

Flood Handbook

Essential tools and tips to be aware of ahead of the flood season

Highlights

- Floods have been increasing in severity and frequency in many areas where we work; this trend is expected to continue, especially in tropical regions.
- Some areas are more flood-prone than others. Flood risk is often seasonal, largely driven by rainfall patterns.
- Being well prepared involves knowing the flood risk and seasonality in your project area and monitoring flood forecasts, as well as lake and river levels.
- There are many tools available to monitor and forecast rainfall and evaluate flood risk, this Handbook is there to help you in knowing which may be useful for your needs. **If you need further support, [contact HACE via Elixir](#).**

Why this Handbook?

Flooding is nothing new, but over recent decades floods have been increasing in frequency and severity in many areas where MSF works¹, partly due to climate change and manmade activities affecting our built environment. Global warming can lead to more energy for tropical storms, sea level rise, melting glaciers and more intense downpours as a warmer atmosphere can hold more moisture. Flooding is projected to increase particularly in the tropics, especially in Africa and Asia (Figure 1)².

At the same time, there are now many more tools and services available to help us both monitor and forecast. But with so many options, it can be hard to know which tools are most useful, when to use them, and in what kind of context to apply them. This Handbook is designed to help MSF teams know about useful resources and prepare for the upcoming flood season more effectively.

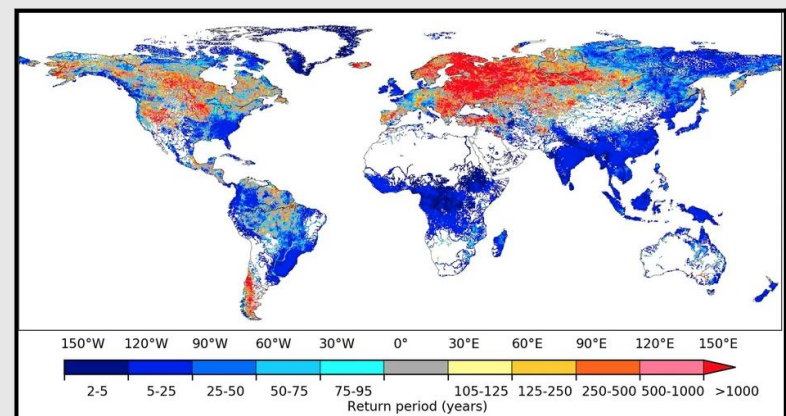
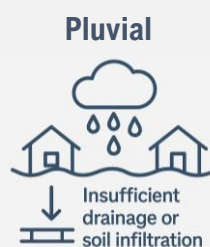


Figure 1 Projected change in the frequency of 1-in-100-year floods for 2071-2100 under the SSP5 scenario. Areas in blue are expected to experience these floods more often, while yellow to red areas are expected to see them less frequently.

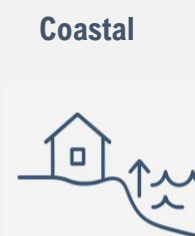
Figure 2 – Types of floods²



Occurs when rivers or lakes overflow from heavy rain, runoff, or blocked drainage. They often develop gradually over days or weeks.



Occurs when heavy rain overwhelms drainage systems or soil absorption, causing flooding without river overflow. These often occur in urban or low-lying areas and include 'flash floods' that develop within minutes or hours.



Occurs when seawater inundates land due to storm surges, high tides, or rising sea levels. They are often driven by cyclones, storms, or long-term sea level rise.



Before the flood season starts

1. Check your flood exposure



Before the flood season, it's important to understand how exposed to flood hazard your project area is. For this, we recommend you check your project ranking on [MSF GeoHazards](#) and/or [this webmap](#) that uses Fathom 2 data for 1-in-100-year flood maps - showing somewhat rare but serious flood events. If you are working in Burkina Faso, Burundi, Central African Republic, Chad, DR Congo, Djibouti, Honduras, Madagascar, Mozambique, Pakistan, PNG, Somalia, South Sudan and Timor-Leste you can use the [Fathom 3](#) data for the most accurate maps.

2. Check the flood seasonality where you work



The risk of floods change over the calendar year based on rainfall patterns and tropical storm seasons. Table 1 shows the *historical* frequency of floods recorded in [EM-DAT](#) for key regions where MSF is present and can be used as a general overview. For more detailed information on [national flood seasonality see the data here](#). To compare this with calendars for rainfall and other hazards at the national or subnational level, you can review our [HACE Seasonal Calendars](#) e.g. for [Central Africa](#), [Central America and the Caribbean](#), [East Africa](#), [Southern Africa](#) and [West Africa](#). These can help with logistical planning and preparedness activities like pre-positioning of supplies.

Table 1 – Regional Historical Flood Seasonality (data from EM-DAT 1900-2025) For more detail see [here](#)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
SE Asia (Malay Archipelago)	Dark Blue	Dark Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue
Central Asia	Light Blue	Light Blue	Light Blue	Dark Blue	Dark Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue
East Africa	Light Blue	Light Blue	Light Blue	Dark Blue	Dark Blue	Light Blue	Light Blue	Dark Blue	Dark Blue	Light Blue	Light Blue	Light Blue
Central America & Caribbean	Light Blue	Light Blue	Light Blue	Light Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Light Blue
South Asia	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Light Blue	Light Blue	Light Blue
West Africa & Sahel	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Light Blue	Light Blue
SE Asia (Mekong Delta)	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Dark Blue	Dark Blue	Light Blue	Light Blue	Light Blue
North Africa	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue
Central Africa	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue
Middle East	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue

3. Monitor seasonal rainfall outlooks



To avoid being caught unprepared, check the [HACE Seasonal Outlooks](#) before each rainy season. They highlight areas at risk of above-average rainfall 3–4 months in advance. While they can't pinpoint exactly when or where flooding might occur, they offer an early heads-up where **flood risk is higher than usual**.

If HACE doesn't cover your region, you can check seasonal and sub-seasonal predictions before and during the flood season. The most reliable global seasonal outlooks are provided by [Copernicus](#) (Europe) and [IRI](#) (US/Canada). You can also keep an eye on climate indices like the Indian Ocean Dipole (IOD) or El Niño–Southern Oscillation (ENSO), which shifts between Neutral, [La Niña](#), and [El Niño](#) phases. These phenomena [influence rainfall and temperature patterns](#) in many region where we work.

If you need help interpreting/using these predictions, you should contact your OD's CEH focal point or [reach out to HACE via Elixir](#) for technical support.

It's generally recommended that adaptation efforts follow a pyramid approach³ — with the majority of resources invested in strong, long-term preparedness as the foundation. This reduces reliance on short-term coping measures or reactive actions that can lead to maladaptation. While MSF's role as an emergency organization may shift this balance, it remains essential that we don't overlook strategic, long-term preparedness to strengthen our ability to respond effectively.

Figure 3. Preparedness and early action for floods



Immediate (days to hours): Distribute grab bags, first aid kits and food, raise the alarm. Evacuation.



Short-term readiness (weeks to days): Alert communities and stakeholders, prepare for evacuation. Distribution of NFI (e.g. trash bags, jerry cans, soap, buckets, chlorine tablets, hygiene kits), Health promotion and community education on water and hygiene strengthen dykes, trenches or levees, regularly recheck river-level and rainfall forecast updates. Relocation of vulnerable items to high ground and removal of toxic/medical waste for safe disposal. Stay alert for health impacts of floods (see Fig 6).



Medium term (seasons to months): Review seasonal climate forecasts for rainfall anomalies, storm activity and ENSO/IOD trends. Reinforcement and strengthening of clinics, hospitals, buildings. Review stown and repositioning of NFI, tents, non-perishable food items and seeds etc in accessible warehouses. Identify safe places / high ground and discuss acceptance of relocation/evacuation with community members. Protect boreholes, acquire and reposition boats, life-vests, tractors/aquatic vehicles and train staff or hire drivers to use if feasible. Review staffing and human resource needs. Advocacy to partners. Review contingency plans, EPREPs and define response triggers in advance (e.g. based on the number of deaths/people affected or water levels).



Long-term preparedness (months to years): Targeted recruiting of staff and experts with necessary skills. Scenario planning, training, role play and capacity building for floods. Data collection (e.g. water level monitoring), improving knowledge around monitoring and forecasting tools. Conducting vulnerability and risk assessments to identify and quantify the needs of groups vulnerable to the impacts of floods (e.g. people living with disabilities, children the elderly) and mapping to identify blindspots. Community strengthening and relationship building. Mapping of other actors (iNGO, MOH, UN/OCHA, Civil defence etc), establish relationships and specifying pre-defined roles and responsibilities in the case of flooding. Sustainable infrastructure and bio-climatic architecture, reforestation, careful planning of project locations to avoid floodplanes and high risk areas and mapping of road/airstrip access. Identify solutions to strengthen water and sanitation. Mapping of environmental contamination risk areas (e.g. oil fields, mining areas). Improving epidemiological monitoring, surveillance and response capacity for potential health impacts of floods (esp waterborne diseases – see Fig 6.)

Stay informed with flood monitoring



Want to know how many people are affected by floods in a specific region? The OCHA [Flood Exposure Module](#) (Figure 4) lets you quickly check population impacts at both national and subnational levels (admin1 and admin2). This is only available for a few select countries in the African continent.

If you're preparing for a mission or project, we recommend subscribing to [WFP's ADAM Flood service](#) — it provides automatic alerts ahead of major flood events and regular updates during ongoing floods.

For a global overview of flood activity, stay informed by regularly checking the Global Disaster Alert and Coordination System ([GDACS](#)) or [ECHO Flash](#).

These monitoring tools are all global, but there are many other warning systems at the national and regional level. We recommend to check if the country or area you are working in provides more local alerts. For example, in East Africa, [ICPAC](#) provide comprehensive updates on current flood events and forecasts for rainfall.

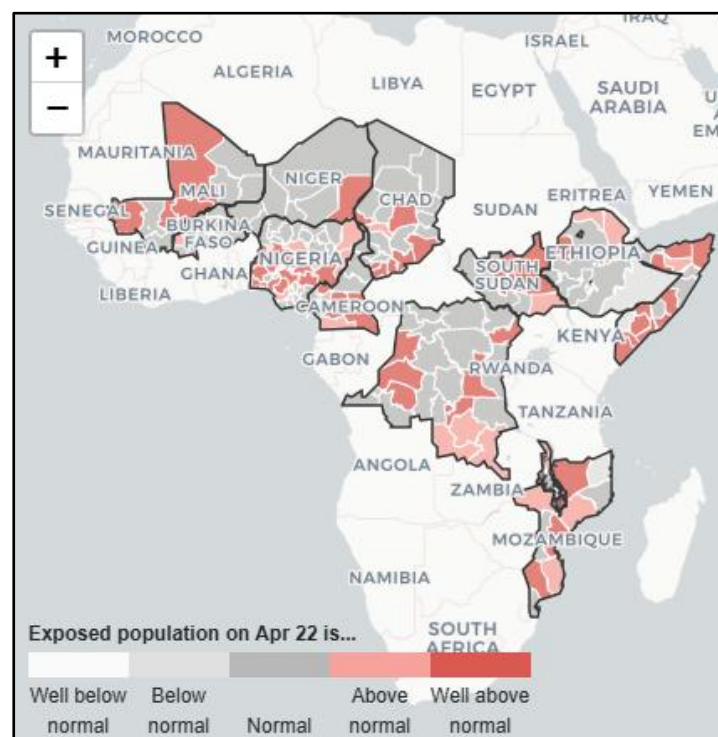


Figure 4 - Map showing the areas in Africa currently covered by [Centre for Humdata flood exposure model](#), which shows the exposed population

Stay ahead with flood forecasting



Need a heads-up on rising rivers? [Google FloodHub](#) provides river level forecasts up to **6 days in advance** — perfect for anticipating fluvial floods. It now covers nearly all regions where MSF operates, thanks to expanded data, even in lower-confidence areas.

For broader flood forecasts, [WFP's ADAM service](#) offers **3-5 day alerts**, drawing on rainfall predictions and data from the Global Flood Awareness System (GloFAS). The ADAM Alerts and Monitoring are also all available via the [Extreme Weather GeoApp](#).

There are some national flood forecasting tools available, e.g. for specific countries like South Sudan. The HACE team usually shares regular flood forecasting updates as these become available via [INFLOW](#) when the rainy season starts.

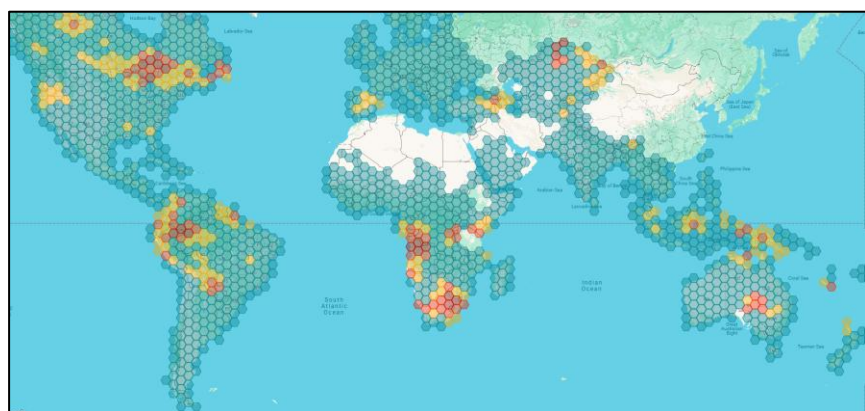


Figure 5 - Showing areas covered by [Google FloodHub](#) with “extended coverage” selected to include lower-confidence gauges.

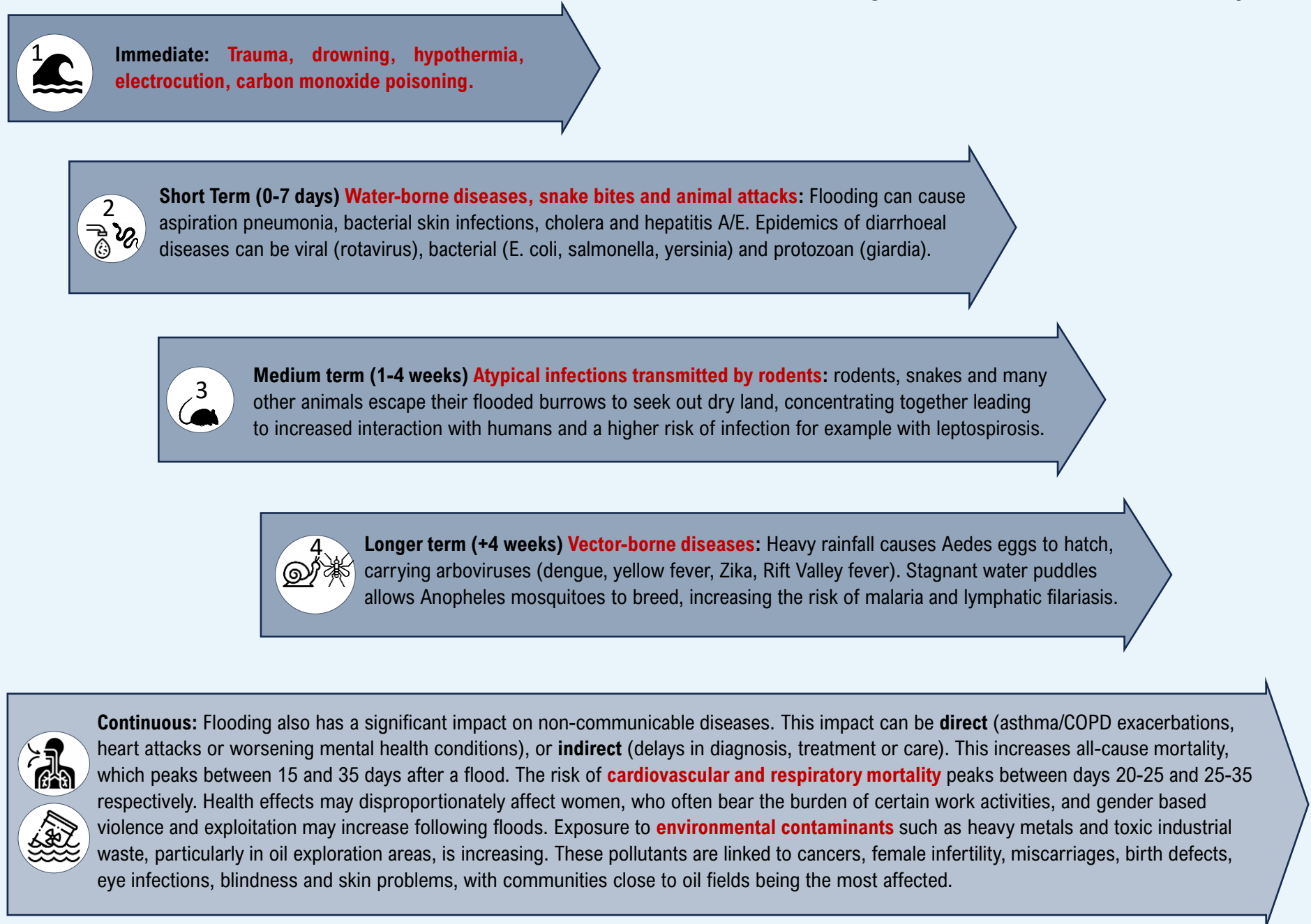
Need further support? Any questions?

To monitor and map flood extent, reach out to the GIS Centre - either through your field GIS officer, GIS advisor or [through Elixir directly](#). For forecasting and preparedness support, [contact HACE](#), also through [Elixir](#).

Timeline of Health Impacts

Both before flooding begins, and during flooding events, it is important to think about the potential health impacts, and when these risks are most likely to occur. Forecasts for heavy rainfall and flooding can act as an “early warning” for an increased risk of various health issues. Be prepared for increases of water-borne and vector-borne diseases as well as impacts on non-communicable diseases over different time scales⁵.

Figure 6. Timeline of flood health impacts



References

- 1 - Jonkman SN, et al. Floods have become less deadly: an analysis of global flood fatalities 1975–2022. *Natural Hazards*. 2024 May;120(7):6327-42
- 2 - Hirabayashi Y, et al Global exposure to flooding from the new CMIP6 climate model projections. *Scientific reports*. 2021 Feb 12;11(1):3740.
- 3 – Infographic adapted from <https://blog.onmarketins.com/three-types-of-flooding-explained-03c0ae102bb0>
- 4 – Figure 3 adapted from Nauman C, et al. Perspectives on flood forecast-based early action and opportunities for Earth observations. *Journal of Applied Remote Sensing*. 2021 Jul 1;15(3):032002-. And Kelder T, et al. How to stop being surprised by unprecedented weather. *Nature Communications*. 2025 Mar 10;16(1):2382.
- 5- Sources: [Brown et al](#), [Paterson et al](#), [Senkwe et al](#), [Martinez et al](#), [Ochoa et al](#), [Benanisio et al](#), [Onafroo et al](#), [Yang et al](#), [McCreesh et al](#), [Holt et al](#), and [Okoka et al](#)