

Comparisons between traditional forecasts, impact-based forecasts, and co-produced impact-based forecasts

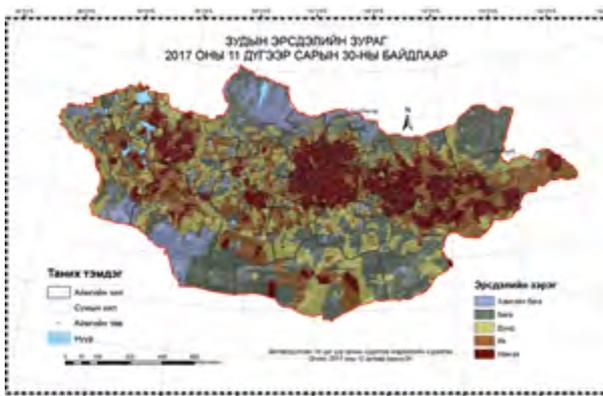
| Hazard | Traditional Forecast | Impact-based forecast for Individuals/ members of public | Impact-based forecast co-produced with and for Sector specific users |
|-------------------------|--|--|--|
| Flooding | Heavy rain is forecast. 100 to 150mm of rain is expected within a three-hour period. | Flash flooding of the County River is expected. Dwellings, farm buildings and grazing land within 30m of the river channel are expected to flood and be damaged. | The forecast water level in the recreational district is expected to cross the +0.85 alert threshold in 5 days and remain above for a further 3 days. An impact forecast of loss of household assets is over 25% and affected population over 40%. |
| Snow | There is a chance of snow showers tomorrow afternoon. 2-5 cm of snow is possible, with 10 cm over the highest ground. | There is a chance of snow showers tomorrow afternoon. 2-5 cm of snow is possible, with 10 cm over the highest ground. Stranded vehicles and passengers possible on some roadways. Cancellations and delays to public transport are expected. Some power outages may occur in the X area. | The 5 days forecast of 20 cm of snow for 3 consecutive days, corresponds to impact forecast of loss 20% of livestock and affected population over 30% in the remote communities in the Andes. |
| Tropical Cyclone | A tropical cyclone category 3, windspeed of 125 km/h is expected in the next 48 hours. | A tropical cyclone category 3, windspeed of 125 km/h is expected to make landfall in 12 hours, in X and Y regions, likely to damage critical infrastructure such as bridges, blocking transport from region X to region Y. | A Tropical cyclone, lead time of 30 hours, with wind speed greater than 125 km/h, corresponding to an impact forecast of damage of 25% of housing. |
| Drought | For June – August, below-average precipitation is more likely than above-average precipitation. Average precipitation for June to August will fall into the driest of the five forecast categories = 60%. Average precipitation for June to August will fall into the wettest of the five categories = 5% (the 1981-2010 probability for each of these categories is 20%). | Below average rainfall is expected throughout the rainy season. There is an 80% chance of crop failure in the central valley. There is a 60% chance of crop failure in the eastern valley. Farming households will need to purchase 40% more food compared to previous years. | The impact forecast is of a reduced yield of 20-40% below the 5-year average. Historically, losses of this magnitude corresponded with a 30-50% rise in the price of millet. The percentage of the population expected to experience acute food shortages and need emergency support is expected to increase from 15% (chronic level) to 35% of the total population. Food shortages and food rationing associated with malnourishment and child stunting will sharply increase in 4 months, especially among chronically poor households. |

Impact-based forecasts and warnings are already changing the way individuals and organisations respond to weather and climate events across the globe, particularly in disaster risk reduction efforts: from Bangladesh to the USA, from the Philippines to Uganda.



Uganda floods, May 2020
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Impact-based Forecasting in Disaster Risk Management



Dzud Risk Map

Mongolia successfully developed and implemented impact-based forecasting for the extreme conditions that lead to large-scale livestock mortality, known as *Dzud*. *Dzud* is a period of extreme cold, often with deep snow, following summer drought. A combination of multi-climate hazards and vulnerability, including inadequate pasture management due to overpopulated livestock, poverty, and insufficient winter preparedness, have led to devastating impacts during recent *Dzud*. In the 2009/2010 winter, more than 10 million livestock died from starvation or exposure, affecting 220,000 households. The estimated cost of the damage was 474 billion Mongolian Tugrik (345 million USD).

Working in collaboration with Japan's Nagoya University, the National Agency for Meteorology and Environmental Monitoring (NAMEM) and Mongolia's Information and Research Institute of Meteorology, Hydrology and Environment, investigated major *Dzud*-producing factors and developed an impact-based forecast service called *Dzud* risk map.

Now, the Mongolian Red Cross and the United Nations Food and Agriculture Organization (FAO) use these monthly updated impact-based forecasts to [trigger the release of funds](#), before the impacts of *Dzud* are felt. When triggered, unrestricted funds and animal care supplies are given directly to the most vulnerable individuals and communities.

The benefits of impact-based forecasting:

Impact-based forecast and warnings triggers anticipatory actions which saves lives and protects property and livelihoods.

Impact-based forecasts and warnings communicate information that allows those at risk to make effective decisions to safeguard against the impact of forecast extreme weather or climate event

Developing impact-based forecasts and warnings builds strong, collaborative partnerships

between national meteorological and hydrological services and sectors operating in disaster risk reduction and management.

Impact-based forecasting communicates uncertainties. Decision makers can factor the uncertainties into choosing appropriate actions.

Producers and users of Impact-based forecasting and warnings share data, best practice and critical information before, during and after weather and climate

events to improve the quality of forecast and warning information.

...there are opportunities for forecasts to support strategic planning in the County such as through using forecasts to inform sectoral annual plans and related budgets, to raise awareness on potential climate risks and resource mobilisation for early action.

ForPAC

Forecast-based Action workshop,

Kenya 2018



© Mongolia Red Cross 2018

Impact-based *Dzud* forecasts have resulted in early actions being taken and fewer lost livestock. A robust, quasi-experimental study showed that by providing early assistance in December and January 2018, before winter conditions reached their most extreme, the Red Cross intervention effectively reduced livestock mortality by up to 50% and increased offspring survival for some species, thereby helping to secure future livelihoods.

Early actions that can be triggered by an impact-based forecast

Actions can be taken by a range of individuals or organisations to minimise the impact of severe and extreme weather and climate events. Some typical examples of actions include:

- ▶ Evacuate vulnerable communities, individuals and their livestock and most important belongings (an example from [Bangladesh Red Crescent](#))
- ▶ Pre-deployment of flood barriers
- ▶ Close roads and bridges
- ▶ Cash transfers that support tailored early actions for families (an example from [Bangladesh Red Crescent](#))
- ▶ Destocking livestock (an example from [FAO](#))
- ▶ Early harvesting (an example from [Philippines Red Cross](#))
- ▶ Distribution of protective items
- ▶ Pre-position (in some cases distribute) relief packages, which may include tents, food, water, and purification tablets (an example from [Peruvian Red Cross](#))
- ▶ Pre-position response vehicles and staff
- ▶ Board up windows
- ▶ Repair or shore up loose or damaged property and infrastructure (an example from [Mozambique Red Cross](#))
- ▶ Move furniture and belongings to a safe location
- ▶ Ensure vulnerable individuals and groups understand the forecast, expected impacts, and appropriate response
- ▶ Move livestock to safe location
- ▶ Clear drainage channels

Global call to develop Impact-based Forecasting

National meteorological and hydrological services can contribute to the delivery of key global agendas by developing impact-based forecasting.

The World Meteorological Organisation (WMO) actively encourages impact-based forecasting as a mechanism to deliver aspects of the [Sendai Framework for Disaster Risk Reduction](#), the [Sustainable Development Agenda](#), and the aims of the [Risk informed Early Action Partnership \(REAP\)](#) and the [Anticipation Hub](#).

The guide “The Future of Forecasts: Impact-based Forecasting for Early Action” provides a step by step guide for national meteorological and hydrological services and partner organisations interested in developing impact-based forecasts and warnings. The guide builds on best practice from a user and producer perspective and offer guidelines set out by the WMO and leading impact-based forecasting practitioners and it builds on and is aligned with the [WMO Guidelines on Multi-hazard Impact-based Forecast and Warning Services](#) and the [Red Cross Red Crescent Forecast based Financing Manual - Triger methodology](#).