations, fostering collaboration and enhancing disaster resilience through a whole-of-society approach. In-kind support like connecting NMHSs with broader networks, research organizations or global initiatives, such as SOFF can be valuable.
- You can be a champion of your NMHS both nationally (e.g. disaster response platforms) and globally (e.g. under the Early Warnings for All banner).

If you need additional policy-level wording about the value you can bring to NMHS mandates, the table below provides some ideas to build upon and/or adapt.

National Society approaches and principles – policy phrases

- ensuring a **people-centred, participatory and inclusive** approach in its own work and promoting it to other actors
- ensuring at-risk people, communities and local actors, including **the most vulnerable** and marginalized persons, are part of the design, implementation and review of activities, plans and protocols relevant to Early Warning Early Action/Early Warning Systems (EWEA/EWS), thus contributing to their success and sustainability
- recognizing the **specific needs and capacities of at-risk populations**, which may include, depending on the context, marginalized people, women, men, youth, elderly people, children, persons with different kinds of disabilities, displaced persons, indigenous peoples or marginalized ethnic groups
- empowering **locally-led responses** and supporting local stakeholders to lead through an extensive network of local volunteers
- connecting communities and other stakeholders, and acting as a link between technical information or monitoring and national decision-makers, when needed
- being ears on the ground to collect data and feedback about vulnerability, exposure and the effectiveness of early warning systems
- capturing learnings from past disasters on what worked and what did not work from community perspectives regarding warnings received, their usability and action taken
- **learning** from previous responses and taking action to address possible gaps in preparedness and early action
- facilitating **cross-sectoral, multi-stakeholder coordination and collaboration**, and acting as a convenor bridging actors across sectors
- promoting a **whole-of-society** approach: bringing in and facilitating the involvement of civil society organizations and representatives of vulnerable groups, media, private sector, academic and research institutions
- promoting a **whole-of-government** approach involving all relevant governmental actors including sectoral agencies (water, land use, urban and rural planning, health, housing, migration, agriculture etc.), civil protection agencies, police, military and governmental institutions
- agility and adaptiveness to changing risk landscape, conditions and operating environment.

Are there any possible challenges that we should be aware of as we begin to engage with our NMHS?

You may come across some challenges as you develop these conversations. Here are some of the most common ones and some ideas on how to address them.

Conception of mandates and roles

Both NMHSs and National Societies are auxiliaries to the public authorities and can therefore have common networks and structures within which to collaborate. However, this is not always known. Favourable laws, norms and standards are in place to facilitate collaboration within a disaster risk reduction platform or its equivalent in a country.

Funding

There are many funding challenges that you should be aware of and try to address whenever possible. First, self-funding is insufficient as many NMHSs receive minimal funding from their government and global or regional structures. This can limit any increase or adaptation of their capacities (both human and technological). Thus, when you have specific needs for their services, keep in mind that the NMHS may be understaffed and unable to respond. Lack of funding also translates into lack of equipment at country-scale. This has an impact on the comprehensiveness of observation networks and NMHSs may not be able to provide information (weather observations) in certain locations, particularly in rural areas. You can discuss ways to increase this funding, e.g. by bidding for joint projects or through early action protocols budgets.

Technical barriers

Communication channels and vocabulary: the majority of NMHS staff are trained physical scientists and experts in their fields, but many might not be trained in communicating science information and tailoring the communication methods to specific types of users. While the fields of applied climate science and climate services are growing, leading to improvements in science communication globally, it is still likely difficult for most National Societies to have discussions on an equal footing with NMHS staff, who are used to using highly technical and sophisticated terminology with their scientist peers. Similarly, the language of the disaster management and development sector is full of jargon and acronyms (such as DRR) that may be unfamiliar to external partners.

Different perspectives when looking at climate facts: up to now (even if a noticeable change is trending), NMHSs provide monitoring and forecast of weather events without a real focus on their impacts. For instance, a meteorologist would be interested in saying "x amount of rainfall is expected at y location", whereas for the National Society's disaster management unit, the impact of such an event is more important than the actual quantity. Impact-based forecasting has yet to be mainstreamed within the NMHS.

Useful spatio-temporal scale of information: the spatial scale of weather, water and climate information is often a source of frustration and confusion. National Societies often have very localized projects (at the community-level), whereas NMHSs generally provide their information with some granularity (e.g. at the national and sub-national levels). This may affect perceptions of accuracy.

The inherent uncertainties of the information: there is always uncertainty associated with forecasts. However, uncertainty is often not understood by humanitarian actors or the general public who may prefer receiving deterministic information (e.g. will there be flooding or not). As a result, some NMHSs simply do not share the uncertainty information. You can learn more about this, for example, by asking them to provide training on how to interpret it.

What steps should we take to start engaging with our NMHS?

Building a strong relationship with a NMHS can be a rewarding and mutually beneficial endeavour that requires time and effort. Here are some steps that you can take to begin:

1

Learn about the NMHS mandate and activities: become familiar with the mandate of the NMHS, the national legislation regarding their role and the provision of climate services at large, as well as the forecast products and warning information that can be made publicly available as a result. The more you will engage with the NMHS, the more you will learn from it. So, it is important that you document this information and share it to others in your team.

2

Discuss what you would hope to develop: have an internal strategy meeting at technical and senior management levels where you ask yourselves the following questions:

- What are you looking for in a relationship with the NMHS? What do you expect from initial meetings? What questions do you have for them?
- What do you know about existing NMHS products available to us? Which products do you currently access and use?
- Does your National Society have any history of working with your NMHS? Who led this initiative? What was it?
- What sort of engagement are you looking for in the short, medium and long-term?

3

Identify who to reach out to: if your National Society has a history of working with your NMHS, find out the details and the best person to contact. You can also reach out to the Red Cross Red Crescent Climate Centre to see if they have connections you could use.

4

Get the timing right: if you do not already have a relationship with your NMHS, make sure to reach out well-before a high-risk period (such as the rainy season) when both of your organizations are likely to be very busy. Building the foundation for a flow of relevant information takes time, so do not start conversations during emergencies.

5

Clear up any possible misunderstandings: in some contexts, NMHSs perceive the International Red Cross and Red Crescent Movement as a wealthy international organization —similar to the United Nations or International Non-Governmental Institutions (INGOs) – rather than auxiliary to government. As a result, they may expect to receive significant resources from their engagement. If you come across this perception, you should clarify any ambiguity from the start and promote the nationally mandated mission that both the National Society and the NMHS share.

6

Meet often, especially in the beginning, and then regularly: one way to get the conversation going is to invite key decision-makers from the NMHS to your office and show them some of the activities your team is involved in and how climate and weather information is critical to your work. It can also be interesting to ask your NMHS focal point if they might be able to provide a tour of their offices for you to better understand the work they do. You should also ask them about local weather stations in places where you have a presence and if your branch staff and volunteers may meet the local NMHS staff there.

7

Ask good scoping questions: asking good questions about the NMHS's work and the lens they bring to their work is crucial. This can help you identify possible collaborations and open a conversation. Below are some example formulations.

For which extreme events do you provide forecasts?

- It is useful to specify the timeline of the National Society's actions to help NMHS understand what type of forecast may interest you.

What are the forecast timescales (e.g. monthly, weekly, daily or hourly weather forecasts.)?

- Remember the difference between a forecast issued once a week for the week ahead and a seven-day forecast issued every day. You can also inquire about the seasonality of such forecasts; some forecasts on certain timescales may only be available in certain seasons. Be opportunistic – you may be able to ask if the NMHS has the capacity to offer forecasts on other timescales, and what might be needed to do so.

At what geographical scale do you provide forecasts (e.g. national, provincial level etc.)?

- It is worth checking the spatial resolution (how localized) at which the weather forecasts are made, and then how well these forecasts match what has been observed. You may also ask for climate summaries for localized areas – these are often available and are useful to understanding things like 'below normal' rainfall as presented in seasonal forecasts. In addition, long-term trends in temperature, rainfall and flood levels may be available for regions or specific watersheds and be helpful for disaster preparedness planning for the National Society and its branches, as well as at-risk communities.

Do you have strategic development plans you could share?

- First, try to find out whether the NMHS has publicly available information (check website); it may be useful to explore overlaps with National Society strategic priorities.

Do you offer impact-based forecast? For what risks? If not, do you have plans to do so?

- A follow-up to this can be how the National Society can potentially fit into and/or support the NMHS plans to develop impact-based forecasts, noting that NMHS may need to work in partnership with disaster managers in order to develop impact-based forecasts (due to the need for vulnerability and capacity information that National Societies may have but NMHS may not).

Are you aware of the National Society's efforts in climate risk management?

- If your NMHS has plans to move towards or enhance impact-based forecasting, it may be of interest – and even helpful – for them to know about current or anticipated National Society capacity for early action.

Is there a list of accessible climate services?

- You should always check in advance what is already publicly available (probably through NMHS websites), but they arel likely to have more information.

Do you provide any training to the public or specific user groups on how to understand and use forecast information?

- National Society staff and key volunteers (including youth) may be potential candidates for future training.

Can you show me your forecasts leading up (e.g. for a specific flood event)?

- This may start a dialogue on how disaster managers used information, how the NMHS information was disseminated to organizations and the public, etc.

Do you know how many of these events you were able to forecast, and how far in advance?

- This question, and the one below, are good discussion starters on uncertainty and disaster management decision making. However, beware that in some contexts, there is a risk the questions may be considered 'a criticism' – so phrase it carefully.

Do you know how many times you issued a similar forecast and then it turned out to be a false alarm (e.g. flood event didn't happen)?

- See above. Understanding false alerts will help the National Society to raise awareness that forecasts provide the best information available. This information can be used by disaster managers responsible for early action planning and can be trusted by the volunteers and communities who need to take action on the ground.

Do you have specific forecasts for urban areas?

- Certain hazards can be exacerbated in urban areas (e.g. heat wave impacts and flash floods) and can affect a large number of people. The specific opportunities for early action in crowded urban environments call for timely warnings.

Can you help interpret the climate projections for this country? What would it mean for disaster patterns and, hence, for our National Society's work on disaster management and community resilience?

- Ask the NMHS scientists to explain how the large-scale climate projections (for the region or country) may translate into likely changes in disaster patterns and extreme events over the coming decades. Use their knowledge to help National Society contingency planning for new "worst case" scenarios and to support climate-smart community resilience planning; be sure to also let them know when your National Society is making good use of NMHS information.

What are your long-term goals?

- This can be a useful question to open up a discussion in which the long-term goals of the National Society could be shared and compared. It may be the case that both the NMHS and the National Society are interested in supporting efforts to build community level resilience (e.g. heat waves in urban areas).

In contrast, certain question formulations should be avoided – the table below offers some examples and alternatives.

Can we have the data?

What types of data do you collect?

- Don't ask for raw data, such as the daily rainfall measurements taken at a particular weather station. It is difficult for them to provide data and in some cases, it may be politically sensitive. This format may not be useful to you anyway, unless you have the capacity to analyse it. Generally speaking, any information you ask for should come in the form of interpreted products such as a flood risk map, a rainfall forecast tool, or a chart with trends in rainfall or flood levels in a certain area.

Why do you give wrong forecasts?

How can we help communities and practitioners understand uncertainty in the forecasts and warnings?

- There is significant uncertainty in the forecasts making process and therefore sometimes forecasts will be wrong. It may be productive to talk about a positive experience with an accurate NMHS forecast that was used by the National Society for taking early action. If there is interest in why a disaster occurred and a timely forecast was not issued, it is a good idea to frame it in a way that the NMHS understands how the timely communication of a forecast could have helped in disaster preparedness and maybe saved lives and assets.

What is the skill of the forecast?

How early do you tend to be quite confident in your forecast? What is the earliest you think we should be acting on the information in [x] ways?

- This could be a good question to ask but only if the person asking it has a grasp on what forecast skill means.

Can you provide climate projections for this town?

Have you done any research about climate change in this area? What trends do you see in the hydrometeorological observations you have for this area?

- Do not ask to "downscale" climate projection modelling to local levels – the uncertainty increases so much that it becomes meaningless, and the NMHS scientists should refuse the exercise.

Bear in mind a few key principles

- Strive to establish a win-win collaboration (e.g. exchanging knowledge and services) that falls within the NMHS and the National Society's overlapping strategic priorities. Hence, it would be part of – and funded through – the NMHS regular work. When feasible, explore joint projects or how to contribute to fund some of their needs (e.g. equipment or capacity building). For more detail on funding, see section below.

- Pick the low-hanging fruit in the beginning. Look for the easy gains where you can start to build a relationship. Do not suggest collaboration into areas that the NMHS may appear reluctant to engage in until you understand the reason behind it. A long-term agreement on even a very limited set of priorities can likely be expanded as the relationship grows. Many National Societies have such agreements that identify areas of collaboration, many of which are not tied to funding.

- Respect the confidentiality of the information. When the NMHS provides you with confidential data, such data should not be shared with any other partners without explicit permission.

- Take care of this relationship. Identify diverse ways to connect your work with theirs. Share opportunities and resources you think might be of interest. Communicate regularly. Explore the possibility of seconding staff in each other's institutions for a period of time.

- Develop a feedback mechanism where both your organizations talk to each other when information is shared and used. This can help you focus on what would be most useful and used.

- Celebrate successes and reflect on lessons learned.

How do we institutionalize our relationship with our NMHS?

At first, your engagement with your NMHS might be punctual, project-related or simply informative. However, as this relationship deepens, you may benefit from a formalized long-term relationship.

Initiating dialogue

The initial phase of engagement with the NMHS depends on the context and it is important to cultivate an organic relationship-building process. This likely means that multiple in-person meetings will be necessary in addition to a systematic, coordinated follow-up process. When the time is right,which will vary considerably depending on the situation, you should consider establishing a more formal, sustainable relationship, for instance based on a memorandum of understanding.

Discussing resources

You may be asked to show resources that you can bring to the relationship, but these do not necessarily need to be financial. Managing this two-way relationship will take effort from National Society staff and flexibility to change some ways of working. Ask yourself what you can commit to this relationship.

Identifying human capacity

Identifying who would holdf the relationship is key. You must ensure that there is at least one role or position at both technical and senior management levels that is considered to be a focal point. For example, you may wish to consider whether the human resources for engaging with your NMHS may be included in the National Society programming (perhaps with external donors), such as disaster risk reduction and resilience - to ensure the programming is climate-smart.

Institutionalizing the relationship

To institutionalize the relationship between the NMHS and the National Society, it is essential to assign the responsibility for maintaining the partnership to specific roles or positions, rather than individuals. This approach ensures continuity despite staff turnover, as accountability remains tied to the position rather than the person. The National Society could also advocate for this with the NMHS. Clearly defining the duties and expectations for these roles in a formal agreement or memorandums of understanding (MoU) can further solidify the relationship, ensuring a consistent and structured channel of communication between the organizations. This strategy minimizes disruption and maintains long-term collaboration regardless of personnel changes.

Check if there is a precedent within your National Society for holding formal agreements or MoUs with government entities. An MoU template is provided below for you to adapt.

Additional resources

NOAA, 2023. "National Weather Service welcomes American Red Cross as a core partner". https://www.noaa.gov/news-release/national-weather-service-welcomes-american-red-cross-as-core-partner

SNM Argentina. 2024. "Good Practices for Interacting with Users of Meteorological, Climate and Environmental Services". https://repositorio.smn.gob.ar/bitstream/handle/20.500.12160/2713/0002MS2024.pdf?sequence=4&isAllowed=y

Future Leaders Network on Early Warning Early Action. The Importance of Connecting Regional and National Hydro-Meteorological Services with Anticipatory Action Practitioners. Berlin: Anticipation Hub, 2024. https://www.anticipation-hub.org/download/file-4232

SENHAMI and Save the Children. *Sistema De Información Agrometeorológica*. http://sia.senamhi.gob.pe/?p=inicio

Framework for climate services in developing countries. https://www.int-res.com/articles/cr_oa/c047p145.pdf

THE ROLE AND OPERATION OF NATIONAL METEOROLOGICAL AND HYDROLOGICAL SERVICES. A Statement by the World Meteorological Organization for Decision-Makers. https://library.wmo.int/viewer/54871/download?file=2015_role-operation-nmhs-dm_en.pdf&type=pdf&navigator=1

IFRC. "Early Warning Early Action" https://www.ifrc.org/our-work/disasters-climate-and-crises/climate-smart-disaster-risk-reduction/early-warning-early

World Meteorological Organization. Guidelines on the Role, Operation and Management of National Meteorological and Hydrological Services (WMO-No. 1195). https://library.wmo.int/viewer/55823/#page=1&viewer=picture&o=bookmark&n=0&q=

WMO Open Consultative Platform White Paper #2 - Future of National Meteorological or Hydrometeorological Services: Evolving roles and responsibilities. https://wmo.int/media/announcement/wmo-open-consultative-platform-white-paper-2-future-of-national-meteorological-or

Systematic Observations Financing Facility. Hydromet Gap Report 2024. https://www.un-soff.org/document/hydromet-gap-report-2024/

Red Cross Red Crescent Climate Centre and International Federation of Red Cross and Red Crescent Societies. *Guide to climate-smart programmes and operations*. 2023. https://www.ifrc.org/document/guide-climate-smart-programmes-and-operations

The Future of Forecasts: *Impact-based Forecasting for Early action.* 2021. https://www.anticipation-hub.org/Documents/Manuals_and_Guidelines/RCCC_Impact_based_forecasting_Guide_2021-3.pdf

There is a wealth of experience and expertise from other National Societies that you can draw upon as you move forward! We would strongly encourage you to reach out to colleagues in other National Societies to learn from them and reflect together. The IFRC and the Climate Centre can help you make these connections and we look forward to hearing about your journey.

Annex 1

Potential elements of a memorandum of understanding between a National Society and a NMHS

Should the initial collaboration between the NMHS and the National Society evolve into a more long-term relationship, it may be necessary to enter into a formal written agreement. This document would specify the areas in which the parties are committed to collaborating in order to advance shared objectives, in relation to your respective mandates. The following list provides suggestions on items to consider and elaborate on as appropriate to your situation:

1. The [[National Society] is committed to strengthening community resilience, disaster risk reduction and disaster management. [NMHS] provides observation forecasts and warning services on weather-related disasters in different spatial and time scales including [xxx] (e.g. three hour forecast), short and medium range (up to seven days), extended range (up to two weeks), seasonal forecast for temperature and monsoon (four months for rain, three months for temperature). [NMHS] will provide this forecast to [National Society] on a regular basis through [xxx].

2. For collaboration and proper exchange of information there will be cooperation at the national, district/ provincial/ sub-national level.

3. For capacity building to strengthen community preparedness, the [National Society] will organize TOTs at the national, state and district levels and [NMHS] will provide resource persons and knowledge support for understanding and interpretation of weather monitoring and forecast information.

4. [NMHS] at present issues impact forecasts for cyclones. A joint effort will be made by the [National Society] and [NMHS] to undertake a pilot study in [x] districts to develop impact-based forecasts with respect to [heat wave, cold wave, heavy or deficient rain leading to floods, etc.].

5. [National Society] and [NMHS] will work jointly to improve communication of weather forecasts and warnings to at-risk communities, building on the current digital or media tools, supplemented by the National Society and the International Red Cross and Red Crescent Movement's outreach through its staff and volunteers.

6. [NMHS] will collaborate with [National Society] to raise awareness on weather monitoring and forecasting, including extreme weather forecasting, as part of the community-based preparedness programme of the International Red Cross and Red Crescent Movement starting with [xxx] districts.

7. [National Society] and [NMHS] will work together to make weather and forecast data and products more user-friendly, understandable and actionable.

8. [NMHS] shall provide historical weather data, if possible, for areas of interest to the [National Society] as per the existing procedures for data sharing and supply.

9. [NMHS] carries out a technical survey [post-cyclone, flood etc.] to find out the characteristics and impacts. It will work with the [National Society] to also get an impact assessment from the ground wherever possible for improving impact-based forecast and warning.

10. Both [NMHS] and [National Society] will evaluate the benefits of their collaboration and share them in appropriate forums.

11. Both parties shall identify regional and state focal points for coordination at the regional and state level.

12. Information on past climate trends and future projections will be shared with [National Society]. NMHS may assist [National Society] in interpreting the likely implications of the projections for disaster preparedness at all levels, as well as for community resilience programming.

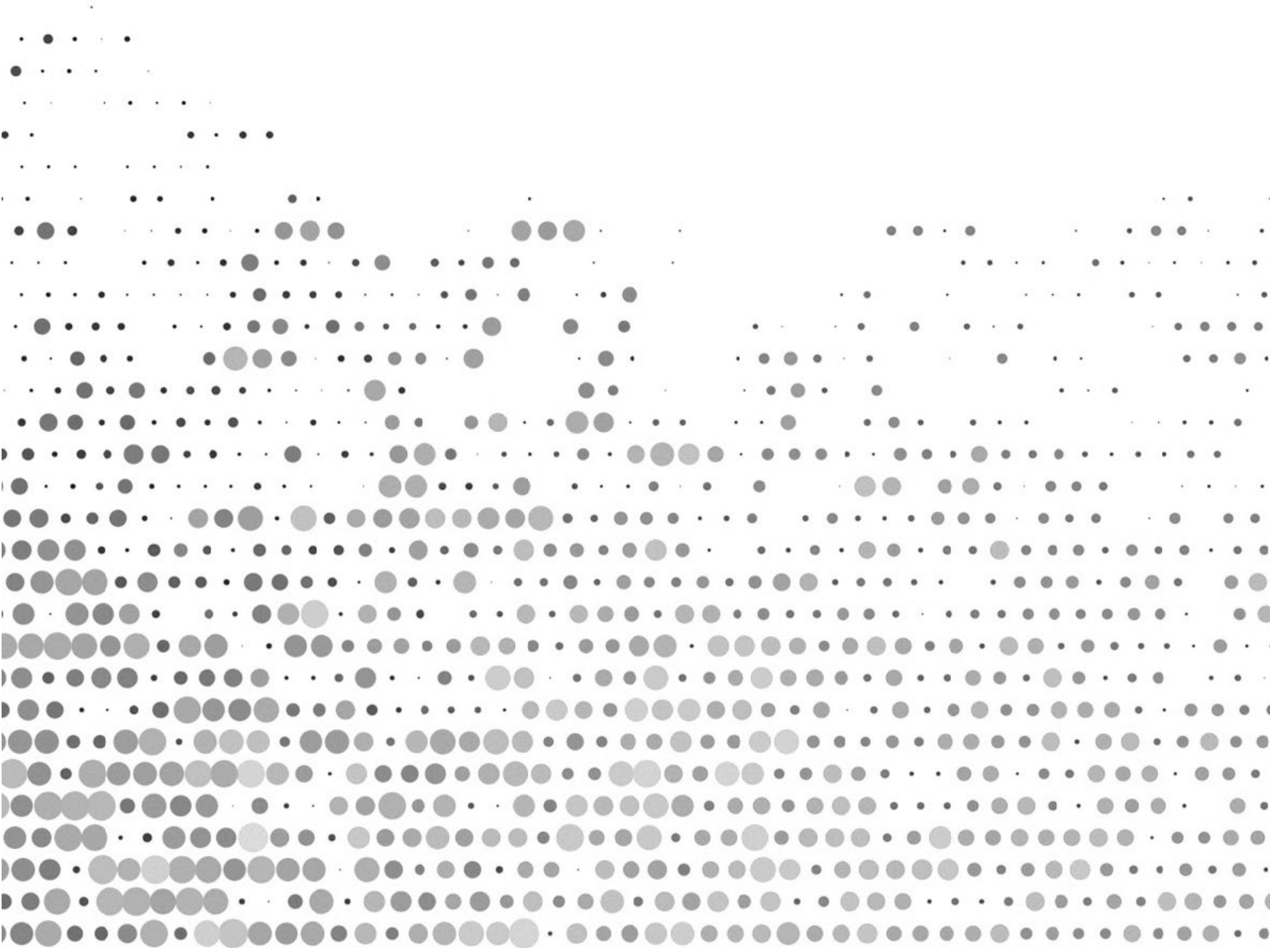
13. [NMHS] and [National Society] will collaborate on multi-hazard early warning and weather and climate risk mapping to build community awareness and resilience.

14. [NMHS] and [National Society] shall jointly publish papers for the purpose of knowledge sharing, awareness and information.

15. [NMHS] and [National Society] will jointly identify, on a pilot basis, one riverine flood-prone rural area and one flood-prone urban area to prepare a plan with local authorities for forecast-based preventive action based on agreed standard operating procedures.

16. [NMHS] and [National Society] will work jointly to fine-tune existing early warning systems to meet the needsof communities of communities, especially with respect to preparedness, disaster risk reduction, health and agricultural livelihoods.

17. [NMHS] will assist [National Society] in the development and monitoring of triggers for Early Action Protocols (EAPs) to support operational anticipatory action.



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