

# **UNCOVERED: THE REAL BURDEN OF EXTREME HEAT**

**How Disaster Risk Finance  
can save lives**

by Zoe Scott

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ISBN-13: 978-1-61977-252-6  
October 2022

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## Foreword

Communities around the world need timely and adequate financial resources to effectively adapt to the projected impacts from climate-driven extreme events. In the case of extreme heat, for example, a [report](#) by Arsht-Rock found that the United States currently loses an estimated \$100 billion annually from reduced worker productivity due to human heat stress.

As much as this need is generally recognized, the fact of the matter is that money is not available, particularly to those most in need: vulnerable groups, and communities in the Global South.

Why does this dissonance exist between what is clearly needed and what is being delivered?

We at Arsht-Rock would like to provide answers to that question with this report.

By singling out a particular climate hazard—in this case extreme heat and its impacts, we can better identify and align specific needs with available and effective financial tools. This same approach could be done across other climate hazards.

In this report, we argue that the same tools that are used to finance the recovery from climate-driven extreme could also be redesigned to enhance the infrastructure, social services, and information sharing mechanisms that reduce the risk of extreme events.

We use disaster risk finance, including insurance, to prove the point that a repurposing of these tools is not just possible but much needed. This should be equally explored for other tools originally designed for financing social and economic development.

Without strong social support networks, these efforts to align and repurpose financial tools cannot progress at the scale and pace required to meet the rapid and evolving disruptions that climate change is already imposing on our communities. It's on all of us to strengthen these networks and communities.

We look forward to continue driving this urgent conversation by seeking and providing solutions. Would you join us?



Jorge Gastelumendi  
*Director, Global Policy at the Adrienne Arsht-Rockefeller Foundation Resilience Center*





## Uncovered: the real burden of extreme heat. How Disaster Risk Finance can save lives

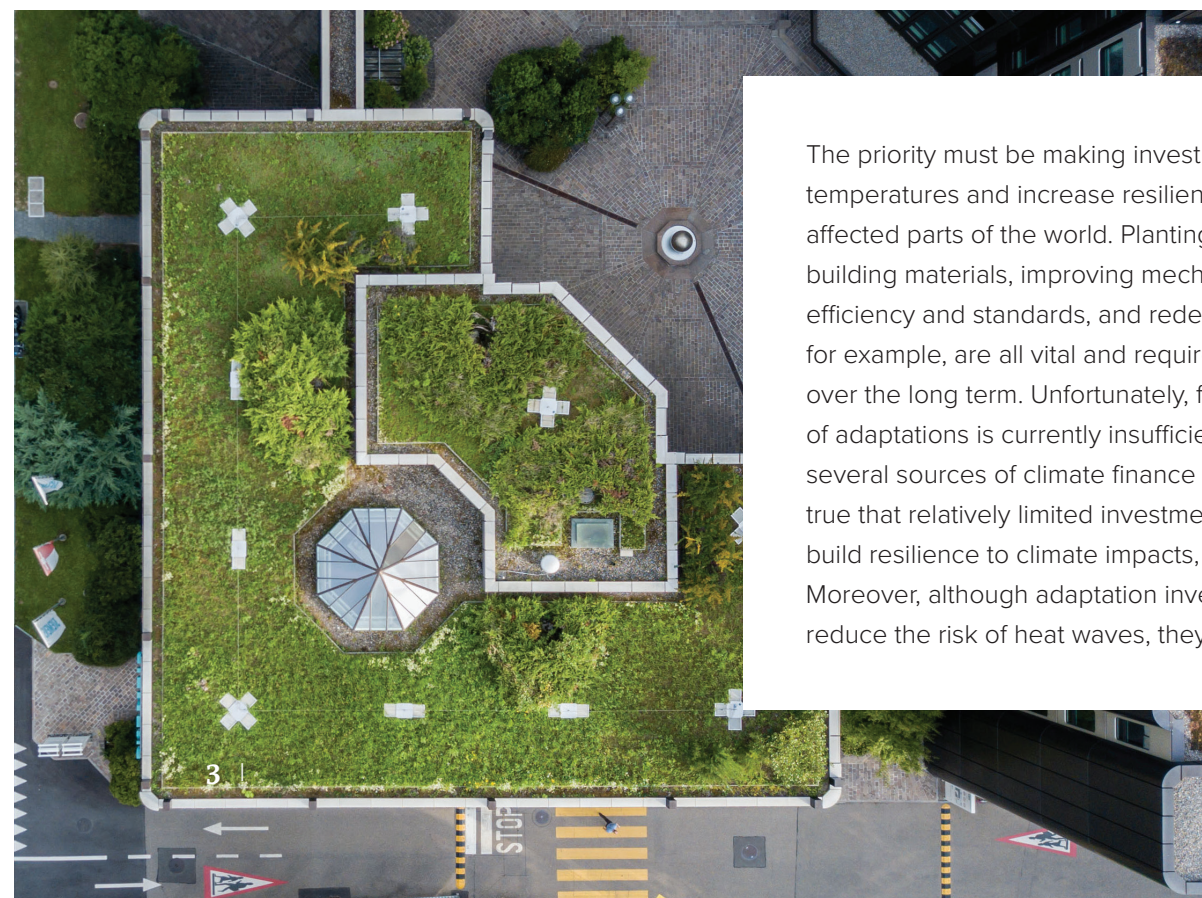
We need to change the way we pay for extreme heat. We currently pay in lost lives, devastated livelihoods, damaged infrastructure, and reduced productivity across all spheres of life. This will get worse as temperatures soar around the world, with the most vulnerable people in our societies affected most, often irrecoverably. There is an alternative for how to pay for the rising number of heat waves that are occurring around the world: we can arrange finance in advance to help ensure appropriate and timely support for people, communities and governments. We can even do this in a way that helps to reduce temperatures year-round and over the long-term. This brief explains how and invites you to partner with Arsht-Rock in finding better ways to pay for the impacts of heat waves.



## Is heat really that much of a problem?<sup>1</sup>

# YES

Between 2015 and 2019, “heat waves were the deadliest meteorological hazard,” with heat stress being the leading cause of weather-related death in an average year, outstripping hazards like hurricanes and typhoons.<sup>2</sup> And the problem is growing: in 2022, 1.2 billion poor people are at high risk because they lack access to cooling, an increase of twenty-eight million since 2021.<sup>3</sup> However, extreme heat is called the “silent killer” because deaths are often not recorded as being heat related. Impacts are largely hidden, with little understanding of how extreme heat influences all aspects of daily life. The economic losses that result from heat are huge and diffuse, estimated at \$100 billion in lost labor productivity every year for the United States alone.<sup>4</sup> In addition to causing serious, life-threatening health conditions, heat waves reduce educational attainment and worker productivity, damage infrastructure, increase food insecurity, and put strain on all public services. The situation is usually worse in cities, where temperatures are even higher due to the urban heat-island effect.<sup>5</sup>



The priority must be making investments to lower temperatures and increase resilience to heat in the most affected parts of the world. Planting trees, changing building materials, improving mechanical cooling efficiency and standards, and redesigning urban spaces, for example, are all vital and require strategic investment over the long term. Unfortunately, finance for these kinds of adaptations is currently insufficient. While there are several sources of climate finance and funding, it remains true that relatively limited investment capital is flowing to build resilience to climate impacts, particularly in cities.<sup>6</sup> Moreover, although adaptation investments will help reduce the risk of heat waves, they cannot eliminate them



entirely. This means that alongside these wider investments in climate adaptation, we also need to plan for the acute emergencies that arise from hazards like heat waves. The focus of this briefing is, therefore, on how to design finance that can pay for effective responses to heat emergencies today, while simultaneously reducing tomorrow's temperatures.

At the moment, because governments, businesses, organizations and communities tend not to be aware of the multitude of impacts and costs that arise from heat waves, responses are often small scale and low cost—for example, volunteer visiting schemes or handing out water bottles. The emphasis has been on averting immediate threats to health, which are really the “tip of the iceberg,” rather than tackling the much more extensive, longer-term and higher-cost impacts of heat waves. These are mainly related to health (including long-term complications), reduced productivity, and the protection and repair of infrastructure and services.



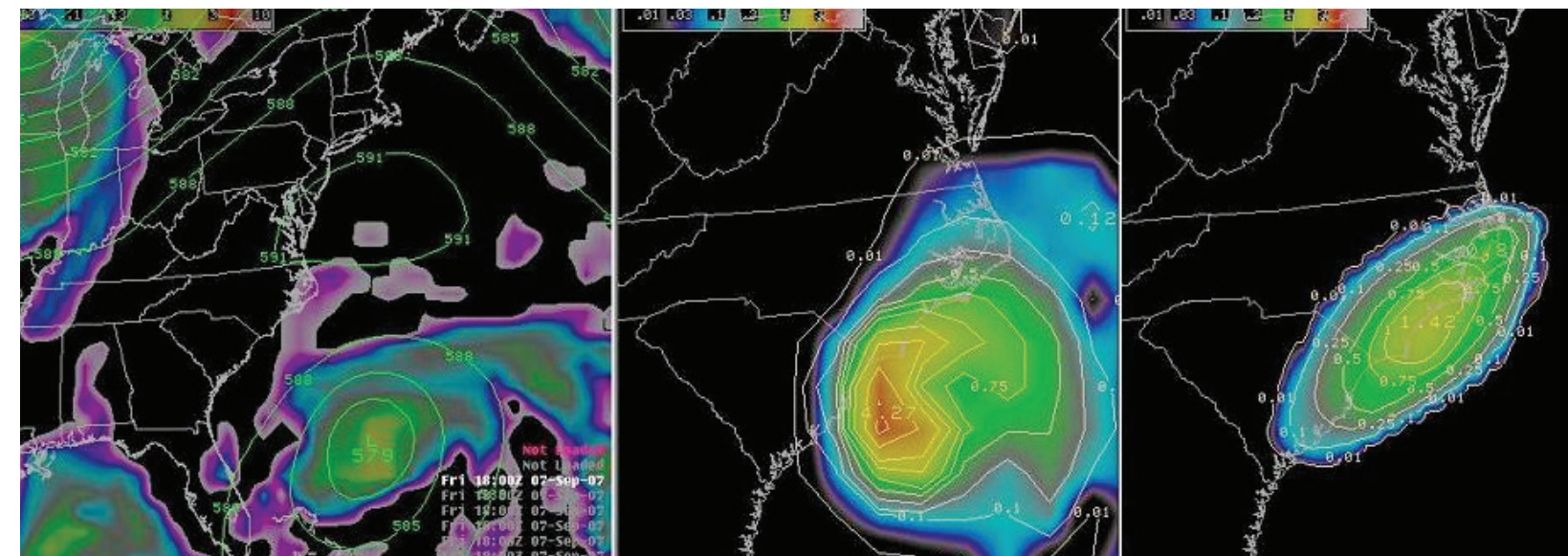
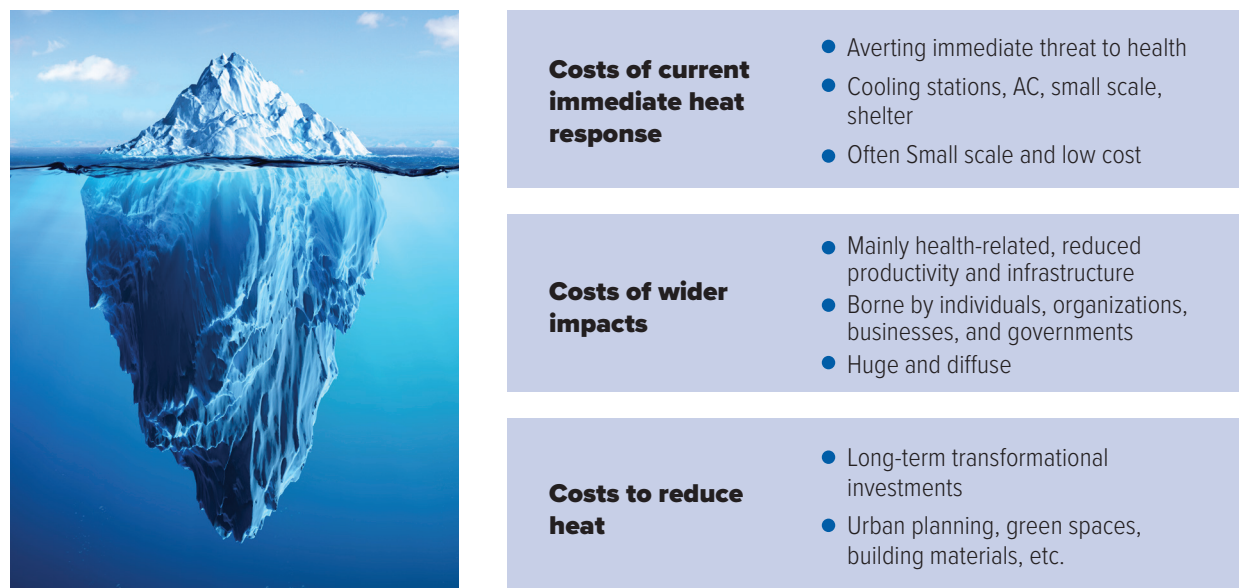
This brief focuses on both the costs of immediate heat response but also explores how governments, businesses, organizations and communities could start to use disaster risk finance (DRF) to address the larger, often hidden, costs of all heat impacts, ideally whilst simultaneously helping to reduce heat. At the moment, the huge and diffuse impacts of heat are often paid for by the individuals and communities who can afford them the least.

## What is disaster risk finance?

DRF aims to quickly and efficiently get money to people affected by a disaster. It relies on using risk information to understand how much money is likely to be needed, and how often. Different financial instruments can then be designed to ensure that the necessary funds arrive when support is needed, rather than months (or even years) later, as is the norm with disaster response. As finance is arranged in advance, often with built-in automatic triggers to release funds when certain thresholds are met, money can arrive shortly after a shock, or even before the main impacts have been felt (if based on forecast data).

DRF is already used for a wide range of climate hazards, including hurricanes and droughts, but it has not yet been widely used in relation to extreme heat. This is a missed opportunity. International organizations, governments, and businesses are now waking up to both the climate crisis and the possibilities of DRF, with it featuring on the agendas of the Group of Seven (G7) and Group of Twenty (G20), the World Economic Forum, and recent UN Climate Change conferences. This brief explains how to harness the potential of DRF for extreme heat and provides real-life examples and scenarios, while acknowledging the challenges that lie ahead. DRF can be a steppingstone toward better global resilience to heat waves, and a key part of a holistic approach to protecting people from heat.

**Figure 1: What does heat cost?**





## How can DRF help manage extreme heat?

In general, funding for crises and emergencies has remained unchanged for hundreds of years, despite rapid advances in forecasting and financial innovation. The norm is to wait for a disaster to happen and then try to scrape together the money to pay for it. This is slow and inefficient, and ultimately costs lives across all types of disasters.<sup>7</sup> This is the typical approach for responding to heat emergencies. When a heat wave strikes, little if any finance has been arranged in advance, meaning that responses continue to be small scale, funded by nonprofits or individuals, and ultimately insufficient to meet the scale of the unfolding crisis. The hidden costs, such as long-term ill health, reduced income for informal workers, lower educational attainment, and damaged infrastructure are largely ignored. In contrast, by planning finance in advance, DRF can offer the following benefits.

- 1 DRF is fast:** Prearranged finance arrives the most quickly in an emergency.<sup>8</sup> This is particularly important for heat waves, which can escalate quickly. Because everything is arranged in advance, DRF can trigger within hours. Finance can also be designed to trigger based on forecasts, meaning that money for heat response can arrive several days in advance, giving valuable time to put lifesaving adaptations in place, such as activating resilience/cooling centers and running communication campaigns.
- 2 DRF is reliable and predictable:** Because finance is agreed in advance, all parties can have clarity about what they will get under what circumstances—unlike discretionary disaster finance, which may or may not appear after a shock.
- 3 DRF builds risk awareness:** To arrange finance in advance, you need to investigate and understand the likely frequency and severity of a particular hazard. This activity can help to publicize and raise understanding among decision-makers, particularly of hazards like extreme heat that are typically hidden and under-researched.
- 4 DRF aids planning and preparedness:** Having early conversations about financing a response encourages advanced planning, and the pre-positioning of supplies where necessary. It can help to bring together the many different agencies and organizations involved in heat emergency response to agree on actions and roles in advance, rather than trying to coordinate mid-crisis. Actors will be more engaged knowing that finance is available for plans.
- 5 Effective DRF helps to reduce risks:** Finance can be designed to reduce as well as respond to risks. For example, a loan or insurance for a heat wave may include a pre-condition that a credible plan to address heat response and resilience is developed, or that certain building materials are used. Vast investment is needed in many cities to reduce temperatures. It will not be possible to meet this need primarily using DRF, as waiting for a disaster to occur before one can access funds for heat-reducing measures is not logical or cost-effective. However, DRF can help by incorporating incentives for risk reduction as part of the financial instrument, and by providing reliable finance that can potentially fund response activities that also have longer-term temperature-reducing impacts, such as creating cool roofs. DRF is not the answer for funding large-scale urban transformation or redesign, but, given the current absence of large-scale adaptation finance, it may provide a helpful steppingstone in the right direction.



## What are the challenges to DRF?

Those wanting to pursue DRF for extreme heat must overcome a number of challenges. Changing entrenched patterns of decision-making and resource allocation around disaster response is politically difficult, especially in relation to a risk like heat that is deprioritized or not well understood. Politicians and budget holders have little incentive to tie up scarce resources addressing disasters that, if they are lucky, may not happen. Disaster preparedness, planning, and risk reduction, particularly for largely invisible risks like heat, are unlikely to gain them much favor with the wider population.

In addition, data and technical capacity around extreme heat are missing in many countries, creating problems for DRF, which relies upon accurate information on past events, evidence of impacts and losses, reliable forecasts, and dependable risk models. As risk awareness for heat is low in many countries, and the impacts are still so diffuse and invisible, DRF for heat waves can be seen as a “nice to have” rather than a crucial, life-saving approach.

DRF is not a “quick win.” In many countries, efforts are stalled by the need for multisectoral coordination and changes in culture, policies, processes, public financial management, and sometimes even legislation. However, the world now faces an unprecedented threat from extreme heat. As decision-makers and the public become increasingly concerned about the impacts of heat on people’s health and economies, incentives for overcoming these challenges become clearer by the day.



## What are the options for financing heat wave response?

There are various ways of getting money to pay for heat wave response. In the vast majority of cases, finance for heat emergency response has not been planned in advance, so the approaches used are typically slow and unreliable, and can take money away from other important activities. The table below sets out the options that public and private organizations typically use for emergency funding.

**Table 1: Traditional methods of paying for disasters: slow, inadequate, and potentially harmful**

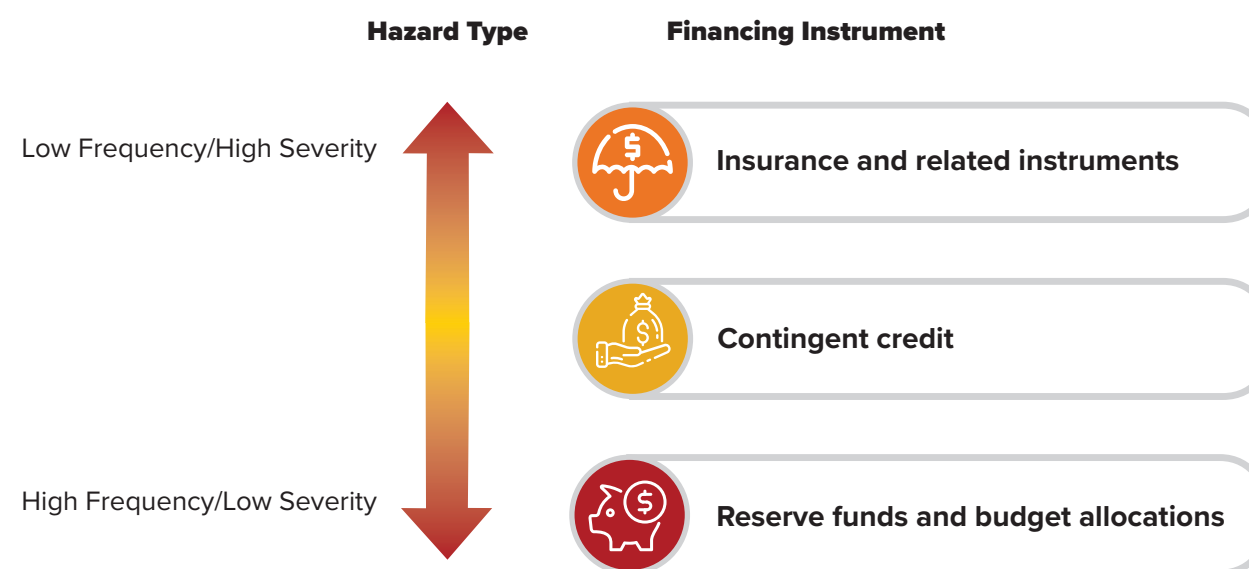
	<b>Emergency budget reallocation</b>	Governments and organizations can theoretically reallocate budget from other planned activities. However, low-income countries and communities often have limited ability to do this without having to cut expenditure on other important activities such as education or health, which can have significant negative long-term effects.
	<b>Borrowing and asset sales</b>	An alternative could be to borrow, but it may not be possible to access affordable credit in low-income contexts. Selling assets can be slow, and can have longer-term impacts—particularly if the full value was not realized, or if the asset will need to be repurchased in the future.
	<b>Tax increases</b>	Governments can seek to pay for the disaster by increasing taxes—for example, by raising income taxes, imposing one-off levies, or increasing value-added tax (VAT) rates. However, this is likely to be very slow, and may have negative economic and political impacts.
	<b>Humanitarian and emergency development aid, philanthropic donations, appeals</b>	These sources of funding are entirely discretionary, and so cannot be relied upon. There is no guarantee that sufficient funding will be raised to meet needs, and the process is likely to be slow.

While these are the typical ways that heat waves (and all other disasters) are paid for, they are all clearly far from ideal. As the table above shows, there are serious limitations to relying on each of these approaches, as well as longer-term negative impacts. Fortunately, there are alternatives for paying for heat wave response, if finance is planned in advance. Advances in the understanding of heat risks and in financial innovation means that one no longer needs to rely on the approaches listed above. Better is possible.

## What are some better approaches to pay for the impacts of heat waves?

There are various options that can be planned in advance to provide fast, reliable, and cost-effective finance for heat emergencies. Some are referred to as “risk transfer,” in which another party takes on the responsibility to pay if a heat wave occurs. Others are classed as “risk retention,” because the same party continues to be responsible for paying for the disaster, rather than passing the risk to someone else. Each option is flexible, and can be designed to meet the needs and objectives of affected communities.

**Figure 2: Selected options for pre-arranging finance for extreme heat**



The next pages overview the three types of prearranged risk finance that public officials could consider using to fund all types of heat wave response activities—the choice of which instrument to use will depend on the impact officials want to have (see the twelve-step framework set out below for further guidance).





## Reserve funds, contingency budget allocations

- **What is it?** A specific budget line or reserve fund is created that can be accessed if certain conditions are met (for example, if extremely high temperatures are forecast, met, or sustained for an agreed amount of time). Essentially, money is put aside so that it is not spent on other activities, and will be available if needed. This can be set up within government, or be funded by a donor agency, international organization, or nongovernmental organization (NGO).
- **What are the benefits?** It is inexpensive to set up, can be flexible, and should have funds readily available if needed. Funds can also be set up to trigger in advance of a heat wave, and so can fund anticipatory action.
- **What are its limitations?** It can be difficult to protect money allocated for a potential disaster when there are other pressing needs. Reserving large amounts of money is often not possible, politically desirable, or a cost-effective use of funds.
- **When is it most suitable?** As funds and budget allocations are likely to be relatively small, these instruments can be useful for funding relatively low-cost, small-scale responses to extreme heat. They are also useful for responding to heat waves that happen frequently, so funds are not seen as lying idle. Given that it will not be feasible to set aside enough money to meet the costs of a severe heat wave or prolonged heat with costly impacts, they are better suited to responding to less severe heat events.



## Contingent credit

- **What is it?** Loans that are made available when a particular event occurs or pre-agreed thresholds are met (for example, when a state of emergency is declared or when temperatures exceed a certain level). The loan is paid back according to the pre-agreed terms when the emergency is less pressing.
- **What are the benefits?** Funds do not need to be tied up in advance, and credit can be made available very quickly following a heat wave—or potentially ahead of time, based on forecast data. International finance institutions can offer concessional terms, making the loans relatively cheap. In addition, conditions can be placed on the loan prior to it being finalized to support risk reduction (for example, the creation of a government heat investment strategy or the establishment of a cross-sectoral technical working group to address heat impacts).
- **What are its limitations?** The loan amount plus interest must be repaid, and an upfront arrangement fee may be required. Potentially, the awareness that money will arrive if needed could reduce incentives for risk reduction.
- **When is it most suitable?** It is useful for heat waves that are relatively high frequency and low severity. It is good for all types of heat response, as funds are made available quickly.



## Insurance and other risk transfer instruments

- What is it?** An arrangement in which a premium is paid to an insurance provider, which commits to provide a payout to cover costs if a heat wave materializes. Therefore, the risk is transferred to someone else, in exchange for the premium payment, which is typically annual. Premiums can be subsidized by the state or other actors to help make insurance more affordable for those who need coverage. Catastrophe bonds are another type of risk transfer instrument that has been used to protect against climate hazards such as hurricanes. With catastrophe bonds, instead of an insurance company meeting a claim, bonds are sold to a wide range of investors and the money is kept aside so that it will be available if needed. If the disaster does not occur in the agreed timeframe, the investors get their money back, plus an additional payment.
- **What are the benefits?** The risk is transferred to a third party. Because a detailed contract is in place, insurance offers some reliability. Large payments can be made, which makes it relevant for heat, given that large losses can be incurred in a severe heat wave. In addition, there is a long history of insurance being used to support behavior changes or incentivize preventative investments in exchange for premium reductions (for example, reductions in home insurance for installing smoke alarms). This could be used to good effect in relation to extreme heat, where wider heat-reducing investments are needed, but rarely prioritized. Insurance-like instruments also encourage helpful thinking around risk (for example, a named party assumes ownership of the risk, arrangements are clearly documented, and risks are assessed, quantified, and communicated).
  - **What are its limitations?** Insurance can be expensive, especially in situations where there is little data available, as insurance companies can be less sure about the risk they are taking. It can be difficult to agree when a payout should be made, although the rise of parametric insurance—in which payouts are made based on a predetermined index and set of thresholds, rather than based on a post-event assessment of losses—can help to ease this problem. However, even with parametric insurance, there is basis risk, which is the risk that there is a difference between the index or model used and the actual situation on the ground.
  - **When is it most suitable?** It is useful for severe, infrequent heat waves in which a large amount of money is likely to be needed, in excess of what could be held in reserves. Money from the payout could then be used to fund heat response activities on a large scale (for example, scaling up a social protection scheme or providing compensation to a large business for increased costs or reduced productivity as a result of heat).

Each of these financing options can be linked to triggers, so that finance flows based on pre-agreed criteria and thresholds. Theoretically, they could all trigger in advance of a heat wave. But, to date, it is only reserve funds that are typically triggered before a crisis in order to fund anticipatory action.



## Triggers for Heat Response

Designing good triggers and thresholds is crucial for effective DRF—they help to ensure that an appropriate amount of finance arrives at the right time to deal with a disaster. A trigger is a predetermined criterion that is used to initiate action when a pre-agreed threshold is met. It can be an objective measurement (such as actual or predicted temperature, rainfall, or windspeed) or it can be a judgment of severity (for example, a government declaration of emergency).

A trigger needs to be chosen with consideration of who you are trying to protect, from what, and what activities you intend to fund. For example, funding for air-conditioner loans or communication campaigns ideally needs to trigger before an expected heat event by using forecast data, whereas funding to provide utility-bill relief or cover increased staffing costs at hospitals could trigger after multiple days of impact.

Because DRF for heat is a nascent topic, more work is needed on best practices for heat-specific triggers and thresholds. Using a mix of triggers can help reliability, particularly in contexts where few data are available. For example, in Vietnam, the Red Cross uses a combination of triggers in a layered approach (heat index, forecast maximum temperature, and relative humidity for a set number of consecutive days). To trigger a first tranche of funding, six days before a heat event, a selected heat index must reach the ninety-ninth percentile for two consecutive days *and* the forecast must predict temperatures to exceed 37 degrees Celsius. This initial funding can be spent on preparedness activities. If the thresholds are still being met three days ahead of a predicted heat event, then the Early Action Protocol is activated and full funding is released. If the thresholds are no longer being met, activities are canceled and no funding is disbursed.

Triggers and their associated thresholds need to be highly context specific and account for how vulnerabilities may change. For example, air-pollution levels or religious periods like Ramadan (during which water and food intake may be restricted) may aggravate the health impacts of heat waves. When considering triggers and thresholds in relation to heat, alongside abnormally high temperatures (heat waves), it will also be important to consider temperatures that remain higher than average but over a long period of time.

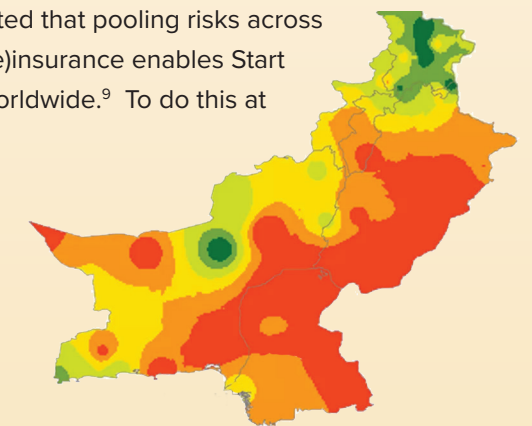
## Prearranging Finance for Heat waves in Pakistan

The Start Network has developed a multi-hazard (drought, floods, and heat waves) DRF system in Pakistan. Start Network's anticipation work in 2018 formed the basis of the predictive heat wave model operating in Pakistan today, which allows members access to ten-day heat wave forecasts. Daily temperature and other meteorological values (e.g., humidity) are used to set pre-agreed thresholds for the release of funding for early humanitarian action. Start Network members in Pakistan then use these pre-allocated funds to roll out early preventative or mitigating actions to reduce the impacts of an oncoming heat wave.

In Karachi, Start's thresholds are aligned with the Karachi Commissioner Office government heat wave plan, established after the 2015 heat wave event; maximum temperatures need to be above 42 degrees Celsius for two consecutive days, and the minimum temperature of those days should be equal to or above 30 degrees Celsius. (Thresholds vary across Pakistan, as the climatic conditions are highly localized.)

In May 2020, the model predicted a heat wave that met the pre-agreed thresholds in Karachi with a six-day lead time. £36,000 was released to Action Against Hunger and HANDS, which had been pre-selected as lead agencies in Karachi by other Start member organizations. Awareness-raising campaigns (print, Short Message Service (SMS), radio, and social media) were funded through this small release of funding. A follow-up survey showed encouraging results: only 9 percent of respondents felt they got the messages too late, with 88 percent able to later recall the key messages around preventing health impacts.

Start Network is now replicating this system, adapting it to contextual realities in six countries and for eight hazards. The probability that different hazards in different parts of the world will occur at the same time is extremely small, meaning that holding 100 percent of the funds in reserve is not efficient. Actuarial analysis conducted in 2020 demonstrated that pooling risks across different geographies into one global fund, and purchasing (re)insurance enables Start to stretch its funding to cover up to four times more people worldwide.<sup>9</sup> To do this at scale, it has launched Start Ready, its global DRF mechanism.





## How do I know which DRF instrument to use?

For a government or public official wanting to arrange protection from extreme heat, this range of DRF options might seem confusing. The best approach may be a combination of instruments, tailored to provide different levels of finance on different timescales, to respond to different severities of heat wave. One size does not fit all with DRF.

Below is a twelve-step framework to help guide public decision-makers in selecting what risk financing instruments might be well suited to their needs for heat wave response. Government officials, as well as a wide range of organizations, can work through the questions in the framework to help design risk financing proposals for heat waves, to ensure they are in step with emerging best practices. The questions are designed to be tackled sequentially, with answers building on each other, covering

- “money out,” or planning the response;
- “money in,” or arranging the finance; and
- context and process.



Figure 3: **12 Steps for Designing DRF for Extreme Heat**

### “Money Out” planning the response

- 1 Who do you want to help, and what are the main ways that heat waves impact them?
- 2 What response activities would most benefit those most vulnerable?
- 3 Could the activities incorporate risk reduction in some way?
- 4 How often will these activities be needed?



### “Money In” arranging the finance

- 5 How much money is needed?
- 6 When is the money needed, and what might be an appropriate trigger?
- 7 Are there existing risk financing instruments that could incorporate heat waves?
- 8 Where could the money come from? Who might pay?
- 9 Which funding/financing option provides the best value for money?



### Context and Process

- 10 Could the financing incentivize risk reduction and preparedness?
- 11 How could you ensure sustainability?
- 12 How will you know if you’ve been effective?





## Step 1

### Who do you want to help, and what are the main ways that heat waves impact them?



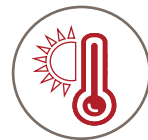
The starting point for designing risk financing should be to determine how to get money or support to the people who need it most, so that it will have maximum impact on their lives. This is sometimes called “money out.” Figuring out how to get “money in,”—i.e., which financial instrument to use—can come later. The priority is to identify effective channels of support to reach vulnerable people.

To answer this question, you will need to consult with at-risk communities to fully understand all the different ways in which heat waves affect them, and identify the groups that are most negatively impacted.<sup>10</sup> While the immediate threat to health is an obvious impact, there may be larger, longer-term impacts that are more concerning for affected communities. For example, informal workers may suffer from a significant drop in their income during heat waves, particularly if they work outside as construction workers, farm laborers, rickshaw drivers, or street vendors, and this may be their primary concern. Similarly, broader infrastructure challenges like electrical outages may be the priority for communities.

*To conduct this step, you will need input and support from at-risk communities, civil-society organizations, and individuals with skills in running community consultations.*

## Step 2

### What response activities would most benefit those most vulnerable?



Once you have understood the key impacts of heat waves on the people you wish to support, the consultation should continue, with a focus on what response activities would be most supportive. Communities should be in the driving seat, identifying the activities that would work best.

Many different types of heat response activity are possible. Some possible emergency responses are

- awareness-raising campaigns to make people aware of the risks of heat waves and how to protect themselves and others;
- creation of community resilience/cooling spaces, from air-conditioned community spaces to water play areas in parks;
- temporary service provision, such as water trucking, transport to healthcare facilities, and visits to check on vulnerable households;
- provision of assets or adaptations (for example, increasing the efficiency of air-conditioning (AC) units, painting to create cool roofs, umbrellas, canopies, etc.);

- cash transfers, vouchers, or subsidies (for example, electricity subsidies to cover additional costs of running air conditioning, upgrading to more efficient units, or cash to compensate for lost income); and
- protection of assets and infrastructure (for example, shelter for livestock or misting roads).

In considering different heat wave response options, you will need to think through wider implications and potentially balance tradeoffs. For example, what are the environmental impacts of increasing AC use or water trucking? Will women and older people feel safe travelling to resilience/cooling stations, and do they have the financial means to do so?

Much heat wave response is currently relatively small scale and low cost (for example, running awareness campaigns on social media or activating volunteer networks to undertake neighborhood visits). These activities are excellent for addressing immediate threats to health and life. However, it is also important to consider and design heat wave-response activities that can address less visible impacts of heat, which typically incur large costs and long-term damage (for example, lowered educational attainment, damage to crops or livestock, or reduced productivity for businesses). In the early stages of designing disaster risk financing, think about how to have the biggest impact possible, rather than focusing on constraints.

*To conduct this step, you will need input from at-risk communities. You may also need input and support from humanitarian advisers, social protection practitioners, heat specialists, gender and poverty advisers, and service providers.*

## Step 3

### Could the activities incorporate risk reduction in some way?



Once you have selected an activity or set of activities, investigate ways that you could simultaneously address longer-term risk reduction. Ultimately, it is important to reduce, as well as respond to, the heat risk. Ideally, responses to heat waves would also be mindful of how they can support longer-term transformational investments and reduction of chronically high temperatures. Given that these much-needed investments are often not prioritized, DRF has potential to incentivize risk reduction, and to provide a transitional step toward transformational investment and improved awareness. Some examples include

- awareness campaigns, including information on caring for trees during a heat wave;
- cash transfers for lost income, to be accompanied with vouchers for home adaptations;
- payments to construction workers to cover lost income, accompanied by information on how to spot signs of heat exhaustion;



- subsidising high-efficiency AC units that do not raise the ambient temperature outside as much as older machines;
- creation of quality community or local heat response plans, strategies, or oversight groups to raise awareness and support longer-term preparedness; and
- repairs to damaged infrastructure using materials that can withstand higher temperatures or offer better future protection.

*To conduct this step, you will need input and support from at-risk communities, civil-society organizations, and individuals with skills in running community consultations.*

## Step 4

### How often will these activities be needed?



To design DRF, you need access to data on the likely frequency and severity of heat waves. Frequency means the likelihood of occurrence within a particular timeframe, sometimes called the return period. Severity is often discussed in terms of estimated losses or impacts. As mentioned above, different financial instruments are typically used for different frequency and severity levels; for example, insurance is often too expensive to use for high-frequency/low-severity events, but can be appropriate for low-frequency/high-severity disasters.

Unfortunately, heat waves present a challenge, as much less is known about their profiles and possible impacts than about other climate hazards such as hurricanes, and data are missing for many parts of the world. Heat is also highly context specific, as what is considered an abnormally high temperature differs by geography. In addition, countries that do not regularly experience high temperatures are less likely to have AC in homes, high awareness among the population, or resilient infrastructure, meaning that major impacts will be seen at lower temperatures than in a country that is prepared for regular heat waves.

Some heat response activities will require finance every time there is a heat wave, but others will not. For example, an awareness campaign may only need to be run every other year, vouchers for cool-roof paint may only be needed every three years, and subsidies for AC units every five years or longer.

*To conduct this step, you will likely need support from risk modellers and heat specialists who can help you understand more about the probability and profile of extreme heat in your context.*

## Step 5

### How much money is needed?



By now, you should be clear on your preferred activities and how often you are likely to need money to implement them. You can use this information to develop a costing to help understand more about how much money is needed for the activity. This information will help to determine the type of risk financing instrument you should use. For example, insurance can make large payouts for infrequent events, whereas reserve funds are generally more suitable for smaller amounts of money that are likely to be needed frequently.

The scale of the activities will obviously impact costs; it may be useful to consider different scenarios. When designing DRF, there is often a tradeoff in deciding whether to provide a lot of support to a smaller number of people, or little support to more people. This is where costing information is vital to help determine appropriateness. Obvious examples include

- when providing cash transfers to informal workers affected by heat waves, the transfer needs to be carefully balanced so that the maximum number of people are supported, but the amount provided is still significant enough to have the desired impact;
- when providing vouchers, they need to have a value that enables suitable purchases (for example, enough materials to create a cool roof for an average-sized home);
- when providing subsidies, the amount needs to be informed by an understanding of how much will lead to the desired behavior change or investment (for example, how much high-efficiency AC units need to be subsidized in order to encourage people to purchase them as opposed to cheaper, lower-efficiency alternatives).

*To conduct this step, you will likely need inputs from at-risk communities, service providers, and public financial management professionals, as well as people with access to cost information related to your chosen activity and, potentially, also economists with expertise in poverty and vulnerability.*

## Step 6

### When is the money needed, and what might be an appropriate trigger?



DRF instruments can be designed to release money before a heat wave (based on forecasts), when the heat wave hits, or afterward. Different response activities will require money at different times.



- Preventative and adaptive measures like awareness campaigns, AC improvements, or activating resilience/cooling stations require money ahead of a heat wave, so funding would ideally be triggered based on forecasts and models of likely impact.
- Compensating for lost income or higher utility bills could be covered by finance that pays out when the disaster occurs.
- Reconstruction and repair of roads, railways, and electricity infrastructure could be covered by finance that pays out after the shock.

DRF instruments can be set up so that they automatically trigger and release funds when certain pre-determined thresholds are met. Funding can be triggered by objective data, such as maximum temperatures (actual or forecast), actual loss (such as assessments of damage), or judgments of severity (such as a government declaration of a state of emergency). Care needs to be taken when selecting a trigger, and it may be appropriate to use multiple or combined triggers. However, using too many triggers can overcomplicate and lead to delays in funding being released. Alternatively, in some contexts, it may be preferable not to use an automatic trigger to release funding, but instead have the decision made by a committee, based on risk information combined with its understanding of the unfolding situation on the ground.

*To conduct this step, you will likely need inputs from at-risk communities, heat specialists, DRF experts, service providers, humanitarian advisers, social protection specialists, and public financial management professionals, as well as people with expertise in poverty and vulnerability.*

## Step 7

### Are there existing risk financing instruments that could incorporate heat waves?



Before considering setting up a new DRF instrument, it is sensible to consider if there are existing risk financing approaches that could be adapted to also respond effectively to heat waves. For example, is there a national or local disaster fund that could incorporate some heat-related triggers? Is there a social welfare transfer that is made to vulnerable households based on cold weather that could be adapted to also provide support in abnormally hot weather? Are any contingent loans in place for other climate hazards? Is there insurance coverage for drought or wildfires that could be adapted to also provide cover for heat waves? This step is especially important for disasters like heat waves, which are not managed by a single government entity.

*To conduct this step, you will likely need inputs from DRF experts and public financial management professionals.*

## Step 8

### Where could the money come from? Who might pay?



Now that it is clear what funds are needed, when and for what, the issues of which instruments to use and who might ultimately pay for the heat response activities need to be tackled. Public decision-makers, particularly at a local level, often struggle to access resources to either pay for heat response themselves or pay to finance the risk. Below is a list of possible sources of funding and financing that could be explored for each of the risk financing instruments mentioned above.

**Contingency budget/reserve funds:** in high- and middle-income countries, it may be possible to create contingent budget lines or reserve funds within national or state budgets, or using local government or city budgets. Local governments often complain they lack access to resources, and so they may need to think creatively (for example, pursuing local businesses to help provide funding from the perspective of corporate social responsibility).

For lower-income contexts, international donors, humanitarian agencies, NGOs, Civil Society Organizations (CSOs), and philanthropic organizations may be willing to provide funding for government-led national or local disaster funds, or to run their own equivalent prearranged emergency fund using funds from across the humanitarian, development, and climate sectors. Development actors may be willing to provide contingent budget to scale up specific programs or initiatives in the event of a heat wave. For example, the United Kingdom government's Foreign and Commonwealth Development Office has, for several years, provided a contingent budget to the Kenyan government to allow it to scale up its Hunger Safety Net Programme in the event of a drought.

**Contingent credit:** there is not currently a commercial market for contingent lending, but international financial institutions, particularly multilateral development banks (for example, the Asian Development Bank), sometimes offer contingent credit. The World Bank has provided several countries with contingent credit totaling \$2.4 billion using its Development Policy Financing with Catastrophic Deferred Drawdown Option (CAT DDO). The loan is made available within forty-eight hours of a government declaring a state of national emergency, and is designed to address climate shocks and health-related events. Some bilateral donors (for example, the Japan International Cooperation Agency) are also considering offering contingent loans. Cities or local government entities in lower-income contexts may be reliant on a national government arranging the loan and subsequently transferring funds.

**Insurance:** premiums can be paid from national or subnational budgets in higher-income countries, or potentially using grant finance from international donors and NGOs in lower-income contexts. In some contexts, local government will be reliant on national government to arrange the policy and pay premiums on its behalf. The experience of the African Risk Capacity (ARC), a pan-African risk pool providing drought insurance, demonstrates that even low-income countries are sometimes willing to use national budget to purchase an insurance policy for a climate hazard. Several donor countries—notably,



Germany, the United Kingdom, and the United States—are continuing to provide significant amounts of funding for premium subsidies to help lower-income countries purchase sovereign-level insurance, and on humanitarian agencies to purchase matching policies. For micro-level insurance, premiums can be paid by individuals, households, cooperatives, or small businesses, again with possible subsidization from a third party. Several global initiatives exist to help provide funding, capacity, and advice in low- and middle-income contexts to encourage the use of insurance to protect against climate risks (for example, [the Insurance Development Forum](#), [InsuResilience Solutions Fund](#) and [InsuResilience Investment Fund](#)).

*To conduct this step, you will likely need inputs from DRF experts, development and humanitarian finance professionals, and public financial management specialists.*

## Step 9

### Which funding/financing option provides the best value for money?



Financial analysis of the different financial and budgetary instruments under consideration will need to be carried out at this stage. As there are many different DRF instruments that could be used, and government resources are usually constrained, it is important to use approaches that offer cost-effective protection. Some financial instruments can be difficult to understand, so professional help and impartial advice will be vital at this point. Sometimes, people get excited by using scientific or financial innovations when a much simpler and more cost-effective solution may exist. It is also important to consider costs for ongoing maintenance and development.

Various tradeoffs will need to be considered in the financial analysis, including

- whether the costs of the finance are disproportionate to the benefits;
- whether a cheaper alternative exists;
- whether money is better spent reducing the risk, rather than financing the specific response activities (for example, whether money for insurance premiums would be better spent on heat-reducing interventions that can have a longer-term impact); and
- whether arranging contingent credit increases debt too much, or uses up too much of available borrowing capacity.

Finance professionals can also advise on how to combine different types of budgetary and financial instruments to ensure the best value for money and to cover the greatest range of extreme heat events. For example, it may be possible to pool risks together under a single fund and buy insurance to enable the fund to cover more needs.

*To conduct this step, you will likely need inputs from public financial management professionals, actuaries, insurance brokers, economists, and DRF experts. The Centre for Disaster Protection provides an impartial, free quality-review process for actors from low- and middle-income contexts. Access more information here if you require specialist support.*

## Step 10

### Could the financing incentivize risk reduction and preparedness?



Money is needed to pay for heat wave response, but also to pay for adaptive, transformative interventions that aim to reduce temperatures over the longer term. DRF offers the opportunity to incentivize risk-reducing investments and prevention or preparedness activities—not just in the selection of activities to finance, but embedded in the specific DRF instruments. Essentially, this means placing conditions on access to money or how it is spent, in order to act as a form of commitment device. Some examples include the following.

#### For reserve funds and contingent budget

- eligibility criteria for the fund could be having a credible heat response plan or heat reduction strategy for the locality or organization;
- governance and management of the fund could incorporate multiple entities to encourage cooperation; and
- contingent budget should require clear multistakeholder plans for how the money will be spent.

#### For contingent loans

- to access the most concessional contingent lending, specific preconditions could be required (for example, the establishment of a heat task force or appointment of a chief heat officer);
- arrangement fees could be waived if there is proof that certain risk-reducing activities have taken place; and
- plans for how the money will be spent should the loan trigger could be an upfront requirement, demonstrating prioritization of the most vulnerable groups or consideration of risk reduction in the selection of activities.

#### For insurance

- premium reductions could be offered if significant risk reduction investments are made;
- access to donor premium subsidies could be awarded if certain risk reduction investments or preparedness activities are undertaken; and

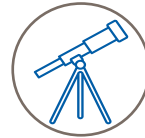


- development of a multistakeholder heat response plan could be a condition for purchasing an insurance policy.

*To conduct this step, you will likely need inputs from public financial management professionals, insurers, DRF experts, and heat specialists.*

## Step 11

### How could you ensure sustainability?



Much DRF to date has happened in the nongovernmental realm, led by humanitarian and development actors, rather than by governments. It has also often happened on a small scale, often as pilot activities, without secure long-term funding. Ideally, DRF for heat waves would be happening at scale, led by accountable governments and embedded in national and local policy frameworks to ensure longevity. Some tips for ensuring a more aligned, sustainable approach to DRF for heat waves include the following.

- Ensure government is involved from the beginning. Even if the DRF is led by a nongovernmental organization, government should be consulted wherever possible, as long-term sustainability will only come with government ownership and leadership.
- Demonstrate alignment with existing policy frameworks for DRF, disaster risk management (DRM), local development, and climate change—including strategies, plans, and other national, regional, or local institutional policies. This will help align incentives and prevent DRF from occurring in a vacuum, separate from wider government-led initiatives.
- Connect with other risk financing or DRM initiatives to maximize complementarity and avoid duplication. It may be possible to share some processes (for example, systems for distributing support, achieving economies of scale).
- Promote multistakeholder working, to ensure understanding and acceptance across all relevant stakeholders. DRF and extreme heat are both highly cross-sectoral, relevant to many different government departments and agencies. Examples include multisector technical working groups on extreme heat—including personnel working beyond just DRF, DRM, and climate change—to potentially include, for example, poverty reduction, economic development, social protection, and agricultural development.
- Engage the private sector as a collaborator and partner, where possible, given its enormous technical capacities and potential access to sustainable capital.

*To conduct this step, you will likely need inputs from across different government ministries, including, for example, finance, planning, agriculture and health, as well as private sector professionals.*

## Step 12

### How will you know if you've been effective?



Globally, there are few examples of DRF for heat waves, and so little is known about what works well and how relevant these initiatives might be for other contexts. This makes it even more important that when DRF is used for heat waves, performance and impact are tracked and publicly reported. Monitoring and evaluation (M&E) can provide accountability, support transparency, and, crucially, facilitate learning, meaning that your DRF instrument can evolve and improve over time.

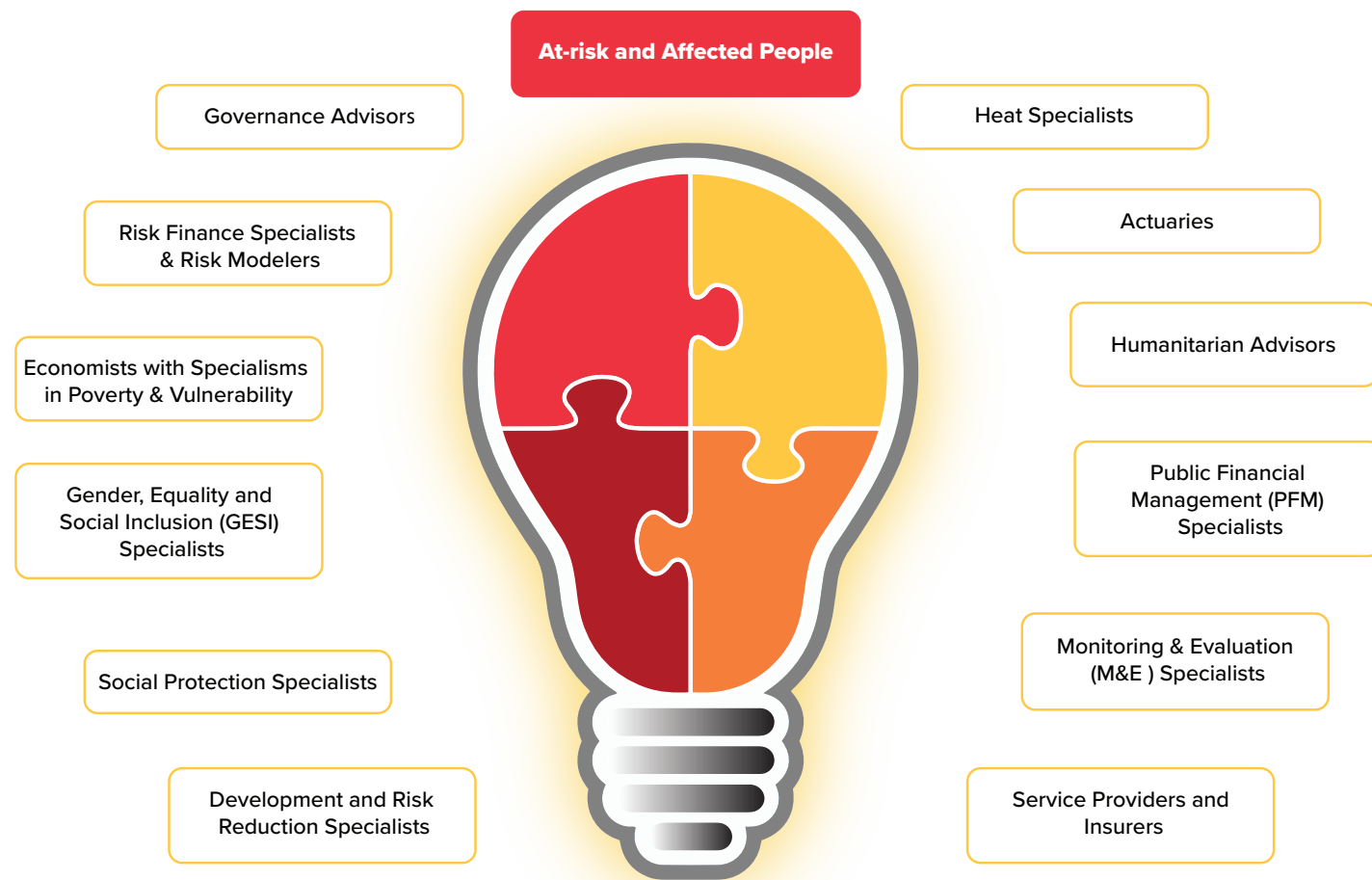
M&E should be undertaken when finance is triggered, but also when it is not triggered, to assess the quality of design work, consultation, and communications. If finance is triggered, it creates the opportunity to audit the financial flows to identify any leakage or bottlenecks, as well as conduct surveys with beneficiaries and implementers to ascertain outcomes and impact. All this information can then be reviewed and used to see how the design could be tweaked for improvements. Monitoring can be set up to be done periodically in house, whereas evaluations are typically bigger studies that are best done by independent experts. M&E can help with

- quantifying your impact (for example, demonstrating reductions in mortality or the number of emergency-room visits);
- determining the reliability of your selected models and triggers;
- clarifying where procedures have been followed and where there have been deviations;
- identifying the characteristics of beneficiaries (for example, gender, age, and race);
- collecting and collating the views of at-risk communities on the effectiveness and timeliness of the support;
- understanding the cost-effectiveness of the approach; and
- providing an independent view on the overall effectiveness of the approach (often required when donor funding is used).

Public sharing of M&E data and reports related to DRF for heat waves will help to improve global understanding, drive up standards and, hopefully, encourage others to embark on their own journey to prearrange finance.

*To conduct this step, you will likely need inputs from monitoring and evaluation experts, programme implementers, and heat specialists.*

**Figure 4: The importance of teamwork: the right people and skills<sup>4</sup>**



As the twelve-step framework demonstrates, designing risk finance is best approached in a multidisciplinary way, pulling together a team of people with different skills and knowledge to ensure an appropriate, cost-effective outcome. There is a danger in seeing DRF as a “finance thing”—in reality, a full range of expertise and experience is needed, as demonstrated in Figure 4. Many of these people are typically excluded from the design of risk finance, particularly the people and communities who are facing the risk, as highlighted in red in the diagram.

### Learning from drought insurance: African Risk Capacity

Although insurance for extreme heat is an underdeveloped area, lessons can be learned from drought insurance, which has been used in low-income contexts at a sovereign level. For example, the African Risk Capacity (ARC) is an African Union (AU) initiative, providing climate-related insurance to AU member states. Since 2014, it has provided \$720 million of insurance coverage, aiming to protect seventy-two million vulnerable people across different African states. Most of this has been parametric insurance for drought, although products for typhoon, flood, and outbreaks and epidemics are in various stages of development. ARC also provides capacity-building support to governments looking to improve their DRM, and has recently started offering policies to humanitarian agencies under the “Replica” initiative. A key strength of ARC insurance is that it addresses both “money in” (the insurance) and “money-out,” as contingency plans must be developed prior to the policy being issued. This can help to promote risk awareness and understanding, as well as ensure that attention has been paid to how to channel any payouts to reach the most vulnerable people as effectively as possible.





## Spotlight on insurance: what role can insurance play in helping address and reduce extreme heat?

Responses to extreme heat are currently insufficient and ad hoc, when what is needed is *scale* (to reflect the huge impacts) and *sustainability* (given the unprecedented, rising threat). Insurance is increasingly being used to address the rising threats of other climate disasters—for example, drought and typhoons—and is typically used for low-frequency but high-severity disasters. Insurance is often thought of as very costly, but it has been successfully used in many low-income contexts, often supported by donor subsidies, capital investments, and capacity-development programs.

Parametric insurance is an innovation that has been used successfully for climate risks in low-income countries, where the payout is based on a predetermined index and set of thresholds (for example, related to rainfall or wind speed) rather than on costly and time-consuming assessment of actual losses (for example, damage to buildings). Heat waves are well suited to parametric insurance in some ways. For example, it is quick to pay out, which is good as heat wave response typically needs to be implemented in a matter of days, and it can be based on forecasts. Some countries, such as the United States, have well-established heat indices that increase the feasibility of parametric instruments, as well as lots of experience with parametric insurance and related instruments like catastrophe bonds. Parametric insurance also helps to lower transaction and administrative costs, making products potentially more affordable. Insurance also has a long history of being used to incentivize risk reduction, which is much needed in relation to extreme heat.



Photo courtesy of: Henry Donati/DFID

## When could insurance be used for extreme heat?

Insurance is not widely used for extreme heat, although various insurers and reinsurers have expressed interest in developing new products to provide protection. In addition to the limitations identified above, heat waves provide additional challenges for insurance including the following.

- Data gaps: in all contexts, the full scale of losses has not been adequately quantified and, for many countries, the forecasting of heat waves needs improvement.
- Diffuse impacts: as impacts are spread across multiple actors, this can reduce the likelihood of one customer willing to purchase an insurance policy, or of aligned interests among stakeholders who could collectively buy a policy.
- Different metrics for heat impacts and different thresholds for impact: this can be the case even within one sector (for example, thresholds for heat-health impacts vary by age), which can increase the complexity of insurance instruments.
- Diffuse ownership of the challenge: heat management cuts across different government entities, which may not have sufficiently aligned incentives and priorities to enable them to work together to develop and take out an insurance policy.
- Current responses are very low cost: existing approaches to heat wave response have focused on low-cost interventions. This has led to a misperception that little money is needed, and this has possibly fuelled a lack of motivation to engage from the market. If countries, businesses, organizations and communities focus not on the costs of current heat wave responses but on the huge losses that are incurred during a heat wave, insurance becomes more suitable.

Below are some potential scenarios in which insurance could be used innovatively to provide a viable and appropriate option for heat wave protection, across a range of organization types. The list is intended to generate ideas for how insurance could be a useful financial tool, and to provoke discussion between public and private entities and the insurance industry. Each example includes discussion of how payouts could be targeted to support the poorest people (as they are always most affected), and also how to embed risk reduction within the insurance.

### Scenario 1: Heat wave insurance for a hospital or healthcare provider

**What are the impacts?** Healthcare providers suffer a number of impacts during a heat wave, mainly driven by increased caseload as more people fall ill and need emergency care. This may lead to increased staffing costs, and increased use of facilities, medicines, equipment, and so on. There is also likely to be increased pressure on emergency health services and paramedics. Hospitals and clinics will also be subject to potentially increased power costs (for example, if generators are needed to cover power blackouts).

**How could insurance help?** An insurance policy could provide coverage for a hospital for these increased costs in the event of a catastrophic heat wave with high excess mortality. A proportion of any payout could potentially be set aside to subsidize healthcare costs for low-income households, particularly if the premium is paid by a third party with developmental aims. The insurance could be parametric—for example, based on forecast or actual temperatures over a set period of time—or it could be indemnity insurance, based on actual caseload figures. In contexts where healthcare is provided by the state, government funding could be used for the premium payments. In low-income contexts, this could be subsidized by donors or NGOs. Donors and development banks that have invested in building a hospital (or, indeed, other types of service infrastructure) may be keen to purchase insurance to protect their investment from service interruption or damage due to heat waves, along with other climate risks. Having a credible heat response plan could be a condition to purchase a policy, and reduced premiums could be offered for specific risk reduction or preparedness activities.

### Scenario 2: Business Interruption insurance for heat waves

**What are the impacts?** All businesses are likely to be affected by extreme heat, but some sectors are particularly vulnerable, including construction and agriculture. Businesses incur extra costs in heat waves (for example, providing air conditioning, shelter, and additional water for workers, when these costs are often skyrocketing due to market demand). Businesses with large numbers of outdoor workers are likely to incur substantial losses not just in reduced productivity, but in delays to projects and difficulty getting hold of supplies. Agricultural businesses may also incur large losses from cattle death and crop failure.

**How could insurance help?** Businesses could purchase business-continuity coverage to protect themselves. This could help to ensure that workers' wages continue to be paid during heat waves, and could require certain preconditions, such as a credible heat response plan. This may be a particularly appealing option for businesses operating in environments with legislation related to maximum allowable temperatures for

outside work, although it may add to political pressure to under-report temperatures. It may be possible to incorporate premium reductions for risk reduction activities such as installation of AC or water cooling in worker spaces. Alternatively, payouts could be channelled as cash transfers directly to workers to protect their income, effectively paying them to stay at home in excessively hot weather. National or city-level governments could also purchase insurance to protect workers on government contract-work schemes, which are common in low-income countries. For smallholder farmers, cooperatives or unions could also collectively purchase insurance. In low-income contexts, these could all be supported by donors. The insurance could be parametric, based on forecast or actual temperatures or indemnity based on actual hours of work lost. In low-income countries, parametric would work better as most businesses operate at the subsistence level, so payouts are needed quickly to avoid negative coping behaviors, such as skipping meals or sale of assets.

### Scenario 3: Insurance for social protection schemes targeting low-income households

**What are the impacts?** Low-income households and communities often bear the brunt of heat wave costs and longer-term heat impacts. For example, they are less likely to have AC at home or work, and less likely to have health insurance or savings to cover increased costs for healthcare, shelter, water, and power. They are more likely to be informal workers, and less able to cover their basic needs if their income is reduced due to an inability to work or a need to reduce hours. They are less likely to live in areas with green areas or good service provision. Women and girls are disproportionately affected (for example, pregnant women are at a higher risk from heat exposure).

**How could insurance help?** Low-income households are sometimes in receipt of social protection, or social welfare, payments. Insurance could potentially be purchased by national or subnational governments, possibly with support from donors or NGOs, to cover additional payments to be made in the event of a heat wave, either based on forecast or actual temperatures. Channeling payouts through social protection programs potentially improves the speed and cost-effectiveness of response, as the recipients have been preselected and existing systems and processes can be used. This approach has been explored for drought insurance, with contingency plans for the use of payouts that detail what programs will be used and how the additional funds will be administered. In addition, transfers for heat waves could be linked to heat-reducing activities (for example, vouchers for cool-roof coatings), or to prevention (for example, mobile payments accompanied by text messages outlining actions to take to spot and reduce heat exposure).



#### Scenario 4: Heat wave insurance for utility companies

**What are the impacts?** High temperatures increase demand for electricity (for example, for air conditioning and to support water utilities who themselves see an increase in demand). Generating extra power on short notice can incur high costs. Heat can also cause damage to infrastructure (for example, sagging power lines and increased risk of fire), and can reduce the efficiency of energy generation, particularly for solar and gas.

**How could insurance help?** Utility companies could purchase insurance—either parametric based on forecast or actual temperatures, or indemnity based on actual costs or losses. Payouts to utility firms could help to ensure uninterrupted supply during heat waves, or could be used to help subsidize increased power usage for vulnerable communities or essential service providers such as hospitals and schools. If payouts were used for the protection of vulnerable communities (for example, to help them pay higher energy bills), then the insurance could be publicly funded, or potentially subsidized by a donor in low-income contexts. However, there would need to be consideration of tradeoffs. It could be counterproductive to incentivize increased AC use, as this can stress the system even more, and actually raise ambient temperatures even higher.

#### Scenario 5: Insurance for a reserve fund or contingent budget line

**What are the impacts?** National or local disaster funds or contingent budgets are useful for responding to high-frequency, low-severity events, but they can quickly become exhausted, especially in resource-constrained environments. This leaves governments having to hastily reallocate their budgets when a heat wave arises, potentially impacting essential services with long-term impacts.

**How could insurance help?** Some humanitarian and NGO funds have considered insuring their disaster funds to protect them should many disasters occur at once, depleting the fund and leaving it unable to support affected communities. For example, the International Federation of Red Cross and Red Crescent Societies (IFRC) has a Disaster Response Emergency Fund, which includes forecast-based protocols for financing extreme heat. An actuarial study demonstrates how, depending on the risk appetite, pooling combined with insurance could help the fund cover four times as many needs as without insurance.<sup>12</sup> One US state is also exploring options for insuring its contingent budget lines for heat waves. The local budgets include enough contingent funds for three days' response to a heat wave. Insurance could be purchased that would trigger on a heat wave once the three days' budget had been used up. Current proposals for this include risk-reducing measures, in that a heat response plan needs to have been developed in conjunction with the local vulnerable community as a condition for the policy, with payouts to be spent on implementing the plan.

#### World Bank Catastrophe Risk Insurance in the Philippines: Lessons and Challenges

Examples of insurance in relation to heat are scarce, but lessons can be learned from attempts to tackle other climate risks using insurance-like products. For example, the Philippines is highly prone to typhoons and earthquakes, incurring massive losses each year. In 2017, the World Bank worked with the government of the Philippines to transfer \$200 million of typhoon and earthquake risk to a panel of international reinsurers. The following year, the government renewed this insurance, and doubled the amount of coverage. The parametric product was designed to pay out when an earthquake or a tropical cyclone exceeded a predefined strength. A [lessons-learned review](#) shares several useful findings, with a [blog](#) by those involved highlighting five key takeaways.

- 1. Parametric insurance can provide governments with rapid liquidity** following disasters. Three payouts were made over two years for a total of approximately \$28 million.
- 2. The private sector will support well-designed parametric insurance programs.** Reinsurers were keen to participate, probably to diversify their own risk portfolios, and the number of counterparties to the policy doubled in the second year.
- 3. Insurance must be accompanied by strong planning** for how to use a payout and, potentially, public financial management (PFM) reform. Much work needs to be done behind the scenes (for example, changes to PFM rules to ensure funds can rapidly reach those who need support, or can pass between layers of government).
- 4. Be aware of basis risk** and plan for atypical outcomes. In one instance, the payout was larger than the actual losses due to positive basis risk. This disrupted plans and created delays.
- 5. Generating political and technical buy-in** is time-consuming, but critical to ensure success.

## Where do we go from here?

The scenarios presented in this “spotlight on insurance” demonstrate that there are multiple ways that insurance instruments could help protect against the impacts and losses from heat waves; finance preparedness measures based on forecasts; support speedy and well-planned response; and simultaneously incentivize reductions in vulnerability over the long term. National and local governments are waking up to this potential and having discussions with international (re)insurers, risk intermediaries, and supportive donors. For example, risk consultants at WTW are currently investigating the potential for employer insurance to cover heat-related business losses in the United States, combined with benefits packages for workers to protect them from exposure when heat is excessive, ensuring their pay is safeguarded and additional costs are covered.

Recent experience demonstrates that there is a market for climate risk insurance across all types of context. While extreme heat has lagged other climate-related hazards, progress is now being made to design, pilot, and implement financial instruments that can support heat adaptation investments under a broader climate finance agenda, as well as DRF approaches to pay for responses to heat waves. Arsht-Rock and the Extreme Heat Resilience Alliance (EHRA) will continue to work on this agenda, producing guidance and providing capacity-building support via the [Heat Action Platform](#), as well as potentially sponsoring initial product development. If you would like to collaborate with us on this topic, please email [YBaharav@atlanticcouncil.org](mailto:YBaharav@atlanticcouncil.org). We hope that you will join us in exploring better ways to pay for the vast impacts of heat waves on lives and livelihoods, and to tackle the unprecedented risk of extreme heat that the world now faces.

## Endnotes

- 1 Arsht-Rock uses the term “heat wave” to refer to abnormally high temperatures and the umbrella term “extreme heat” to cover both chronically high (but not abnormal) temperatures and heat waves.
- 2 See for example: “The Global Climate in 2015–2019,” World Meteorological Organization, 2019, 12, [https://library.wmo.int/doc\\_num.php?explnum\\_id=9936](https://library.wmo.int/doc_num.php?explnum_id=9936); “Primer for Cool Cities: Reducing Excessive Urban Heat,” International Bank for Reconstruction and Development and World Bank, 2020, <https://documents1.worldbank.org/curated/en/605601595393390081/pdf/Primer-for-Cool-Cities-Reducing-Excessive-Urban-Heat-with-a-Focus-on-Passive-Measures.pdf>.
- 3 “Chilling Prospects: Tracking Sustainable Cooling for All 2022,” Sustainable Energy for All, May 17, 2022, <https://www.seforall.org/chilling-prospects-2022>.
- 4 *Extreme Heat: The Economic and Social Consequences for the United States*, Atlantic Council, Arsht-Rock Resilience Center, and Vivid Economics, 2021, <https://www.atlanticcouncil.org/wp-content/uploads/2021/08/Extreme-Heat-Report-2021.pdf>.
- 5 Francisco Estrada, W. J. Wouter Botzen, and Richard S. J. Tol, “A Global Economic Assessment of City Policies to Reduce Climate Change Impacts,” *Nature* 7, 6 (2017), <https://www.nature.com/articles/nclimate3301>.
- 6 *An Analysis of Urban Climate Adaptation Finance*, Atlantic Council and Arsht Rock Resilience Center, February 2021, <https://www.climatepolicyinitiative.org/wp-content/uploads/2021/02/An-Analysis-of-Urban-Climate-Adaptation-Finance.pdf>.
- 7 See, for example: Elle Crossley, et al., “Funding Disasters: Tracking Global Humanitarian Funding for Response to Natural Hazards,” Centre for Disaster Protection, 2021, [https://static1.squarespace.com/static/61542ee0a87a394f7bc17b3a/t/616ad7052646c56d7b356637/1634391815076/WP\\_8\\_16June.pdf](https://static1.squarespace.com/static/61542ee0a87a394f7bc17b3a/t/616ad7052646c56d7b356637/1634391815076/WP_8_16June.pdf).
- 8 See, for example: Zoe Scott, “Finance for Early Action: Tracking Commitments, Trends, Challenges and Opportunities,” Risk-informed Early Action Partnership, June 1, 2022, [https://www.early-action-reap.org/sites/default/files/2022-06/20220613\\_Finance%20for%20Early%20Action\\_FINAL.pdf](https://www.early-action-reap.org/sites/default/files/2022-06/20220613_Finance%20for%20Early%20Action_FINAL.pdf).
- 9 “Annual Review 2020,” Start Network, 2021, <https://start-network.app.box.com/v/AnnualReview2020EN>.
- 10 Relevant resources on engaging communities can be found at: “Heat Action Platform,” Adrienne Arsh-Rockefeller Foundation, last visited August 23, 2022, <https://onebillionresilient.org/heat-action-platform/develop-an-education-and-engagement-strategy>.
- 11 Source: Author, adapted from a Centre for Disaster Protection unpublished resource.
- 12 Georgina Bedenham and Colin Wilson, “International Federation of Red Cross and Red Crescent Societies’ Forecast-Based Action by the DREF: Financing the Forecast-Based Early Action Protocols,” February 2021, [https://static1.squarespace.com/static/61542ee0a87a394f7bc17b3a/t/616acdfefa12511eb85625fd/1634389515780/Centre\\_GN\\_Paper6\\_2Feb%2B%281%29.pdf](https://static1.squarespace.com/static/61542ee0a87a394f7bc17b3a/t/616acdfefa12511eb85625fd/1634389515780/Centre_GN_Paper6_2Feb%2B%281%29.pdf).





### About the Author



Zoë Scott is an independent consultant, specializing in disaster risk finance and management. She has over 20 years' experience and has worked on disaster risk in many low and middle-income countries, providing advice and technical services to governments, donor agencies, development banks and international organizations. She has worked as a Senior Adviser to the UK Government and was formerly Head of Multilateral Programmes at the Centre for Disaster Protection. Her work aims to challenge and reform how the world plans and pays for disasters, promoting evidence-based policy-making, robust evaluation and insightful research.

### About Arsht-Rock's Global Policy Director



Jorge Gastelumendi is the Director of Global Policy at the Atlantic Council's Adrienne Arsht-Rockefeller Foundation Resilience Center. As a recognized climate and environmental policy and finance leader, lawyer and passionate, public-spirited professional, Jorge has previously worked with The Nature Conservancy (TNC), where he was Managing Director of External Affairs and Global Strategies and as their head of International Climate Finance Team.

He has served as Chief Advisor and negotiator to the Government of Peru, leading to the adoption of the Paris Agreement in the government's dual role as UNFCCC COP20 Presidency and co-chair of the Green Climate Fund's board. He has worked as carbon fund manager at The World Bank's Carbon Finance Unit.

### Acknowledgements

Many thanks to Sophie Evans (Centre for Disaster Protection) and Vikram Widge (Climate Policy Initiative) for reviewing an earlier draft and sharing their insights during the development of this report. Arsht-Rock is also grateful to the following individuals for their participation in interviews and a workshop that shaped the ideas presented in this report: Aaron Michel (Swiss Re), Conor Meenan (Centre for Disaster Protection), Deborah Halberstadt (California Department of Insurance), Eleanor Nderitu (Start Network), Eleni Myrivili (Chief Heat Officer, Athens), Elizabeth Rees (Start Network), Emma Flaherty (REAP), Eugenia Kargbo (Mayor's Delivery Unit, Freetown), Francis Bouchard (Marsh McLennan), John Rudoy (Marsh McLennan), Kipkorir Koskei (Insurance Development Forum), Kurt Shickman (Arsht-Rock), Leonie Le Borge (Start Network), Matt Foote (WTW), Mauricio Rodas (Arsht-Rock), Nick Moody (Independent Consultant), Obbe Tuinenburg (Global Parametrics), Omar Abou-Samra (American Red Cross), Owen Gow (Arsht-Rock), Rowan Douglas (WTW), Surella Segú (Chief Heat Officer, Monterrey), Yommy Chiu (Swiss Re) and Yuval Baharav (Arsht-Rock).

	Reserve funds, contingency budget allocations	Contingent credit	Insurance and other risk transfer instruments
<b>What is it?</b>	A specific budget line or reserve fund is created that can be accessed if certain conditions are met (for example, if extremely high temperatures are forecast, met, or sustained for an agreed amount of time). <b>Essentially, money is put aside so that it is not spent on other activities, and will be available if needed.</b> This can be set up within government, or be funded by a donor agency, international organization, or nongovernmental organization (NGO).	<b>Loans that are made available when a particular event occurs or pre-agreed thresholds are met</b> (for example, when a state of emergency is declared or when temperatures exceed a certain level). The loan is paid back according to the pre-agreed terms when the emergency is less pressing.	An arrangement in which a premium is paid to an insurance provider, which commits to provide a payout to cover costs if a heat wave materializes. Therefore, the risk is transferred to someone else, in exchange for the premium payment, which is typically annual. Premiums can be subsidized by the state or other actors to help make insurance more affordable for those who need coverage. Catastrophe bonds are another type of risk transfer instrument that has been used to protect against climate hazards such as hurricanes. With catastrophe bonds, instead of an insurance company meeting a claim, bonds are sold to a wide range of investors and the money is kept aside so that it will be available if needed. If the disaster does not occur in the agreed time-frame, the investors get their money back, plus an additional payment.
<b>What are the benefits?</b>	A specific budget line or reserve fund is created that can be accessed if certain conditions are met (for example, if extremely high temperatures are forecast, met, or sustained for an agreed amount of time). <b>Essentially, money is put aside so that it is not spent on other activities, and will be available if needed.</b> This can be set up within government, or be funded by a donor agency, international organization, or nongovernmental organization (NGO).	<b>Funds do not need to be tied up in advance, and credit can be made available very quickly following a heat wave</b> —or potentially ahead of time, based on forecast data. International finance institutions can offer concessional terms, making the loans relatively cheap. In addition, conditions can be placed on the loan prior to it being finalized to support risk reduction (for example, the creation of a government heat investment strategy or the establishment of a cross-sectoral technical working group to address heat impacts).	The risk is transferred to a third party. Because a detailed contract is in place, insurance offers some reliability. Large payments can be made, which makes it relevant for heat, given that large losses can be incurred in a severe heat wave. In addition, there is a long history of insurance being used to support behavior changes or incentivize preventative investments in exchange for premium reductions (for example, reductions in home insurance for installing smoke alarms). This could be used to good effect in relation to extreme heat, where wider heat-reducing investments are needed, but rarely prioritized. Insurance-like instruments also encourage helpful thinking around risk (for example, a named party assumes ownership of the risk, arrangements are clearly documented, and risks are assessed, quantified, and communicated).
<b>What are its limitations?</b>	It can be difficult to protect money allocated for a potential disaster when there are other pressing needs. <b>Reserving large amounts of money is often not possible, politically desirable, or a cost-effective use of funds.</b>	<b>The loan amount plus interest must be repaid, and an upfront arrangement fee may be required.</b> Potentially, the awareness that money will arrive if needed could reduce incentives for risk reduction.	Insurance can be expensive, especially in situations where there is little data available, as insurance companies can be less sure about the risk they are taking. It can be difficult to agree when a payout should be made, although the rise of parametric insurance—in which payouts are made based on a predetermined index and set of thresholds, rather than based on a post-event assessment of losses—can help to ease this problem. However, even with parametric insurance, there is basis risk, which is the risk that there is a difference between the index or model used and the actual situation on the ground.
<b>When is it most suitable?</b>	<b>As funds and budget allocations are likely to be relatively small, these instruments can be useful for funding relatively low-cost, small-scale responses to extreme heat.</b> They are also useful for responding to heat waves that happen frequently, so funds are not seen as lying idle. Given that it will not be feasible to set aside enough money to meet the costs of a severe heat wave or prolonged heat with costly impacts, they are better suited to responding to less severe heat events.	<b>It is useful for heat waves that are relatively high frequency and low severity.</b> It is good for all types of heat response, as funds are made available quickly.	It is useful for severe, infrequent heat waves in which a large amount of money is likely to be needed, in excess of what could be held in reserves. Money from the payout could then be used to fund heat response activities on a large scale (for example, scaling up a social protection scheme or providing compensation to a large business for increased costs or reduced productivity as a result of heat).



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