IDSBulletin
Transforming Development Knowledge

COURTING CATASTROPHE? HUMANITARIAN POLICY AND PRACTICE IN A CHANGING CLIMATE

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Scalable and Sustainable: How to Build Anticipatory Capacity into Social Protection Systems*

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Abstract Climate shocks contribute to a significant share of the humanitarian burden, and are a key factor in increasing poverty and food insecurity. Social protection is increasingly recognised as an instrument to help build resilience to climate risks through long-term, large-scale national systems. However, most experiences to date have focused on social protection's role for chronic needs, or at best, shock-response, rather than on anticipation and prevention. This article argues that social protection can support more effective resilience building at scale by integrating early action and preparedness. We propose a concrete solution, namely linking a Forecast-based Financing mechanism to a social protection system to enable anticipatory actions based on forecast triggers and guaranteed funding ahead of a shock. Such a system may enhance scalability, timeliness, predictability and adequacy of social protection benefits. Key considerations for success of this emerging approach include sound analysis of forecast, risks, cost and benefits, and ring-fenced funding.

Keywords: social protection, Forecast-based Financing, early warning, early action, anticipatory capacity, climate risk management, resilience.

1 Introduction and rationale

Climate shocks represent a significant part of the humanitarian burden and are a key factor in increasing poverty and food insecurity. Current trends in climate change could contribute to doubling humanitarian needs and some estimate that it could force more than 100 million people into extreme poverty by 2030 (UN 2016; Hallegatte *et al.* 2016).

Social protection is becoming increasingly recognised as a tool to help households and communities prevent, cope with and adapt to the impacts of climate shocks through longer-term, more sustainable systems (Davies *et al.* 2008; Kuriakose *et al.* 2012; OPM 2016). The Sustainable Development Goals and the World Humanitarian Summit identify social protection as a key, nationally-owned instrument for building climate resilience.

While much of the research and operationalisation of 'climate-smart' social protection has focused on the ability of these programmes to support shock-response, there have been limited experiences and learning on the role it can play to anticipate and adapt to climate risks. Building climate resilience will require a stronger focus on anticipatory and preventative actions that can mitigate the impacts of shocks before they happen. The benefits of early action, including cost-effectiveness, are well recognised. In addition, our capacity to anticipate many extreme weather events is increasing, while innovations in the humanitarian system, such as forecast-based action, are being tested to find ways to reach more people, faster. Social protection can support anticipatory action as part of long-term, sustainable, country-owned systems.

This article argues that scalable social protection systems can support climate risk management by focusing on risk mitigation and preparedness measures that increase the capacity of the system to anticipate shocks. The article proposes a mechanism linked to a social protection system that (1) *enables actions at a large scale in advance of a weather-related shock*, and (2) *guarantees funds for those actions*, enhancing scalability, timeliness, predictability and adequacy of social protection benefits, ultimately protecting development gains and contributing to increased resilience of vulnerable households and communities.

The article focuses on Forecast-based Financing (FbF), an innovative instrument currently being piloted as part of humanitarian operations to support improved anticipation and mitigation of climate shocks. The article aims to contribute to a nascent area of work and to serve as one of the first, non-exhaustive explorations of the potential for integrating forecast-based action mechanisms into social protection. We draw from lessons learned from ongoing FbF pilots implemented by the Red Cross Red Crescent and its partners.

Section 2 provides an overview of the ways in which social protection can help build climate resilience, with a focus on shock anticipation at scale. Section 3 details FbF mechanisms, including lessons from current implementation. Section 4 proposes ways to link FbF and social protection systems, and explores potential synergies as well as key considerations for such integration. Finally, Section 5 provides conclusions and a way forward.

2 The role of social protection in building resilience to climate risks at scale

Social protection consists of a system of policies and programmes that aims to reduce poverty, deprivation and vulnerability by providing support to individuals throughout their life cycle (World Bank 2001).[7] The last two decades have seen a substantial increase in social protection interventions in the developing world; in Africa alone, the number of countries with safety net programmes doubled between 2010 and 2015 (World Bank 2015).

At the same time, there has been increased interest in how social protection can help households and communities cope with, mitigate

and adapt to climate risks and, ultimately contribute to climate resilience (Kuriakose *et al.* 2012; Davies *et al.* 2008; Bastagli and Holmes 2014; OPM 2016). Focusing on resilience,[8] Ulrichs and Slater (2016) research several social protection programmes in Kenya, Uganda and Ethiopia to understand how they contribute to three key resilience capacities developed by Bahadur *et al.* (2015): absorptive, anticipatory and adaptive capacity.

Evidence shows that social protection makes a strong contribution to households' absorptive capacity (i.e. the ability to manage adverse conditions after a shock) by providing direct support after a shock, in addition to increasing incomes and livelihoods in the long term. These benefits help beneficiaries maintain consumption levels and avoid negative coping strategies after a shock occurs (Ulrichs and Slater 2016). For instance, in Ethiopia, the Productive Safety Nets Programme (PSNP) helps beneficiaries experiencing drought maintain a higher level of welfare and recover more rapidly than non-beneficiaries (Knippenberg 2016).

Evidence also shows that social protection can make contributions to building anticipatory capacity (i.e. the ability to *anticipate* shocks and stresses and *take adequate measures* to reduce their impact) both at household level and system level. At household level, some evidence points to an increase in households' savings in anticipation of a shock, even if most programmes do not encourage beneficiaries to save (Ulrichs and Slater 2016). At the system level, the research finds stronger evidence of social protection's contribution to building anticipatory capacity, particularly in the cases where programmes have evolved to include contingency plans and financing as part of a stronger preparedness system. In 2011, Ethiopia's PSNP established a Risk Financing Mechanism that allowed financial repositioning and disbursement of benefits when a shock occurred (Ulrichs and Slater 2016). The system was able to deliver benefits to households affected by drought six weeks after a request was made for its activation, while the existing emergency response mechanism took nine months from the launch of the humanitarian appeal (Hobson and Campbell 2012).

Finally, social protection's contribution to building adaptive capacity (i.e. the ability to adapt and to have in-built flexibility to manage long-term climate risks) is less clear. The ability of social protection to support long-term graduation and transformation in the face of climate risks is limited if not integrated with additional interventions (Ulrichs and Slater 2016).

In this article, we focus on the contribution social protection can make to building anticipatory capacity at scale through the integration of FbF. Anticipatory capacity is understood here as the ability to take proactive action before a foreseen event to avoid or minimise disruption, in contrast with the more reactive actions that take place after a disturbance (Bahadur *et al.* 2015).[9]

Social protection often relies on large-scale, long-term, nationally-owned systems. These systems reach significant sectors of the population: in 2015, more than 1.9 billion people in 136 low- and middle-income countries were on beneficiary rolls of social safety net programmes (World Bank 2015). Moreover, in recent years, governments and donors have made significant investments in setting up social protection systems that increase coordination, reduce duplication of programmes and deal with crises and shocks (Devereaux, Roelen and Ulrichs 2015; Marzo and Mori 2012). These efforts are underpinned by a strong focus on building supporting structures (staff, tools, resources) as well as robust systems for targeting and registration of beneficiaries, delivery of benefits and management of information.

Social protection platforms can be used during emergencies to efficiently expand response, delivering additional benefits to programme beneficiaries affected by a disaster, as well as identifying and enrolling new beneficiaries that have been made eligible because of the shock (Slater, Bailey and Harvey 2015; OPM 2016). For example, in Lesotho, after three successive humanitarian disasters in 2012, the unconditional cash transfer Child Grant Programme increased benefits for its beneficiaries while expanding to additional disaster-affected households (OPM 2016).

By focusing on risk mitigation and anticipatory action, these scalable social protection systems may also be able to more effectively prevent the impacts of climate shocks. While a number of climate risk management tools can support this goal, in this article, we explore how a forecast-based system for early action and financing can enable more timely action when a climate shock is imminent.

3 Increasing anticipatory capacity for managing climate risks through Forecast-based Financing

3.1 Why focus on early action and Forecast-based Financing?

There is significant evidence in the climate and disaster risk management sectors of the benefits of preventative action to avoid disaster losses (Ebi *et al.* 2004; Braman *et al.* 2013; Coughlan de Perez *et al.* 2014; Pappenberger *et al.* 2015). However, while investments in early warning systems have increased, and there are some compelling success stories, effective early action is still rare (Lautze *et al.* 2012; Clarke and Dercon 2016).

Several challenges limit the effectiveness of early warning systems: technical capacity to issue warnings, the ability of responsible agencies to receive and understand the warning, and the willingness or capacity of people and institutions to take appropriate action (Glantz 2009). Since forecast information cannot provide complete certainty, the risk of 'acting in vain' and, consequently, the perception of 'wasting funds', often prevents early action (Braman *et al.* 2013; Coughlan de Perez *et al.* 2014). Political interest also constrains action by donors and government, as the public's support for action can often only be rallied once the impacts of a disaster are visible (Cárdenas, Cotterill and Wrabel 2016).

FbF acts as a mechanism that enhances early warning systems by catalysing early action measures based on pre-agreed forecast triggers, supported by protected funding. Upon actualisation of a forecast trigger, an FbF mechanism automatically releases funding to take anticipatory, pre-defined actions *before* a potential hazard event materialises. For instance, in 2016, based on a five-day forecast of cold waves, the Peruvian Red Cross supported the vaccination efforts and distribution of veterinary kits to reduce the risk of mortality of Alpacas in the Puno region of Peru (Peruvian Red Cross, German Red Cross and Red Cross Red Crescent Climate Centre n.d.).

FbF mechanisms advance traditional early warning approaches towards an impact-based forecasting approach. Risk analysis, understanding of potential impacts and analysis of forecast reliability are combined to provide a set of options to trigger actions when a specific forecast threshold is reached. In addition, each pre-agreed action embedded in a pre-defined standard operating procedure is tied to pre-defined funding sources – this is key to ensuring that, once a threshold is surpassed, funding will automatically be used to take early action. While it will not fully eliminate uncertainty, if calibrated well, an FbF system ensures that the cost of sometimes acting in vain is outweighed by the value of reduced impacts when an extreme event does materialise (Coughlan de Perez *et al.* 2014).

### 3.2 Forecast-based Financing: challenges and opportunities

Since 2008, the FbF concept has been piloted by humanitarian actors in over 15 countries, primarily at a local level, with actions triggered in several countries, including Togo, Peru and Uganda. Key lessons that have emerged so far provide insights to opportunities and challenges.

In Bangladesh, where the mechanism is expected to provide a one-off cash transfer in advance of floods, a cost-benefit analysis based on an analysis of literature found that every dollar invested in the programme would save three dollars in beneficiary losses (Urrea *et al.* 2016). Cash transfers in advance of the flood would help households avoid negative coping strategies when a disaster materialises.

While this is a promising finding, implementation of such a system has several operational constraints: a successful activation of forecast-based cash transfer depends on the capacity of the system to identify and pre-register beneficiaries, as well as the capacity of the service provider to execute the distribution in the short window of time between a forecast and the occurrence of the hazard. The process of establishing an FbF system can often be quite lengthy; therefore, in some locations triggers for action were reached before the systems were able to respond and deliver early actions.

In addition to cash distributions, there are several other early actions that could be taken based on forecast information, which should be selected based on effectiveness. In Uganda, jerrycans and water purification tabs were distributed based on a flood forecast with an aim to reduce diarrhoea.

Figure 1 Social protection linked to a system-wide FbF mechanism
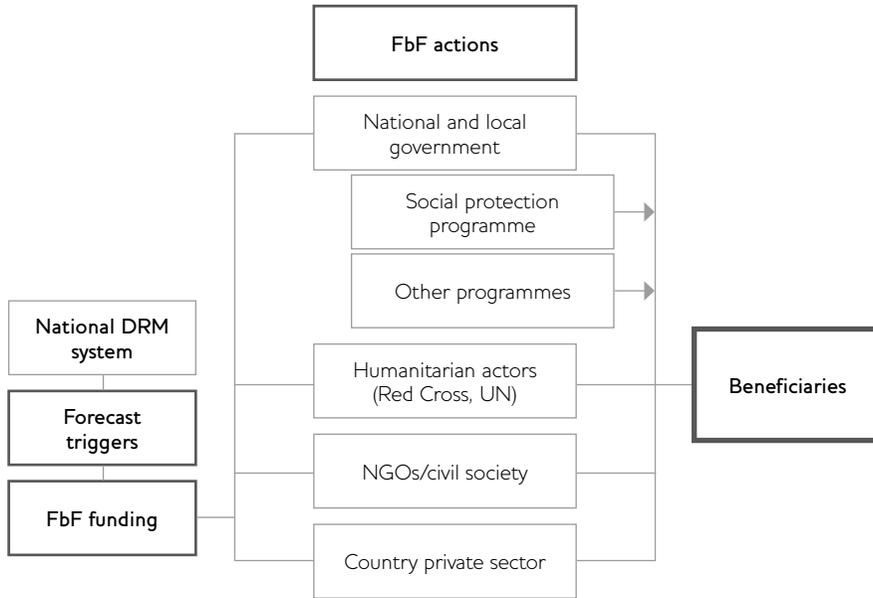
Source Authors' own.

Figure 2 FbF mechanism integrated into a social protection structure or programme
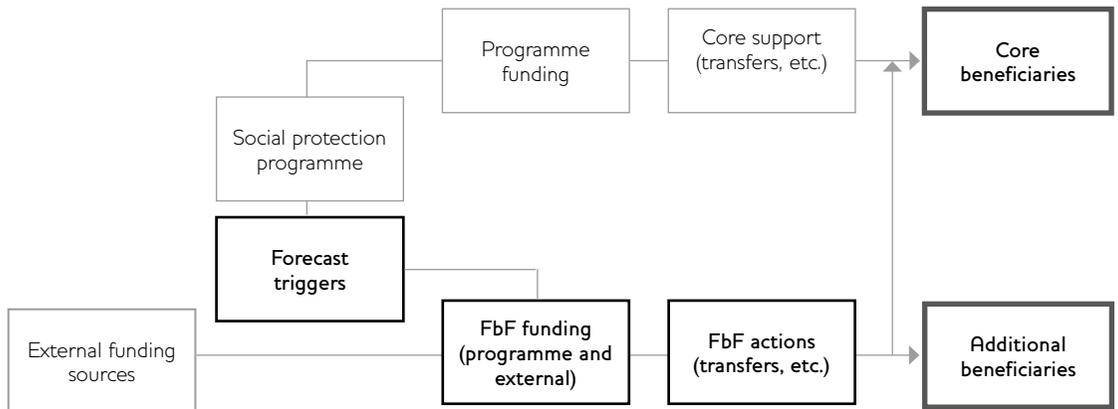
Source Authors' own.

The people receiving these interventions saw a drop in rates of diarrhoeal diseases and losses compared to neighbouring communities, but the intervention was not able to eliminate disease and other impacts. These actions are now being revised to improve the impacts of the mechanism.

Ongoing projects have demonstrated the potential for effective use of scientific inputs in decision-making, enabling the allocation of funds based

on rigorous analysis. However, it is also important to consider forecast skill in the identification of actions, to ensure an effective cost-benefit ratio.

While the limited geographic scale of most pilots to date has provided an opportunity for more focused interventions, it has also reached a limited number of people. It has become clear that the sustainability and effectiveness of the FbF approach requires embedding it in broader risk management structures, for instance at country or regional level.

4 Integrating Forecast-based Financing into social protection: key considerations, challenges and opportunities
4.1 What would the integration of Forecast-based Financing and social protection look like?
FbF consists of three key elements that enable early action: (1) a set of pre-agreed triggers (or danger levels); (2) pre-defined actions to be taken when those triggers are met; and (3) a financing mechanism to automatically fund those actions (RCCC and GRC 2017).

Conceptual frameworks for linking forecast-based action and financing with social protection are beginning to evolve, and this article is an effort in that direction. Figure 1 shows a potential method for integrating a climate-smart social protection structure or programme into a system-wide FbF mechanism. Alternatively, FbF mechanisms could be integrated into an existing social protection system, triggering support to existing or new beneficiaries (Figure 2). In this case, new and additional funding could be allocated and disbursed through a social protection system to core or new beneficiaries.

The two models presented in this article are based on ongoing discussions among humanitarian and development practitioners and will no doubt evolve. In both cases, however, the integration of FbF and social protection would use the existing ability of the social protection programme to reach a large segment of the vulnerable population and help minimise the impacts of shocks.

In the first model (Figure 1), a wider range of actions and funding could potentially be mobilised by other actors, in addition to the social protection actions, thus reaching more people with tailored support. An FbF system linked to a social protection structure (Figure 2) might be easier to implement in the short term and serve as an initial departure point. This model would be particularly relevant for social protection programmes that already have a system for shock-response, where a logical next step would be to move from response to anticipation of shocks by embedding such a mechanism into their existing systems. Nevertheless, this model will also require strong coordination and consistency with national and regional contingency plans and actions.

Forecast-based triggers for action (thresholds) can be established for one or multiple hazards, and actions can be defined according to different levels of probability of the risk materialising. As a contribution to a country or regional disaster risk management system, an FbF

mechanism might be linked to early actions in multiple sectors. Specific actions for a social protection programme (for instance, expansion of transfers, public works, etc.) would be triggered when the pre-agreed thresholds for those actions are reached. If an FbF mechanism is built as part of the social protection structure system (Figure 2), it would be important that the triggers and the actions are consistent with government contingency plans. Roles and responsibilities for those actions would need to be established in standard operating procedures.

Depending on lead time, there are a number of social protection actions that can be triggered. For example, on the 1–3-month time frame, public works efforts could be expanded to reinforce critical infrastructure. On the 3–7-day time frame unconditional cash transfers could be released to support the evacuation of people and assets, or avoid negative coping strategies such as taking high-interest loans. When a forecast points to a likely increase of rain, the mechanism can also capitalise on this information, for instance by distributing seeds for additional planting to take advantage of potential asset gains from a bumper harvest (Smith 2016).

A financial instrument guaranteeing funds for each of the actions is crucial. It requires a financial protocol that indicates where the funds will be physically placed (e.g. international, regional or national level), roles and responsibilities for managing the funds, and how funds can be accessed once the FbF mechanism is triggered.

4.2 What are the potential synergies and gains?

Recent literature agrees on a number of features that can make social protection systems more effective in managing climate risks: (1) climate-aware planning and targeting; (2) ability to scale up support during shocks, supported by flexible systems and adequate financing; (3) timeliness and predictability of benefits; and (4) appropriate interventions that support households' livelihoods (Kuriakose *et al.* 2012; World Bank 2013; Bastagli and Holmes 2014). Integrating an FbF mechanism would bring practical improvements to social protection systems in all these areas. The following list is not exhaustive and the scope for expanding research and testing of these concepts is large.

4.2.1 Climate-aware planning and targeting

Social protection systems must hedge against uncertainty and plan for more frequent and more severe disasters when designing interventions, including considering direct and indirect impacts on vulnerable populations (World Bank 2013). Improvements in forecasting capacity have extended the ability to anticipate extreme weather events. When combined with risk analysis, forecast and weather information may allow for selection of operational areas based on an analysis of climate risks that considers needs for both long-term support and additional scale-up. This information may also allow for dynamic prioritisation of early action and response operations, if robust enough systems for scale-up are in place.

In addition, because FbF focuses on different levels of danger and thresholds, it can support scale-up of social protection intervention to deal with different 'layers of risk'. These can range from the frequent but less damaging events to the rare but catastrophic disasters, a key feature of climate-smart social protection (Kuriakose *et al.* 2012).

Forecast information and risk analysis for a target area, combined with other measures of vulnerability might provide supporting information for identification and pre-registration of potential beneficiaries. This can be used to reduce disaster impacts as well as facilitate faster response after the shock occurs and is a documented way to make social protection systems climate-aware (Kuriakose *et al.* 2012).

4.2.2 Scalable systems and financing

A key feature of climate-smart social protection systems is their ability to support affected households in the face of shocks. For this, programmes must be able to rapidly scale up during a crisis and back down once the crisis is over. An FbF mechanism would be a key piece of such a system, helping to establish objective indicators and agreed plans of action as well as ring-fenced financing. In particular, FbF might provide the impetus for the establishment of contingency financing as it links funding to credible forecasts and a plan of action. Understanding pre-existing constraints for effective early action and contingency financing is still critical for the design of an effective FbF system.

Where they exist, FbF can build on and enhance social protection's programmatic and administrative systems that support the delivery of long-term benefits as well as scalability, providing an additional layer of risk coverage through a post-forecast, pre-disaster mechanism.

4.2.3 Timeliness and predictability of support

Timely support of beneficiaries is a key element of a climate-smart social protection programme or system. The faster support reaches people affected by an extreme event, the less likely they are to resort to negative coping strategies (Hillier and Dempsey 2012). Experience from social protection programmes has shown that, even if a programme has shock-responsive mechanisms in place, response can still take time due to the need to agree on coordinated actions with the humanitarian actors and to have solid mechanisms in place well before the shock (Hobson and Campbell 2012).

In some instances, a forecast-based mechanism would be able to offer additional lead times to enable more timely action. By placing an emphasis on actions triggered by objective indicators and supported by protected financing, it can enable action as soon as the threshold is reached. However, the political will to establish a standardised and objective system of action would still need to be in place from the beginning for the FbF mechanism to be designed and implemented successfully.

Similarly, an important feature of well-implemented social protection is its predictability (reliability and regularity). The ability to take timely

action can be embedded through standard operating procedures that reach social protection beneficiaries more predictably and reliably once objectively triggered, if these are appropriately resourced.

4.2.4 Increased adequacy of interventions

An established, well-functioning social protection programme can offer a platform to implement targeted, pre-defined actions more effectively when a forecast trigger of a certain risk is met, whether this is as part of a larger system for disaster risk management or as one specific function within the social protection programme. Understanding how households' assets and livelihood strategies are affected by climate risks is critical for identifying appropriate interventions (Kuriakose *et al.* 2012). By placing an emphasis on risk analysis and impact forecasting, an FbF mechanism can enable pre-selection of actions that are appropriate to context. Cost-benefit analysis of actions is also key to ensure that the right actions are triggered at the right time, based on differential levels of risk.

In Bangladesh, an in-depth analysis of communities' coping strategies for flood, combined with cost-benefit analysis, helped select cash transfer as the most effective action. It was clear that several of the negative strategies households use for evacuation could be prevented by making a cash transfer in advance of a shock.

4.3 Key considerations for sustainably linking Forecast-based Financing and social protection

The opportunities and limitations of FbF are currently being tested in several countries, supported by analysis and research (Coughlan de Perez *et al.* 2014; Stephens *et al.* 2015; Cárdenas *et al.* 2016). Stephens *et al.* (2015) provide an overview of technical considerations for forecast-based action frameworks and develop corresponding research priorities. Here we highlight some of those key issues and their relevance for linking FbF with social protection, fully recognising the need for further research and analysis beyond this article.

4.3.1 Forecasts and risk analysis

The success of an FbF mechanism depends, to a certain extent, on forecast skill, i.e. the accuracy in correlating the prediction of an extreme event to the actual occurrence of one. Forecast skill varies across countries and is limited in many cases. Despite investments being made all around the world, the ability of meteorological services to systematically provide impact-based forecasting information is still limited (Stephens *et al.* 2015).

This means that the geographic scale and the level of confidence in the ability to act at each scale will vary, depending on the skill of the forecast. A forecast-based action mechanism that is part of a social protection system will need to grapple with these limitations.

4.3.2 Actions and impacts

If actions do not reach the most vulnerable people, they will not be effective. While understanding the risks vulnerable populations are

exposed to is essential, the impacts of climate shock are also a function of underlying vulnerabilities, many of which are rooted in structural inequalities. Discovering and understanding these vulnerabilities is essential for prioritising actions.

Similarly, differential vulnerabilities at the community level might have an impact on whether agreed actions and their expected consequences materialise. i.e. FbF may identify relevant triggers, plans and assured funding, but this does not necessarily mean that those at risk will use the advance funding to follow the agreed plans.

In addition, if targeting information is not available for a region, an FbF system might not be able to act when that region receives an early warning. In small-scale pilots, identification and targeting of recipients is time- and resource-intensive. While a social protection system might offer a larger, more sophisticated platform for identification and targeting, a substantial part of these processes would need to be completed as the FbF mechanism is being established, so that the mechanism can be triggered effectively. The pre-identification and pre-registration of beneficiaries will need to consider the constraints on effective actions outlined previously.

Finally, it is important to note that a forecast-based action is not likely to eliminate the need for *ex-post* response, but it should significantly reduce it. Appropriate, timely response will need to deal with the residual risks to ensure that further suffering is avoided.

4.3.3 Financing
The emerging experience on FbF and social protection shows that financing of these systems requires overcoming significant challenges in the way aid funding is structured. While there is agreement that long-term, more sustainable systems are desirable, it still requires several funding agencies to be convinced of its cost-effectiveness through available evidence and data. While many organisations are already acting early to mobilise resources based on available data and evidence, what is missing is a country-wide approach to resource mobilisation.

Funding for ongoing FbF pilots has largely come from dedicated project funding to support innovations at relatively small scale. The next step requires identifying more sustainable sources of funding. Clarke and Dercon (2016) identify instruments that can be used to finance disaster risk *ex-ante*, either for risk retention (contingency funds, ring-fenced budget allocations, or contingent credit lines) or risk transfer (traditional and indexed insurance or reinsurance, derivatives and capital markets instruments such as catastrophe bonds).

While social protection programmes could potentially establish contingency funds or budget allocation from programme funds, additional sources of financing would be required. Existing global relief pooled funds, preparedness funds, as well as risk transfer instruments have also the potential to be sources of funding in the framework of FbF.

A financial instrument for FbF will need to enable rapid release of funding as soon as thresholds are reached, thus requiring alignment between the FbF mechanism's triggers and those for releasing the funds. Finally, layering of different financial instruments might offer more flexibility and affordability in dealing with different levels of risk (Clarke and Dercon 2016).

4.3.4 Coordination with climate and disaster risk management actors

Successful implementation of both climate-smart social protection and FbF approaches requires partnerships and coordination among diverse stakeholders in the climate and disaster risk management sectors; from civil society to research institutes to government agencies at all levels (World Bank 2013). Coordination across sectors is often difficult because of the need to harmonise different mandates, interests and priorities. For instance, understanding of risks and forecast science respectively are often managed by different government institutions.

When integrating FbF, social protection specialists will have a key role in early action identification, prioritisation and implementation. Prioritisation of forecast-based actions requires a rigorous analytical and consultative process in order to guarantee use of funds in an uncertain environment.

The delivery of forecast-based actions will require strong pre-established commitments and agreements. For example, in order for a social protection programme to deliver cash in anticipation of a shock, it is critical that roles, responsibilities and the necessary administrative agreements for delivery agents are established in the design phase, to ensure activation between the forecast and the potential disaster.

5 Conclusions and recommendations

The fact that most disasters are related to weather and climate presents an opportunity and a challenge. On the one hand, it means we can anticipate many extreme events before they occur – thus enabling the choice of early action. On the other hand, we can expect many of these extremes to become more intense and frequent in the warming climate (IPCC 2013), significantly taxing an already strained humanitarian system.

The role of social protection in helping anticipate, absorb and adapt to climate risks and extremes is becoming increasingly recognised. While efforts have been focused on how social protection supports households in the aftermath of shocks, we argue that social protection can also support increased anticipation, risk mitigation and overall preparedness at system level. One way to do so is by more effectively integrating climate risk management tools that are being tested in the humanitarian sector to reach more people faster, even before the impacts of foreseeable extreme events materialise.

To achieve this goal, we propose an innovation: integrate FbF mechanisms into social protection systems. This would enable actions in advance of a shock, and guarantee funds for those early actions. Such an approach may help increase timeliness of interventions, likely

resulting in improved efficiency and ability to scale up actions to address avoidable losses and suffering. It could also support more predictable and sustainable anticipation at scale. This can help increase the reach of humanitarian action and help protect development gains from extreme weather and climate events.

We recommend that the design of new social protection systems or programmes include a feasibility study for the integration of FbF mechanisms from the outset. Such a study should take into account several considerations, including the skill of forecasts and the need for comprehensive risk analysis as well as the selection and prioritisation of worthy early actions. FbF mechanisms should subsequently be designed and implemented in a coordinated way; and should include sustainable, ring-fenced funding that can be automatically released when the pre-agreed risk triggers are reached.

Regarding existing social protection systems, we suggest that social protection actors and disaster managers and scientists converge to discuss the elements listed previously. Depending on the local situation, an FbF system could be introduced in phases, first targeting the most predictable hazards with relatively simple and affordable early actions, and then expanding to more complex actions or less predictable events. It will be important that donors and governments commit to fund this and design the outcome assessments of their social protection investments to assess whether early actions were taken and what difference they made. Ultimately, if properly designed and implemented, people at risk can benefit from FbF-infused social protection systems.

Notes
* This article has been prepared with the support of the Humanitarian Policy and Practice in a Changing Climate, the BRACED programme (Building Resilience and Adaptation to Climate Extremes and Disasters), the German Red Cross and the German Federal Foreign Office.
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7   Typical forms of social protection include social assistance (also called social safety nets), social insurance, social services and labour market interventions. In this article, we use the term social protection with a focus on social safety nets, i.e. programmes that help households manage chronic and transitory poverty and vulnerability by providing non-contributory support based on need. The term refers to programmes such as school feeding, unconditional and conditional cash transfers, and public works (cash/food for work) where resources, either cash or in-kind, are transferred to vulnerable individuals or households with no other means of adequate support as part of a predictable system of support.

8   Climate resilience here refers to the ability of a system (national, community or individual level) to anticipate, avoid, plan for, cope with, recover from and adapt to climate-related shocks and stresses (Bahadur *et al.* 2015).

9   Anticipatory capacity is part of the overall system's preparedness. Preparedness is understood as 'the knowledge and capacities developed by governments, response/recovery organisations, communities and individuals to effectively anticipate, respond to, and recover from, the impacts of likely, imminent or current hazard events or conditions' (UNISDR 2009).

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