Expanding anticipatory action to new hazards: mudflows in Central Asia

Building on experience and expanding to new hazards

Humanitarian organizations are increasing their investments in, and commitments to, anticipatory action. This trend is evident in the recent pledge by the International Federation of Red Cross and Red Crescent Societies (IFRC) to disburse 25 per cent of its emergency funds to anticipatory action by 2025 (**IFRC 2020**), and by the Risk-informed Early Action Partnership's (REAP) goal of covering one billion people with anticipatory action systems by 2025 (**REAP 2022**).

One way for the IFRC, REAP and others to meet these targets is by expanding anticipatory action to additional hazards. Currently, most anticipatory action plans address hydrometeorological hazards (including heat waves, cold waves, tropical storms, floods and drought) for which forecasting methodologies are well established. There are, however, efforts under way to implement anticipatory action ahead of other types of hazard, especially in places where hydrometeorological hazards do not present the highest risk.

The Red Crescent Society of Kyrgyzstan and the Red Crescent Society of Tajikistan are working to apply anticipatory action to a complex hazard: mudflows (Box 1). The two National Societies worked to develop Early Action Protocols (EAPs) for heat waves and cold waves as part of the Forecast-based Financing (FbF) in Kyrgyzstan and Tajikistan project from 2019–2021. In 2022, they began to apply the skills, experience and relationships they had developed to be among the first to use anticipatory action to mitigate the impacts of mudflows. However, expanding this approach to a new hazard has brought new challenges, from risk analysis and forecasting issues to the design and implementation of effective early actions.

Drawing on interviews with 15 stakeholders from the two National Societies, national hydrometeorological services and other international organizations, this briefing outlines how experience with cold waves and heat waves laid the groundwork for anticipating mudflows, and describes some of the early challenges identified. In doing so, it highlights how existing anticipatory action systems, in the two Central Asian countries and beyond, may need to adapt if they are to expand and address new hazards.

Box 1. Mudflows: a complex hazard

Kyrgyzstan and Tajikistan are landlocked countries with mountainous terrain that exposes people to floods, mudflows, glacial-lake outburst flows, avalanches and temperature extremes, among other hazards. When the Red Crescent Societies of Kyrgyzstan and Tajikistan began working on their EAPs for heat waves and cold waves in 2019, people often asked: "Why did you start with cold waves and heat waves when we have many problems with mudflows in [Kyrgyzstan and Tajikistan]? Why did not you want to start with the mudflow?"

A mudflow is a "water-saturated river of rock, earth and other debris that is drawn downward by gravity" (**Haddow et al. 2020**, p. 54). All the stakeholders consulted for this study explained that mudflows are the most frequent, damaging and deadly hazard that their populations face. Mudflows not only disrupt transport and economic activity, but also destroy houses and can kill people and their livestock.

Despite this, and after much consideration, both National Societies decided to begin their work on anticipatory action with hazards that are easier to forecast. By 2022, they and other stakeholders were optimistic that the experience and momentum gained while working on cold waves and heat waves had prepared them to apply this approach to mudflows as well.

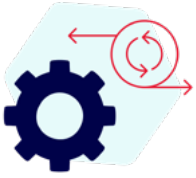
A man moves his cow to safety during a mudflow in Tajikistan. © Red Crescent Society of Tajikistan

Experience with protocols for heat waves and cold waves

Despite challenges and setbacks – such as introducing a new concept to partners, grappling with data gaps, and the logistics of reaching remote communities in short time frames, which are challenges common to most National Societies working on forecast-based financing (**Tozier de la Poterie et al. 2023**) – the stakeholders in Kyrgyzstan and Tajikistan heralded these anticipatory action programmes as resounding successes.

The Red Crescent Societies of Kyrgyzstan and Tajikistan built significant capacity in developing anticipatory action projects, even while working without a delegate dedicated to this theme. By involving other stakeholders in the development and simulation of the two EAPs, they raised awareness of the potential benefits of anticipatory action and strengthened relationships with government disaster managers and hydrometeorological services. For example, in collaboration with the Red Cross Red Crescent Climate Centre, each National Society introduced national hydrometeorological partners to new forecasting methods, increasing partners' understanding and laying the groundwork for collaboration on additional hazards. The multicountry approach also allowed the different stakeholders to share experiences, and learn from and support each other through the processes of risk analysis, trigger development and designing anticipatory actions.

In addition to establishing protocols for anticipatory action in both countries, this project raised awareness of the impacts of heat waves and cold waves on people's health and livelihoods. For example, through its engagement with the project, the Kyrgyz Meteorological Office decided to recalculate its warning threshold for heat waves to better reflect weather conditions and impacts; this process is currently ongoing.



Taking anticipatory action forward: new regions and new hazards

Due to the momentum gained through this project, and the enthusiasm for anticipatory action established in the two countries, the two National Societies were confident in their capacity to expand anticipatory action to new areas of both countries. They are also exploring the possibility of extending regional partnerships to Uzbekistan, another country that is significantly affected by mudflows.

More importantly, the stakeholders involved in the process to date believe that the relationships, experience and confidence developed have prepared them to implement anticipatory action ahead of mudflows, which are a significantly more challenging hazard and one for which anticipatory action has not yet been applied (Box 2).

Box 2. Experience matters: how the past prepares for the future

Anticipatory action is a relatively new concept in humanitarian aid, and experience around the world has shown it takes time for disaster-risk managers to understand the concept and trust its contribution to reducing and mitigating risk. As such, it would have been difficult to tackle a complex hazard such as mudflows as the first anticipatory action project in Central Asia. According to stakeholders in the region, experience and confidence are among the most important factors that enabled them to start expanding to new hazards, and the stakeholders who informed this briefing confirmed that actors across the board are now ready to move forward.

"[Stakeholders] had a chance to be involved in the testing process… from the [government] disaster management department and main volunteers from the branch levels, they were involved in the heat wave, cold wave EAP testing process, at least twice, in all provinces in Kyrgyzstan," said a representative of the Red Crescent Society of Kyrgyzstan, "[which] means that they [were] ready to be involved in a real activation, which now we have in Kyrgyzstan". [1]

"In the beginning, [forecast-based financing] can look like a daunting task, especially when you need to prepare everything from hazard analysis, risk analysis, forecasts, early action, then monitoring your evaluation, the alert or activation procedures," explained a representative from a Partner National Society. "The experience of the past three years paved the way for the National Societies to say 'Hey, now we're familiar with the mechanism and with the entire procedure… So now let's go for something more complex'. So, I think it's the trust in the system and the trust in themselves, that they have built up their own capacity, that [means] they can go for something unprecedented."

"We already understand the style and the approach of international actors," confirmed a representative of the Agency for Hydrometeorology of the Committee on Environmental Protection under the Government of the Republic of Tajikistan. "Now, we are adapted… and I think that it would be now easier to work with partners and with all the forecast[s] within the mudflow project."

1 The EAP for Heat Waves was activated on 17 July 2022.
See: **www.anticipation-hub.org/news/kyrgyzstan-heatwave-eap-activation**

Slow and steady wins the race

Experiences in Kyrgyzstan and Tajikistan reinforced a recurrent theme in anticipatory action: that success takes time. By initially addressing the 'low-hanging fruit' of heat waves and cold waves, the two National Societies built the relationships and skills they needed to implement this approach, while also demonstrating its value and benefits. Although they were not able to address the priority hazards at first, they did secure buy-in from relevant national actors, laying the groundwork for addressing more complicated hazards.

Unresolved challenges

Despite widespread enthusiasm for developing an anticipatory action protocol for mudflows, expanding Red Cross and Red Crescent Societies' EAPs to new hazards raises fresh questions (Box 3) and challenges, including how to forecast and mitigate localized hazards effectively.

Box 3. Is it a flood, a flash flood, a mudflow – or something else?

"To work on this EAP on mudflow, we must rely on official data, but everywhere in the official data it's written that it's [a] flood: not mudflow, flood... the problem will be to explain to the authorities, to partners, to stakeholders, that they are two different kinds of natural disaster. It is not just floods; it is also mudflows in Tajikistan."

This quote, from a representative of the Red Crescent Society of Tajikistan, captures one of the major challenges for implementing anticipatory action to address mudflows: defining the hazard. The informants for this briefing noted that there is little uniformity in how flash floods, mudflows, debris flows or glacial-lake outburst flows are defined across the world. Different stakeholders often use the terms imprecisely or interchangeably, and not even historical data records use consistent terminology.

However, these are all different hydrological phenomena and developing accurate forecasts and triggers for each requires the monitoring of different variables. Therefore, consistent definitions – at least within a country or region – are essential for deciphering historical data, setting triggers, and effectively forecasting and mitigating specific hazard events.

This problem is not specific to Central Asia. For example, in Ecuador historical records do not differentiate between riverine and flash floods. To address this, stakeholders working on anticipatory action devised an index to classify floods in the historical record as flash floods, with a specified degree of confidence.

Forecasting challenges

The ability to accurately forecast when and where mudflows will occur may be the most vexing challenge facing the two National Societies. While it is possible to broadly forecast increases in the risk of mudflows based upon temperature and rainfall data and, in some circumstances, snow melt, it remains extremely difficult to predict exactly when and where a flow will occur. Increasing the localized monitoring of soil conditions in specific river basins is beyond the scope of most anticipatory action projects. This means that triggers and early actions will likely have to cover broader geographic areas, whereas the impacts will almost certainly be much more localized.

This inability to forecast the time and location of mudflows precisely may also complicate the range of viable anticipatory actions. The stakeholders involved in identifying these believe that the most effective actions will be:

- evacuating people and animals from areas of increased risk
- clearing drainage or mudflow channels so that they do not back up or overflow into communities.

Even these potential actions pose challenges, though. It will be impossible to know with certainty which channels to clear, or which villages or hillsides to evacuate. Therefore, early warnings and anticipatory action would need to be carried out at a scale larger than the area expected to be affected. This may translate into increased rates of false alarms for adjacent communities, which in turn has implications for funding, donor accountability and people's trust in warnings and their willingness to act. Additional research and testing are needed to understand how local people would respond to false alarms, or to being encouraged to evacuate while knowing the event might not affect their community.

Is it anticipatory enough?

Other potentially valuable courses of action ahead of mudflows raise issues around the distinctions between early warning, anticipatory action, and disaster preparedness and response. For example, stakeholders agreed that prepositioning stock and other aid items locally could help overcome transportation challenges after mudflows, and that reaching affected populations more quickly after an event could help to reduce suffering.

However, such actions are often characterized as preparedness and early response, rather than anticipatory action. According to one Red Cross Red Crescent representative, "if acting early to reduce [predictable] suffering, regardless of the timing, is the goal, then compartmentalizing funding for different phases of the preparedness—response continuum, for example preparedness, warning, [anticipatory] action, response, may not make sense, especially in the case of localized, less easily predicted hazards."

The stakeholders who informed this briefing acknowledged that anticipatory action ahead of mudflows may not fit within the confines of an EAP (or similar protocol). Furthermore, mudflows have highly localized impacts, patchy historical data, high frequency and high variability (i.e., they occur every year but in different locations), in addition to the forecasting challenges already noted. And although the impacts are devastating, they usually affect small numbers of people (<1,500). Each of these characteristics is potentially at odds with the criteria for developing an EAP.

Next steps

Further analysis

Forecasting experts suggested several ways in which the two National Societies could move towards developing triggers for mudflows. The first step should be to access historical forecasts for temperature, rainfall and mudflows, as well as the World Meteorological Organization's Flash Flood Guidance System forecasts, and then compare these with the actual occurrence of mudflows in the region. This will help to identity relationships between these parameters and the subsequent expected occurrence of mudflows, allowing stakeholders to identify the forecast parameters that need to be monitored.

The National Societies should also determine if there are areas of each country that face no risk of mudflows, as this will narrow the geographic focus of anticipatory action efforts. This can be achieved by asking: are there areas in the country where mudflows are not a risk because of topography, population density, or other factors? Answers to this question will help the National Societies determine when and where there are shifts in baseline levels of risk, enabling anticipatory actions to be targeted.

Damage caused by a mudflow in Shing village, Tajikistan.
© Red Crescent Society of Tajikistan

Box 4. A challenge or an opportunity?

Despite the challenges noted in this briefing, forecasting experts familiar with anticipatory action believe that hazards such as mudflows and flash floods represent an opportunity to focus on how risks are changing.

"Mudflows and flash floods actually do fit nicely within the anticipatory action framework, broadly speaking, and I don't think that we're going to be able to forecast each mudflow or each flash flood or each debris flow," noted a global expert in forecasting for anticipatory action. "However, that's what I like about it. It demands a focus on risk and understanding shifts in risk. And... after ten years of [anticipatory action] work, that's the way to look at this, if we're trying to scale it. If we really want to move beyond the community level, I think we need to use that framing. Yes, [mudflows and flash floods] are hard to forecast if you're trying to forecast the specific spatial extent and the temporal extent for a specific event... But if you take a step back... and look at how risk shifts with different pieces of forecast information, I think it's a really good example."

Simplified Early Action Protocols: a new option for anticipatory action

Given the importance of mudflows for disaster-risk managers and citizens in Central Asia, and the momentum created through the development of the EAPs for heat waves and cold waves, the two National Societies and their partners are enthusiastic about pursuing a full EAP for mudflows. However, they also recognize that the recently launched Simplified EAP (**IFRC 2022**) provides an opportunity to develop and test forecast methodologies, triggers for activating plans and potential anticipatory actions, without having to meet the more demanding requirements of a full EAP straightaway.

More generally, mudflows may present an opportunity to explore the development of broader triggers for anticipatory action which, while less precise, provide actors with longer lead times and hence more time to act. To identify feasible, socially acceptable actions for these longer lead times, National Societies will need to ask at-risk communities what (if anything) they would be willing to do to protect themselves if they knew the risk of a mudflow in their region had increased, but it was not certain when or where it would strike.

Stakeholders agreed that effective anticipatory action for mudflows will require developing and testing new models and actions. This may mean testing in specific regions before moving to a national approach. No matter what the outcome, though, the stakeholders in Kyrgyzstan and Tajikistan agree that if anticipatory action is to address the most critical hazards, in Central Asia and beyond, it will have to become a more flexible approach (Box 4).

For more information about anticipatory action, please visit **the Anticipation Hub**.

You can learn more about anticipatory action in Central Asia on the Anticipation Hub's **global map**.

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