Potential for Risk Financing to Support Shock-Responsive Education Services

Scoping Paper |10 July 2025

THE WORLD BANK

Global Shield
Financing Facility

Contents

Acknowledgements

This Scoping Paper was prepared by Chris Eleftheriades, Arth Mishra, and Jasper Siegfried at Lion's Head Global Partners. The authors extend their gratitude to a team of subject matter experts and advisers who generously provided feedback and input from early conceptualisation to the Scoping Paper's final review. The dedicated contributions of the group significantly enhanced the report's depth, quality, and applicability of insight.

Specifically, the authors would like to thank the following individuals for providing deep expertise across education, disaster risk financing and response:

- Emma Gremley, International Rescue Committee
- Katharine Davis, International Rescue Committee
- Evie Calcutt, World Bank Group
- Emily Montier, Independent Consultant
- Simeon Joachim Abel, World Bank Group
- Conor Meenan, Centre for Disaster Protection

Funding for this Scoping Paper was generously provided by the Global Shield Financing Facility (GSFF). We also thank the World Bank and International Rescue Committee for providing ideas, resources, data and programme-related information that inspired and shaped the Scoping Paper's conclusions and recommendations.

Any views and any errors or omissions presented are the authors alone.

Cover image: 06 September 2022 – Brothers Raheem and Sami wait among the rubble of their home, which was destroyed by floods in Killah Abdullah District, Pakistan. Photo: Mercury Transformations for IRC

Executive Summary

Natural hazards exacerbated by climate change pose a **substantial threat to education systems and outcomes**. Modelling indicates that tropical cyclones and earthquakes alone inflict approximately US$7 billion in damage to education infrastructure in low- and middle-income countries each year. Yet these education sector impacts have been under-studied and under-funded in a disaster risk and response context.

Prearranged disaster risk financing (DRF) instruments have potential to **promote the resilience of vulnerable countries and communities** against the financial impact of disasters and secure access to post-disaster financing *before* an event strikes, thus ensuring rapid, cost-effective resources to finance recovery and reconstruction efforts. Complementary climate financing can help to reduce exposure and vulnerability to natural hazards altogether.

This Scoping Paper (i) analyses ways in which natural hazards and climate change **impact education systems and outcomes**, and the role of education in **promoting resilience**; (ii) examines the **global landscape** for prearranged DRF and wider climate financing for education systems in low- and middle-income countries; and (iii) identifies **high-level financing solutions** to enhance risk management in the sector.

National governments and households at present provide **the vast majority of education sector funding**, supported to an extent by international assistance from development and humanitarian partners. Sovereign DRF instruments in other sectors have become more diverse and accessible, while climate finance has scaled significantly in recent years. Compelling humanitarian DRF innovations led by international and local actors are also emerging.

Despite this progress, there is **limited evidence of education being prioritised** in major DRF and climate finance facilities. Globally, climate finance reached US$1.3 trillion in 2021/22. However, education accounted for 0.001% of the total. Similarly, major education financing facilities have not integrated DRF and climate finance instruments, to reduce and respond to the risk posed by natural hazards.

The Scoping Paper's recommendations aim to enhance effectiveness by identifying **concrete ways in which education systems can be made more responsive to natural hazards**, including:

(i) integrating DRF instruments into education sector planning and budgeting frameworks, learning from social protection innovations, to make education systems and programmes **more *shock-responsive***;
(ii) better connecting DRF to adaptation and longer-term steady-state budgeting, to enhance coherence of operations and ultimately learning outcomes **throughout the crisis arc**; and
(iii) investing in the capabilities, data, systems, and further analysis to test, refine, and scale DRF and climate finance in education.

Emerging pilot programmes and experience in other social sectors show that such integration and alignment of education funding, DRF, and climate finance is feasible. This Scoping Paper provides concrete examples of **how such innovations can be scaled** in the education sector through four diverse case studies. Given the heterogeneity of natural hazards and corresponding impacts on education systems, the paper examines a range of potential models across contexts, including:

A. Connecting existing DRF instruments, including public asset insurance programmes, to shock-responsive education systems and programmes. For example, Model 1 envisages integration of *existing* parametric insurance into *existing* education sector programmes, moving beyond high-level contingency planning to detail in advance the precise conditions under which funds are disbursed and the intended use-of-proceeds. The thesis behind Model 1 is that speed and certainty associated with the insurance payout could unlock more cost-effective and shock-responsive education operations when eligible risks manifest. Available data and research on education sector exposures could even be used to arrange additional *education sector-specific* parametric insurance policies from existing risk pools.

B. Integrating education into national climate adaptation plans and developing education-specific risk financing instruments for government and non-government responders. For example, Model 2a envisages integration of education sector climate risks into the design of National Adaptation Plans and National Disaster Risk Management Plans, backed by financing from *existing* concessional finance facilities for (i) education and (ii) climate resilience and sustainability. Model 2b envisages complementary *response* financing for natural hazards, by (i) integrating DRF instruments into existing and future education sector development loans and grants, and (ii) integrating education explicitly into government contingency funds. To complement shock-responsiveness in government education systems and development finance programmes, Model 2 also includes initial analysis of a *new* dedicated risk pool to cover protection gaps in complex crisis settings.

C. Using DRF to incentivise education sector planning across the crisis arc, ensuring an effective transition from response to early recovery, to long-term reconstruction and rehabilitation. For example, Model 3 envisages preparation of Education Sector Contingency Plans that combine sector-specific risk analysis; documentation of contingent liabilities facing government and international partners; and a costed, funded, phased response plan that delineates emergency action from early recovery and reconstruction. Each Contingency Plan would specifically consider links to (even integration with) *existing* social protection systems and humanitarian cash transfer programmes, which have been shown to support education access and outcomes.

D. Prearranged financing for low-severity, high-frequency events that disrupt learning and education outcomes. For example, Model 4 envisages dedicated national contingency funds to support municipalities and local education authorities in responding to localised natural hazards, such as small-scale flooding. These hazards are not in isolation of a severity that would trigger national DRF instruments but cumulatively can have a material impact on education access and attainment. National contingency funds could benefit from *existing* international adaptation and response financing facilities, national government budget contributions, and insurance, with payouts channelled to local actors.

Many of the proposed solutions for national governments do not require additional funding, rather they aim to enhance effectiveness by making education systems **more shock-responsive**. The case studies also show how national education systems can build from recent innovations in social protection, by integrating DRF into sector budgeting and planning. Guarantees hold particular promise, including potential to increase the scale and reduce the financial and opportunity costs of funding for resilience and response in education. In the non-governmental humanitarian sector, existing pooled funds could similarly go further to integrate DRF instruments and new cross-country risk pools could be established.

Each of these instruments would require **careful tailoring** to the specificities of the education sector. This includes distinct use-of-proceeds, such as reconstruction of school infrastructure, school-feeding programmes, cash transfers, and remote learning. It also includes tailored triggers for the release of funding - most DRF instruments are calibrated to payout when natural hazards pose a risk to lives and livelihoods, but education activities and outcomes are often disrupted sooner.

Across both governmental and non-governmental humanitarian systems, DRF instruments for education should be designed to facilitate and incentivise **more effective *ex ante* response planning**. This involves a shift from high-level contingency plans towards the integration of DRF into longer-term systems and operations that combine system strengthening, risk reduction, emergency response, and sustained recovery and reconstruction.

One common barrier to potential solutions covered in this paper is **inadequate data** on risk exposure, vulnerability, the costs of response, and resultant funding gaps. Investing in these specific data systems and capacity would be a prerequisite to effective protection against natural hazards in the education sector. Emerging pilots, including IRC's CREST programme in northern Kenya, will provide critical learning on both the specific data, systems, and capacities required to scale DRF in the education sector and the incentives that DRF can create to invest in these enablers.

Based on these findings, the Scoping Paper offers **operational, advocacy, and analytical proposals** to enhance the shock-responsiveness of education systems and programmes:

1. All new education sector programmes from development finance and global education facilities should **incorporate DRF instruments** into their education loan and grant frameworks.

2. Education sector risks and responses should be integrated into all new **contingency plans for regional risk pools**. Parallel policies could also be structured for education-specific risks.

3. International climate finance pools should include **dedicated education sleeves** and should be **integrated where possible with DRF mechanisms** to ensure seamless transition from preparedness to response and recovery.

4. Education sector adaptation and DRF instruments should be **scaled in the humanitarian sector**; a new cross-country education risk pool could fill the protection gaps identified in case studies above.

5. Existing technical assistance pools should prioritise investment in **institutional capacity, further research and analysis, and foundational data** required to make education systems and programmes more shock-responsive.

Together, these five actions form a strategic blueprint for building a more resilient, responsive, and globally coordinated education sector financing architecture, building on longer-term investments in education sectors and systems. Delivering even individual elements of such a blueprint will require commitment and coordination among many actors: local, national, and international; government, private sector, and humanitarian; and education experts and finance specialists. Indeed, this was the principal finding of earlier sections of the paper: fragmentation between education and climate/disaster risk financing leads to critical protection gaps locally, nationally, and globally. Delivering coordinated action to remedy these gaps will require political

commitment by leaders to work across sector boundaries more effectively, potentially under an Education Resilience Finance Pact (see Box E1).

Box E1: Towards an Education Resilience Finance Pact

Such a Pact would be comparable to major policy frameworks that have solved coordination problems in other sectors, committing partners to actions that are mutually beneficial when undertaken in concert.[1] An Education Resilience Finance Pact would embody commitments by international, national, and local actors to:

1. Recognise the threats posed by climate change and natural hazards to learning and long-term human capital accumulation.
2. Recognise that education sector threats are unique in their nature and so require tailored operational and financial solutions.
3. Commit to integrating education into climate finance and disaster risk financing mechanisms and commit to integrating climate and disaster risk financing instruments into education sector plans and programmes.
4. Commit to investing in requisite institutional capacity, planning, data, and analysis, required to ensure effective stewardship of shock-responsive education systems and programmes.
5. Commit to equitable climate and disaster risk financing in education, including coverage of communities and children outside national systems.

By its nature, an Education Resilience Finance Pact would require complementary actions by several stakeholders, including governments in low- and middle-income countries, development finance actors in education and disaster risk management, non-governmental humanitarian organisations, and government and philanthropic donors. The paper concludes with specific recommendations for each stakeholder, encouraging each to contribute its unique expertise, resources, and capabilities to jointly test, tailor, and scale shock-responsive education systems and programmes.

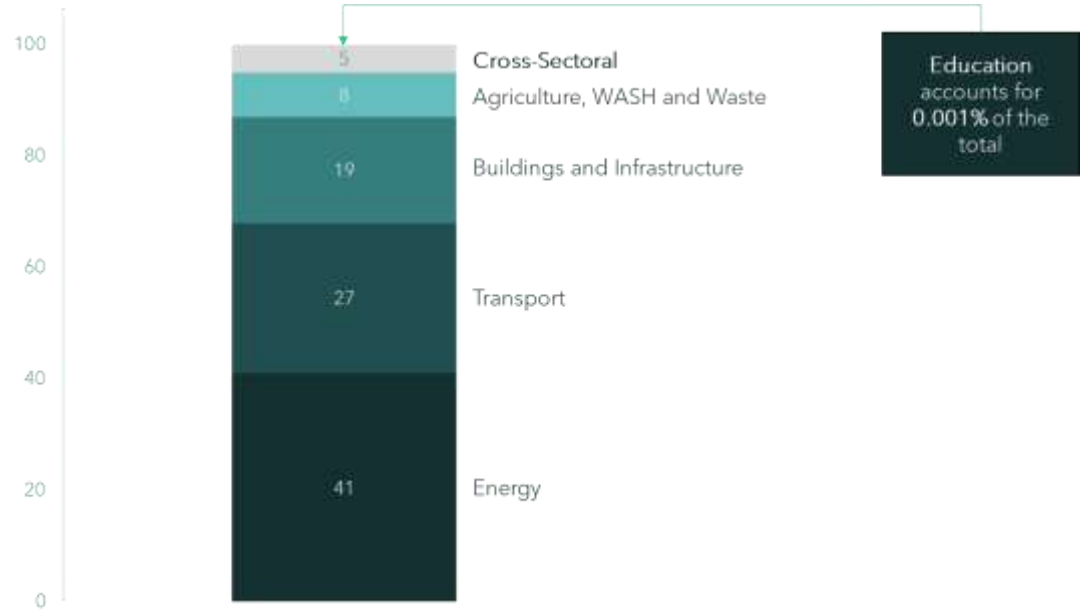
[1] For example, see the Global Compact on Refugees.

1. Introduction

Total education spending per child has either **decreased or stagnated globally** in recent years (World Bank, 2024). This has coincided with deteriorating education outcomes, including a 4-8 percentage point decline in minimum reading and math proficiency among 15-year-olds in middle-income countries since the outbreak of COVID-19 (OECD, 2023). Compounding funding challenges, climate change is "almost certainly already harming education outcomes around the world", including through increasing incidence of, and exposure to, natural hazards (Prentice et al, 2024). These impacts are heavily shaped by existing vulnerabilities and inequities, meaning adverse consequences of climate change for education are most acute among lower-income countries and communities.

While policy momentum around prearranged financing for crisis response and climate finance for adaptation and mitigation has increased markedly, **few additional resources and financing tools have reached education sector actors** in low- and middle-income countries. Globally, climate finance reached US$1.3 trillion in 2021/22. However, Figure 1 shows that education accounted for 0.001% of the total (UNESCO, 2024). Few education-specific prearranged financing mechanisms exist, and the specific needs of the sector are rarely reflected in wider disaster risk management (DRM) and prearranged disaster risk financing (DRF) initiatives. Even in other sectors, international development funding for prearranged DRF fell year-on-year in 2022 across sectors and represented only 1.1% of total crisis finance (CDP, 2024).

Figure 1: Climate Finance Allocations to Education (UNESCO, 2024)



In this context, the International Rescue Committee (IRC) and World Bank's Disaster Risk Financing and Insurance Program, have partnered to explore the **potential for climate finance and prearranged DRF to manage growing risks** presented by climate change in education.

This Scoping Paper contributes to that exploration, by:

- Providing a brief overview of existing education sector funding mechanisms and emerging climate and prearranged DRF models (see Section 3);

- Analysing the relationships between climate and disaster risk and education sector activities and outcomes;
- Assessing risk ownership of climate and disaster risks in the education sector; and
- Developing a series of high-level alternative financing arrangements that could:
    - Enable and incentivise more effective planning and operations to manage vulnerability of education activities and outcomes to disaster risks; and
    - Accelerate funding flows to enhance cost-effectiveness of response.

The Scoping Paper is not intended as the final word on how climate and crisis risk financing should progress in the education sector. Rather, it is intended to **support the development of effective approaches to manage and mitigate climate and natural hazard risks in the education sector**, at both the sovereign and international community levels. As such, the analysis below does not exclusively focus on the structure of financing instruments, nor solely on appropriate use-of-proceeds. Instead, it seeks to combine both financial structuring and education response considerations, to inform innovations that could help to close protection gaps in the sector. This integrated approach is vital to ensure that innovations in preparedness and response financing for education are tailored to the sector's specific risk profile and the existing funding landscape.

The Scoping Paper was written during early-2025 – **a tumultuous time for the sector and its funding relationships**. Falling aid levels and increasing education sector funding needs driven by demographic and crisis dynamics call for innovative financing solutions to maximise available resources and enhance the effectiveness with which they are deployed. The Scoping Paper's analysis points to the importance of emerging mechanisms including private capital mobilisation, guarantees, and pre-arranged financing. This shifting context will affect the relative feasibility and value for money of alternative financing solutions but did not directly affect the first principles analysis and options presented in below.

The Scoping Paper is **structured as follows**:

- Section 2 provides an overview of the relationships between climate and natural hazard risk and education.
- Section 3 analyses the existing funding landscape and ownership of climate and natural hazard risks in the education sector.
- Section 4 presents a series of case studies to identify context-specific protection gaps and potential financing solutions to enhance risk ownership, management, and financing in the education sector.
- Section 5 presents conclusions and recommendations based on preceding sections.

Key Terms

Crisis - A situation creating severe and widespread needs that exceed the existing local and national capacities to prevent, mitigate, or respond. This includes crises arising from a range and combination of hazards including conflict, weather and climate-related events and stresses, and disease. (Centre for Disaster Protection)

Crisis financing - Funding and financing that promotes and specifically targets prevention, preparedness, and response to crises. It could take the form of: (i) cash flow to recipients (e.g. grants) that could be arranged in advance or agreed in real time; (ii) cash flow to and from recipients via a financial intermediary (e.g. loan or insurance). (Centre for Disaster Protection)

Crisis risk - The potential suffering and loss of life that could occur in a specific time period due to a crisis, determined probabilistically as a function of hazard, exposure, vulnerability, and capacity. (Centre for Disaster Protection)

Crisis risk financing - Funding and financing that promotes and specifically targets a specific crisis risk, arranged before a potential shock. This can include paying to prevent and reduce the risk, as well as paying to prepare for and respond to a shock.

Disaster risk financing - Instruments that promote the resilience of vulnerable countries against the financial impact of disasters and secure access to post-disaster financing *before* an event strikes, thus ensuring rapid, cost-effective resources to finance recovery and reconstruction efforts. (adapted from World Bank, Disaster Risk Financing and Insurance Program)

Exposure – The situation of people, infrastructure, housing, production capacities, and other tangible human assets located in hazard-prone areas. (UN Office for Disaster Risk Reduction)

Hazard – A process, phenomenon, or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation. Natural hazards are predominantly associated with natural processes and phenomena. Anthropogenic hazards are induced by human activities and choices. (UN Office for Disaster Risk Reduction)

Vulnerability – The conditions determined by physical, social, economic, and environmental factors or processes which increase the susceptibility of an individual, a community, assets, or systems to the impacts of hazards. (UN Office for Disaster Risk Reduction)

2. Education at Risk: Hazards, Exposure, and Vulnerability

Section Takeaways

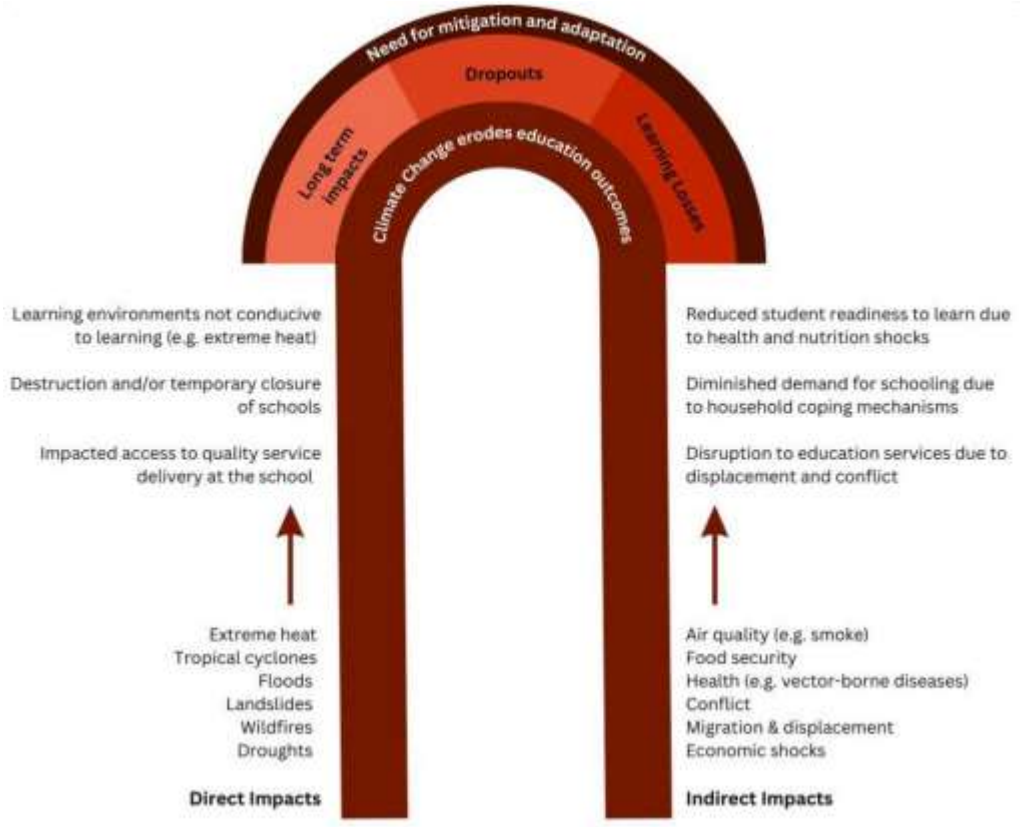
- Climate change and natural hazards can affect education outcomes through a wide variety of causal channels, both directly and indirectly.
- Modelling suggests that tropical cyclones and earthquakes alone cause US$7 billion in damage to education sector infrastructure in low- and middle-income countries (World Bank, 2021).
- Limited data on risk exposure/vulnerability, the cost of response, and resulting funding gaps undermine financial preparedness for shock response in the sector
- Education is itself a critical service in increasing climate resilience, by building awareness of climate change and measures to reduce both exposure and vulnerability to natural hazards.

Climate change, natural hazards and education

Globally, **the climate crisis and natural hazards threaten the resilience and robustness of education sector infrastructure, operations, and learning outcomes**, in turn hindering long-term economic and social development. UNESCO (2024) estimates that over one billion children live in areas that are acutely vulnerable to climate change, where repeated exposure to extreme weather events, other natural hazards, and climate-related crises lead to protracted school closures, damaged infrastructure, and learning disruptions. In East Africa alone, one million children each year face severe educational interruptions due to a variety of hazards, including droughts, floods, and cyclones (Kanu et al., 2024). This threat disproportionately affects low-income countries, which lose an average of 45 days of instruction compared with only 6 days in high-income settings (World Bank, 2024).

Climate change and natural hazards can affect education outcomes through **a wide variety of causal channels**, both directly and indirectly. Figure 2, taken from World Bank (2024), shows the broad range of causal relationships between climate change, natural hazards and education sector activity and outcomes, including dropouts and long-term learning and educational attainment. The evidence base for each of these causal mechanisms varies across countries, with the relative importance of each depending on interactions between the shock and the educational and economic context.

Figure 2: Overview of causal relationships between natural hazards and education



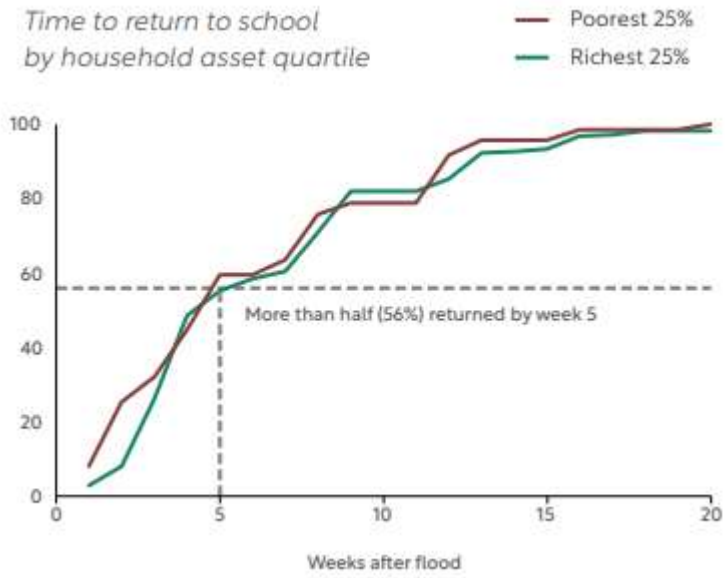
Unpacking the causal pathways

Direct impacts include **physical damage**, either immediately or gradually, to school infrastructure. For instance, in Haiti, UNICEF (2022) reports that physical damage from natural disasters has affected four out of every five schools, prolonging school closures and impacting the physical safety of children in schools. In Pakistan, destruction of infrastructure by severe flooding in 2022 left 92% of affected households uncertain about the reopening of local schools (World Bank, 2024). Figure 3 taken from World Bank (2024) shows that almost 45% of children spent more than five weeks out of school and more than 20% of children spent ten weeks out of school because of the floods.

In addition to damaged infrastructure, natural hazards directly affect learning outcomes when **schools are repurposed** as evacuation centres during emergencies. Repurposing of educational facilities not only delays the resumption of academic activities but also exposes children to crowded and unsupportive environments for learning. For example, when Storm Daniel hit Libya in September 2023, more schools were repurposed to host displaced communities than were destroyed in the flooding (IOM, 2023).

Natural hazards also disrupt students' **learning environment**, which underpins engagement and learning outcomes. Physical displacement of students from familiar learning environments can be particularly disruptive. Recent time-series analysis finds clear causal links between disaster exposures, enrolment and mathematical proficiency, with the strongest negative effects emerging for children earlier in their schooling (ADB, 2025). Risks of disengagement are set to rise, with climate-induced hazards forecast to displace an additional 140 million children by 2050 (ECW, 2020).

Figure 3: Duration out of school following severe flooding in Pakistan



Natural hazards and associated school closures have been shown to negatively affect both short- and long-term **psychological wellbeing** of children and adolescents, with those exposed to multiple, cumulative disasters at greatest risk (Meltzer et al., 2021). Schools play a critical role in providing psychosocial support while restoring routines, normalcy, and stability during times of crisis. The closure of schools represents not only a disruption of learning, but also threatens critically important social support systems, an important protective factor for depression in children and adolescents after natural disasters (Raccanello et al., 2023; Tang et al., 2014). School closures have also been associated with increases in rates of pregnancy, child marriage and sexual violence, particularly in Sub-Saharan Africa and South Asia (Rothe et al., 2015; Kidman et al., 2022; Owais, 2023). Reports from COVID-19 school closures, indicate that teenage pregnancy had long-term education impacts by preventing girls in Kenya from re-entering schools (World Vision, 2020; Zulaika, 2022).

On the 'demand side', natural hazards can **reduce household resources and increase costs** associated with education. Income and wealth shocks can force families to reallocate scarce resources away from education toward essential goods and services. In the most adverse cases, these shocks can force children away from school and towards labour. While school attendance may not be fee-based in many contexts, natural hazards can increase the cost of transit and require households to replace educational materials. For example, in Brazil, small-scale floods indirectly cause repeated absences – ranging from 7 to over 12 days per year – even when formal school closures are not declared (World Bank, 2024).

Beyond the immediate and indirect economic consequences, natural hazards have long-term implications for the **structural integrity of educational systems**. Prolonged exposure to disaster events can lead to a cycle of deteriorating school infrastructure, reduced teacher retention, and falling educational attainment. In Haiti, for instance, recurrent natural disasters have not only damaged physical structures but have also undermined the capacity of schools to provide consistent educational services, leading to measurable declines in student proficiency levels (UNICEF, 2022). Similarly, in South Asia and East Africa, where climate shocks are also recurrent, chronic disruptions have been linked to long-term declines in human capital accumulation, with

significant implications for future labour market participation and economic growth (McDermott, 2012; Dräger et al., 2024).

Emerging evidence demonstrates the **integral role of the education sector in supporting longer-term resilience** of individuals and households. Drzewiecki et al. (2020) interrogate the link between educational attainment and resilience to natural disasters, highlighting that higher-levels of educational attainment are strongly associated with individual capacity to withstand natural-hazard related shocks. As such, the education sector should not only be perceived as a vulnerability in light of increasingly frequent natural hazards, but as an integral institution that is central to building resilience.

Long-term consequences

Crisis-related disruptions to school attendance and learning have material **long-term consequences** for individuals, economies, and societies. Whilst highly idiosyncratic to each country and educational system, education disruptions caused by natural hazards can lead to deskilling in vulnerable regions and lower post-secondary achievement, lower enrolment in higher education, labour force participation and psychological strains among disadvantaged populations (Pelli and Tschopp, 2024; Dräger et al., 2024; McDermott, 2012; Wang, 2024).

World Bank simulations relating to the COVID-19 pandemic suggest that school closures lasting seven school months could reduce the global average learning-adjusted years of schooling (LAYS) by 0.9 LAYS, meaning that a typical student would lose **US$25,000 in lifetime earnings** in present value terms (UNESCO, UNICEF, and World Bank, 2021). Globally, a simulated pessimistic scenario suggested that total lost lifetime earnings for the generation in school during COVID-19 could amount to US$16 trillion (Ibid).

Microdata analysis from Serbia suggests that school closures from 24 March 1999 to the end of the school year, in response to NATO bombing, caused **substantial lasting effects on lifetime earnings**. Those in first grade at the time of the shock earned 7-9% less 20 years after the shock than unaffected cohorts just younger than them. Impacts were larger for those in the bottom half of the income distribution (Kóczán, 2024).

Educational attainment is also a critical facilitator of stable employment. In Vietnam and Cambodia, **each additional year of education reduced the time to secure stable employment by 22%** (Chen, 2019). In Nepal, rural students with interrupted education were 40% more likely to enter lower-renumerated informal sectors (for example, in agriculture) than urban peers, who accessed higher-renumerated formal jobs at twice the rate (Chen, 2019). The wider evidence base clearly links educational attainment to the degree and quality of access to employment opportunities in the long run.

Data availability

Despite the causal and descriptive evidence summarised above, **data scarcity** severely limits the extent to which risks posed by natural hazards to education sector assets and outcomes can be quantified at a global level. Perhaps the most ambitious attempt to date has been analysis of the World Bank's Global Library of School Infrastructure (GLOSI) dataset under the Global Program for Safer Schools, which in turn was launched in 2014 with support from the Global Facility for Disaster Reduction and Recovery (GFDRR). Modelled estimates of "losses schools could incur in the case of natural disasters at the global, regional, and country levels" are summarised in Box 1. These are lower-bound estimates, because only earthquake and tropical cyclone hazards are

included and an emphasis is placed on the value of physical assets, meaning that the full range of education sector vulnerabilities discussed in the preceding section is not captured.

Whilst global risk data is limited, Section 6, presents detailed case studies and seeks to characterise exposures and vulnerabilities in select contexts to inform financing solutions.

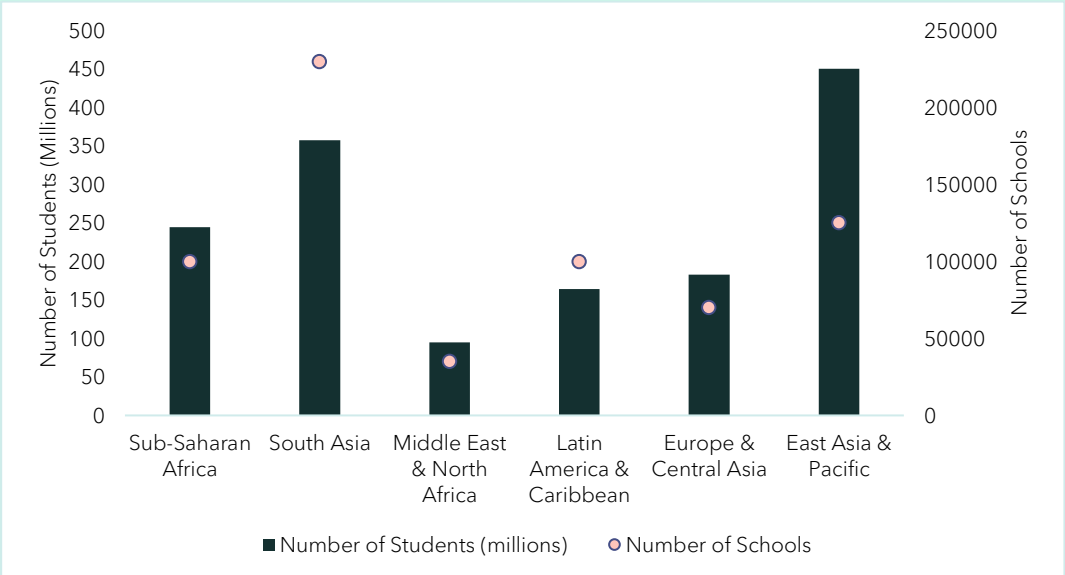
Box 1: Global Baseline of School Infrastructure Estimates

The World Bank Global Library of School Infrastructure (GLOSI) (2021) baseline of school infrastructure provides modelled estimates of "losses schools could incur in the case of natural disasters at the global, regional, and country levels". The baseline provides numbers on earthquake and tropical cyclone exposure, disaggregated by geography.

Using existing hazard models and data sourced from UNESCO, the CATDAT database and ministries of education and statistics agencies, the GLOSI baseline provides risk indicator estimates stochastically at the regional and global levels. These risk indicators are then combined with school and student data to provide modelled estimates on the impact natural hazards have on physical school infrastructure, potential incidents of injuries and fatalities.

These modelled estimates provide more shape with respect to the nature of the protection gap globally. For example, modelling suggests that tropical cyclones and earthquakes annually cause US$4 billion and US$3 billion in losses respectively (World Bank, 2021). Figure 4 below provides more detailed modelled estimates on the regional breakdown of exposures to natural hazards by schools and number of students.

Figure 4: Educational exposures to tropical cyclones and earthquake risk (World Bank, 2021)



East Asia and the Pacific has the largest number of students that are exposed to earthquake and tropical cyclone risk, driven by population size in China and high incidence of larger-scale hazards in countries like the Philippines. South Asia has the highest number of schools exposed to these risks, with India, Pakistan, and Bangladesh highly susceptible to earthquakes and tropical cyclones. In 2024, South Asia was the most affected region from climate-related school disruptions, impacting 128 million children (UNICEF, 2025).

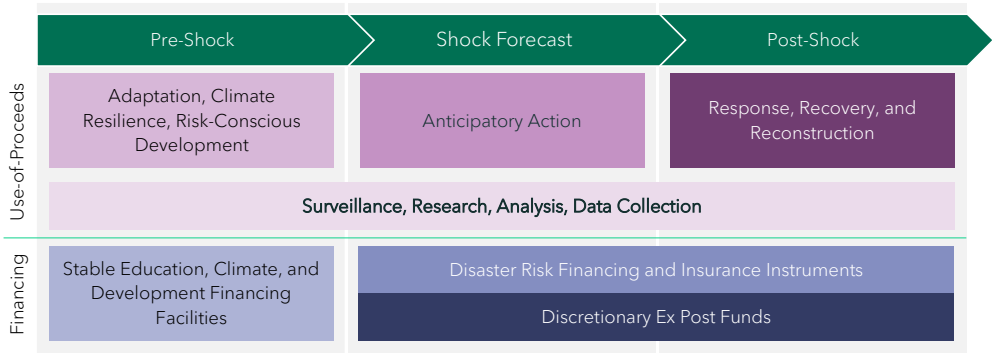
3. Existing Funding Landscape

Section Takeaways

- National governments and households provide the overwhelming majority of education sector funding, compared to a relatively minor role for international assistance even in low income and lower-middle income countries.
- DRF instruments for governments have become readily available and more diverse; innovations among humanitarian actors are also starting to mature. Yet there is limited evidence of education sector integration into major DRF mechanisms.
- International financing for education increasingly emphasises system strengthening and domestic resource mobilisation. Yet there is limited evidence of DRF integration into major education sector funding mechanisms.
- Emerging pilots provide potential direction, by integrating DRF into financing plans for education sector response. This would mirror recent innovations that integrate tailored DRF instruments into shock-responsive social protection systems.

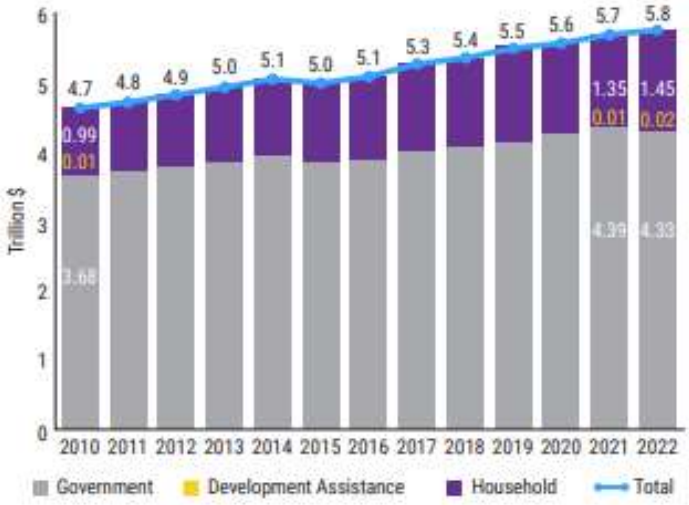
Financing for the risks described in the preceding sections is derived from **several distinct sources**: households, domestic government revenues, and international assistance drawn from DRF, education, and climate finance budgets. Figure 5 shows the range of financing instruments that can be deployed to reduce and respond to climate risk in the education sector. Climate finance facilities and long-term development and education finance play central roles in adaptation and bolstering resilience. Disaster risk-financing, insurance, and ex post discretionary funds can be used to finance anticipatory action and the spectrum of response, recovery, and reconstruction activities when a natural hazard strikes.

Figure 5: Spectrum of Financing Instruments



Before describing the present landscape of international assistance across these sectors, it is critical to note that **national governments and, to a significant extent, households and affected communities carry much of the burden**. Figure 6, taken from the World Bank's Education Finance Watch (2024), shows that governments contributed around three-quarters of total sector spending worldwide, while households contributed most of the remainder.

Figure 6: Total education spending in constant 2022 US$, 2010-2022 (EFW, 2024)



When governments face tight budgets and capacity constraints, the burden of responding to education sector shocks associated with natural hazards tends to **shift to households**. Even in low- and middle-income countries, official development assistance represented less than 1% of education sector spending in 2022. Household contributions were particularly high in low-income (25.8%) and lower-middle income (43.9%) countries. When crisis strikes, families either incur significant additional out-of-pocket costs – for example, switching to private tutoring – or, more often for lower-income households, forego schooling completely in the short- to medium-term. Previous sections and the case studies that follow highlight the long-term social and economic consequences of such protection gaps, underscoring the importance of timely, effective government and international funding.

DRF landscape

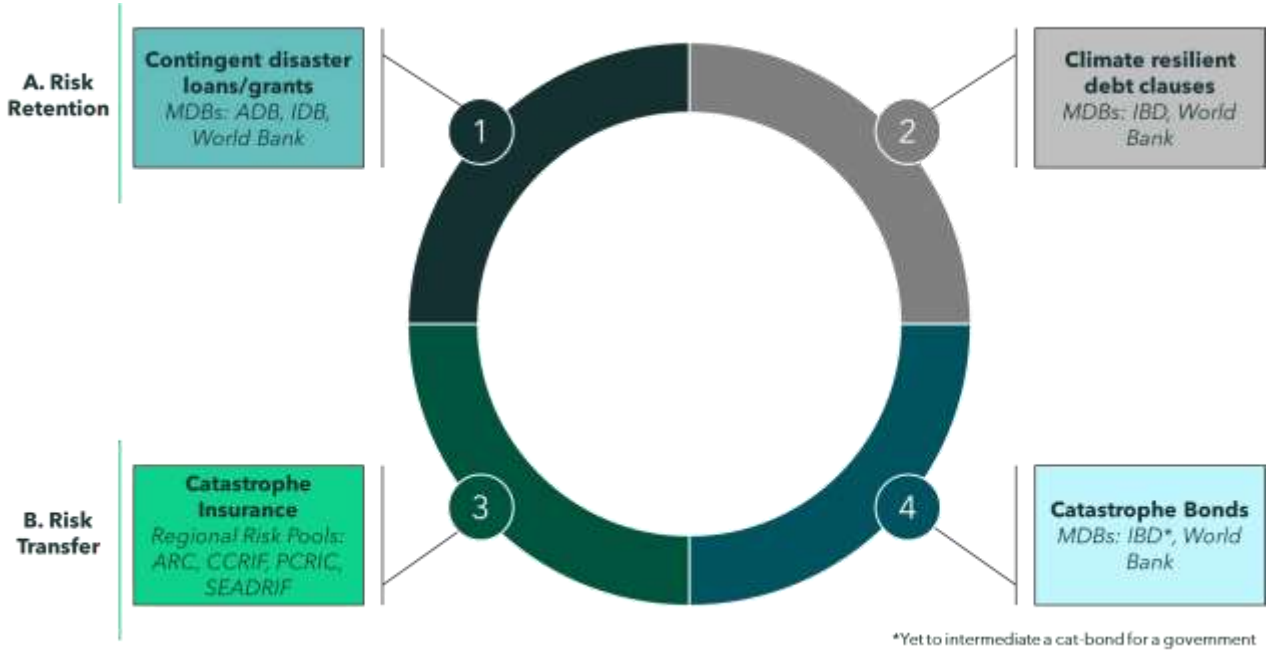
The global DRF landscape has **scaled and matured** significantly since early experiments with sovereign financing for natural hazards in Latin America during the 1990s. Landmark innovations since, often triggered by major disasters, are summarised in Figure 7. These innovations include regional and national risk pools, contingent credit lines from multilateral institutions, sovereign catastrophe bonds, public asset insurance, and sector-specific solutions, particularly in agriculture. These innovations aimed to improve value-for-money in disaster management, by (i) accelerating the availability of funding for emergency response or even in advance of disasters, and (ii) providing greater clarity and incentives to enable more effective contingency planning and operations during response, recovery, and reconstruction.

While a comprehensive inventory of available DRF instruments is beyond the scope of this paper, the following paragraphs provide an overview of relevant types of DRF with short case studies to highlight pertinent features.

Figure 7: Evolution of DRF and Sovereign Insurance Mechanisms (1999-2014) (Financial Protection Forum, 2015)

Prearranged DRF mechanisms available to low- and middle-income governments are summarised in Figure 8, taken from Mustapha and Benson (2024). Both **risk transfer and risk retention mechanisms** can enhance risk management. Risk transfer mechanisms shift the potential financial burden associated with a particular risk from one party to another, often through insurance. Risk retention mechanisms instead aim to improve the effectiveness with which the risk-holder can respond by setting aside funds, for example through contingent credit lines.

Figure 8: Prearranged Financing Instruments from International Financial Institutions (Mustapha and Benson, 2024)



These instruments have predominantly been offered, or supported, by multilateral institutions and accessed by **national or local governments** to manage natural hazards. In most instances, in the event of a qualifying disaster, resources are deployed through central contingency plans that define how funds are to be utilised and by whom. For example, Box 2 highlights the specific features of the World Bank's Investment Project Financing with Deferred Drawdown Option (IPF-DDO) contingent credit line. In instances where governments are not able to respond adequately across their territory, 'replica' products have been used to provide parallel cover for non-governmental responders to act in parallel to the government response (see Box 2).

Box 2 – IPF-DDO Contingent Credit Line for Projects and Institutions

The IPF-DDO provides a World Bank client – typically a national government – with access to additional credit when a pre-defined trigger is met. Importantly, additional financing is made available at the same lending rate as regular Investment Project Financing Loans at the time of drawdown, meaning that the borrower is not penalised with higher rates during a crisis.

Triggers for access to IPF-DDO financing can be 'soft', such as national declaration of an emergency, or 'hard', such as the volume of rainfall in a specific geography over a specific time. Funds must be used for specific, pre-defined expenditures for projects or institutions.

The IPF-DDO product was piloted in 2022 in the context of World Bank financing to a Romanian deposit guarantee fund, with funds flowing directly to the guarantee fund in the case of qualifying bank failures. The IPF-DDO has since been mainstreamed as a standard World Bank lending instrument and can be utilised for natural hazards.

In addition to centralised contingency planning, recent innovations with **shock-responsive social protection** have demonstrated the potential to integrate DRF instruments into funding strategies for specific sectors. Recent evaluations of shock-responsive social protection pilots in Jamaica, Malawi, and Mozambique highlight both the potential of integrating DRF into social protection systems and the practical and political challenges involved (Poole and Clarke, 2024). Many of the lessons learned from these pilots will be of relevance to attempts to design DRF instruments that can make education systems more shock-responsive (see Box 3).

Box 3 – Malawi's Social Support for Resilient Livelihoods Project (SSRLP)

The SSRLP aims to improve resilience among the poor and vulnerable population and to strengthen the national platform for safety nets in Malawi. The project is "a rare example of an integrated approach to designing DRF to match the scale-up priorities of a shock-responsive social protection system… the SSRLP DRF instruments are not simply 'linked to' the social protection system; they are specifically designed to support it as part of a bespoke integrated system" (Poole and Plichta, 2024). The DRF 'stack' includes several layered instruments, including insurance for extreme, low frequency catastrophes and a contingency fund for more frequent, less catastrophic events.

This stack was tailored specifically to the government's costed scale-up plans for specific risks, and in turn these risks were codified into triggers for each piece of financing. Finally, a replica insurance policy to cover refugees was arranged in 2023, with payouts disbursed through UNHCR and WFP in parallel to payouts through national systems from the main insurance policy. While it is too early to tell whether this innovative approach – integrating DRF into social protection systems and harmonising national and non-governmental responses – has enhanced efficiency, effectiveness, and impact, early signs are positive (ibid).

A parallel set of innovations has sought to integrate DRF instruments into international **humanitarian funding mechanisms**. In addition to replica financing described above, examples include standalone risk pools for local responders, use of insurance to transfer risk from humanitarian pooled funds (see Box 4), humanitarian actors providing premium subsidy or top-ups for sovereign insurance, and index-based contingency funds. These innovations aim both to enhance the efficiency and effectiveness of humanitarian response and to enhance harmonisation between non-governmental and governmental action.

Box 4 – IFRC DREF Insurance

IFRC's Disaster Response Emergency Fund (DREF) is a pooled fund that releases money to local Red Cross and Red Crescent Societies before and after disasters strike. IFRC arranged an innovative annual insurance policy to cover the risk of an exceptionally high volume of calls on the DREF. The CHF 33 million threshold of calls on IFRC DREF funding was met in September 2024, triggering a CHF 15 million payout from commercial insurers that was used to help cover additional requests for funding in the final quarter of the year (IFRC, 2024).

Using a trigger based on an unusually high volume of payouts rather than an unusually severe natural hazard was a first in the humanitarian sector. This enabled multi-hazard cover across the entire IFRC network and was only possible because of IFRC DREF's structured and sophisticated approach to allocating response funds. This allocation process and historical data provided "an essential platform for the insurance industry partners to gain the insight and trust necessary" (Meenan and Stefan, 2024).

Education funding landscape

Global education sector funding instruments fund services, infrastructure, and technical support to facilitate education provision and develop education systems worldwide, particularly in low and

lower-middle income countries. This section focuses on the Global Partnership for Education (GPE), the International Financing Facility for Education (IFFEd), and Education Cannot Wait (ECW) as three primary mechanisms. The World Bank remains the largest external financier of education globally, particularly in infrastructure, and other MDBs are looking to scale their lending in the sector.

Global Partnership for Education

GPE supports its 90 country partners to develop and implement education sector plans, with the aim of increasing domestic resource allocations for national education to 20% of total public expenditure in each country. GPE has a particular focus on supporting gender-equal education outcomes, education system strengthening and improvements in teacher effectiveness (GPE, 2023), having directly invested or mobilised close to US$10 billion to date.

The majority of GPE's funding is disbursed as grants for the implementation of education sector plans, with allocation tied to a set of performance criteria focused on equity, efficiency, and learning outcomes. To continue benefitting from GPE allocations, partner countries must demonstrate a commitment to increasing domestic education budgets.

Each GPE grant has a Grant Agent (often the World Bank, but sometimes UNICEF, UNESCO, or others) that administers the funds, a Co-ordinating Agency that coordinates between parties, and a Local Education Group in the country (government, donors, civil society) that plans and oversees progress. The end recipient is the Ministry of Education or equivalent, which uses the funds for agreed activities. In stable settings, the Ministry of Education is the primary implementer (with GPE funds supplementing the ministry's budget or projects). In fragile or conflict-affected contexts, sometimes an NGO or UN agency may implement on behalf of the government – for example, in Yemen and Somalia, UNICEF has managed GPE grant activities due to government capacity constraints.

The GPE Multiplier, the GPE's flagship blended finance programme, uses grants to lower the cost of education loans through interest rate buy-downs, in conjunction with MDB lenders. This includes the Debt2Ed initiative, where GPE, alongside other donors, pledges to buy-down partner country loans in exchange for a commitment to investment additional resources, unlocked through the debt relief, towards the education sector.

While GPE can accelerate funding in exceptional circumstances, this option has been rarely utilised, and an even smaller proportion of accelerations was directed towards natural hazards (GPE, 2020). In terms of preparedness, GPE, in partnership with Save the Children and UNESCO, has established a technical assistance facility for mainstreaming climate risks "into education sector policy, plans, and budgets" (GPE, 2023) and recently issued guidance on integrating education into preparation for and implementation of Nationally Determined Contributions. However, climate-resilience and disaster response are not among core country-level objectives, nor do they substantively appear in the organisation's current strategic planning documentation (GPE, 2022).

International Financing Facility for Education

IFFEd is a recently established US$1.5 billion innovative financing platform, designed to mobilise long-term education financing for lower-middle income countries, by leveraging donor guarantees and paid-in capital. IFFEd provides guarantees on MDB education loans and grant co-funding to effectively buy down the interest rates charged on these loans. IFFEd aims to unlock US$7 of education financing for every US$1 of donor cash paid into the facility (IFFEd, 2023). In Asia, IFFEd will deploy capital through the Asian Development Bank (ADB) and is anticipated to

launch operations in 16 African countries through the African Development Bank (AfDB) and another MDB partnership in 2025.

Before a country can tap IFFEd-supported loans, it must have:

- A credible education sector plan endorsed by partners, outlining how it will improve access and learning.
- Commitment of domestic resources to education. IFFEd expects governments to maintain or increase their own education budget (addressing the Education Commission's emphasis on domestic financing).
- Results-focused programmes that include measures of outcomes and a robust results framework.

These conditions mirror those of GPE and MDBs, ensuring IFFEd money complements rather than replaces other funds. At the time of writing this Scoping Paper, IFFEd remains in pilot phase, but its financing structure and instruments, as discussed later in the Paper, have the potential for application in the natural hazard response context.

Despite IFFEd's mandate to enable lower-middle income countries to "prioritise investment in education and skills, even in the face of competing needs for climate, health, and infrastructure", it does not have a specific focus on disaster risk management and response. Models 2 and 4, discussed later in the paper, provide potential models under which IFFEd can provide funding to support and incentivise integration of DRF into education sector planning and funding frameworks.

Education Cannot Wait

ECW is the global fund targeting education in emergencies (EiE), and to date has channelled US$712 million to 343 projects in 46 countries, pooling donor contributions from governments and corporate foundations. ECW disburses grants through two main windows:

- First Emergency Response (FER) window: Primarily rapid disbursement grants given in the immediate aftermath of a crisis, lasting 6-12 months and addressing urgent needs. Use of proceeds include setting up temporary learning spaces, providing emergency learning materials, training volunteer teachers and providing psychosocial support. These grants can be approved quickly to on-the-ground partners.
- Multi-Year Resilience Programmes (MYPRs) window: Multi-year grants, typically 3 years, disbursed to governments in protracted crisis settings. These grants are designed to support country-led education programmes that link emergency actions with system strengthening plans developed collaboratively by humanitarian and government actors.

In addition to the two primary windows, ECW has a dedicated acceleration facility to support global initiatives that can support research and pilots with potential to build resilience in education sectors across crisis contexts. Unlike GPE and IFFEd, which provide funding primarily through governments, ECW funds both governments and non-governmental education sector providers, albeit UNICEF is the largest recipient.

ECW has been increasing allocations towards disaster risk reduction and to target underserved psychosocial support through its multiyear programmes. However, even with ECW's broad mandate, as of 2023, only 27% of ECW's funding was channelled to climate-induced hazards (ECW, 2024). This is not to imply a mis-prioritisation of ECW's budget, but to observe that there is

insufficient funding for natural hazard response, relative to other priorities (namely conflict and forced displacement), in the sector[2].

Other multilateral education financing

Several multilateral development actors have also established relevant education sector financing mechanisms, funded from their own balance sheets and with partners. For example, the World Bank GPSS supports resilience investments for school infrastructure and funding for technical capacity building within country systems. In addition to directly integrating DRR considerations into World Bank school infrastructure investments, the GPSS collaborates with governments to build local risk management capacity and identify opportunities for risk-informed investments (GPSS, 2024). Since 2014, the GPSS programme has reached over 121 million student beneficiaries across 564,000 schools and directly supported the implementation of US$2.1 billion in World Bank financed school infrastructure.

Education actors and systems have received relatively little financing from multilateral climate finance facilities to date. Of 591 project proposals funded by multilateral climate resources between 2006 to 2023, a sole project had a principal focus on the education sector[3] (CERI, 2023). The BRACE initiative, funded by the Green Climate Fund (GCF) and outlined in more detail in Box 5, shows how the education sector can productively utilise climate funds. However, major multilateral climate funds tend to deploy capital through accredited entities, often multilateral development banks, and as such are reliant on the project and investment infrastructure of pass-through agencies to facilitate programmes. In practice, this means that to date these funds have been primarily utilised for long-term government investments in climate mitigation and adaptation infrastructure and projects, rather than rapid response activities and financing outside government systems.

The Fund for Responding to Loss and Damage (FRLD) was announced at COP27 as a global financing mechanism to support developing countries in mitigating and recovering from climate-related losses. The FRLD aims to create a dedicated, predictable stream of finance specifically for climate disaster impacts. For education, the FRLD represents a mechanism that could be used to finance school reconstruction, restoration of educational services, and protection of children's development as a matter of climate justice. In practical terms, the FRLD can operate in parallel with existing response initiatives, channel funding to education sector mechanisms, or deploy directly through community first-responders. This focus would be consistent with the proposed community and local government centred mandates that are being contemplated by the FRLD (ODI, 2024).

Box 5: Building the Climate Resilience of Children and Communities through the Education Sector

At the 28th Conference of Parties on Climate Change (COP 28), GPE, GCF, and Save the Children announced the launch of the BRACE investment fund. BRACE aims to build climate-resilient schools in vulnerable low and lower-middle income countries. Approved in 2025, the fund will initially focus on Tonga, Cambodia and South Sudan (GCF, 2023), and will finance interventions that support climate adaptation, seeking to reduce school disruptions from

[2] In January 2025, GPE and ECW announced a partnership to connect the former's system building programs with the latter's emergency response capacity, providing a potentially powerful combination of funding and technical capacity to support building resilient education systems in low-income countries.

[3] CERI (2023) also find that education interventions expected to reach or involve children are incorporated in 13% of multilateral climate facility projects.

climate-related disasters, facilitate the flow of more climate finance to the education sector, and develop tailored climate curricula.

The BRACE initiative marks one of the first international climate finance initiatives dedicated to the education sector. It highlights the potential for multilateral climate and development funds to partner with global education and humanitarian response institutions to combine funding with expertise in delivering climate-resilience for the sector. Whilst BRACE does not utilise disaster risk financing or shock-responsive funding techniques, the *partnership model* underlying the fund provides potential insight for how climate finance could be channelled on-the-ground through education-sector experts that understand needs and effective use of proceeds. There remain clear gaps however, in leveraging climate finance pools for disaster response specifically, creating the impetus for targeted education sector climate finance programmes.

Philanthropic funding

Philanthropic funders supplement core funding in the global education finance landscape, often providing the most concessional financing for interventions that are unlikely to be able to generate cashflows required for investment and insurance financing. Over time, a distribution of different education sector impact focuses across philanthropic funders have emerged, creating a rich ecosystem of donors across early childhood learning (e.g. Lego Foundation), increasing access to schooling for marginalised and out-of-school children (e.g. Education Above All), improving learning outcomes for girls (e.g. MacArthur Foundation and UBS Optimus Foundation) and improving post-schooling vocational outcomes (e.g. Tent Foundation and Caterpillar Foundation). Despite the established philanthropic funding channels for education, limited philanthropic funding directly goes towards DRR and DRF for the education sector – a missed opportunity for impact-first funders to secure the longer-term resilience of education sectors in contexts where governments are unable to otherwise raise the finance for disaster response.

Increasingly, philanthropic funders have been looking towards outcome-based innovative financing mechanisms, which tie contributions to the realisation of pre-selected impact objectives. Education Above All, the Qatar-based education philanthropy, partnered with the World Bank to support the implementation of a programme in Djibouti in which its contribution was partially tied to the number of out-of-school children that were enrolled under the programme. The Lego Foundation, in partnership with the Education Outcomes Fund, has established an outcome-based financing programme for Sierra Leone and Rwanda focused on improving early childhood access and quality to education. Outcome-based financing mechanisms could be more actively considered by donors in delivering DRR for the education systems receiving finance. For example, this could involve tying additional payments to the development of robust disaster management and contingency plans, the number of climate resilient learning facilities built or retrofitted, or number of teachers and staffed trained in disaster response protocols[4].

Beyond traditional philanthropic education funding, there is clear space for non-education specific initiatives focused on climate resilience and mitigation to invest in the education sector. The recently announced Mission 300 (M300) initiative, led by the Rockefeller Foundation, World Bank Group, and African Development Bank, is one example of an ambitious education-adjacent funding drive that can support electrification and resilience efforts for the education sector. M300 is focused on electrifying 300 million Africans by 2030, an ambitious development target which should seek to support electrification and energy efficiency initiatives in schools and support

[4] Results could be related to any number of outcomes and corresponding metrics, these have been selected as indicative examples from the 2022-2030 Comprehensive School Safety Framework (GADRRRES, 2021).

resilience of the sector more broadly. Ongoing droughts, floods and heatwaves are documented to have affected grid stability and caused blackouts across Africa (Euronews, 2024), affecting schools' electricity access and educational outcomes by impacting household access to light and technology.

DRF in the education sector

Assessing the reach of DRF mechanisms into the education sector is complicated by the multisectoral nature of most national disaster response plans and a lack of publicly available data on utilisation of resources for most DRF instruments. For example, the Government of Haiti noted that payouts from its insurance policy with the Caribbean Catastrophe Risk Insurance Facility Segregated Portfolio Company (CCRIF SPC) were used to rebuild schools alongside expenditures in other sectors, but no data were publicly available on the relative prioritisation of education sector funding needs. Similarly, WFP has supported DRF for school feeding programmes in Madagascar, which straddle boundaries between health, food security, livelihoods and education sectors and impacts. Public asset insurance in Indonesia includes cover for educational institutions alongside other government buildings (World Bank, 2024).

With these caveats in mind, a preliminary review of references to education within the World Bank's disaster risk financing database highlights **a paucity of instruments** dedicated to the education sector. Only two disaster risk contingency funds or budgets, in Kenya and Ecuador, included explicit references to education as an eligible sector for disbursement of funds. Education references in these projects related primarily to physical education infrastructure and public asset insurance cover.

While there are evident gaps in international DRF mechanisms and data, **emerging pilots highlight potential direction**. The International Rescue Committee's £3 million, 30-month Climate Resilient Education Systems Trial (CREST) seeks to connect early-action approaches with parametric insurance to mobilise funds at speed for communities affected by climate-related school closures. The CREST programme focuses on ensuring learning continuity in response to climate-induced natural hazards, leveraging cash transfers to households and the provision of remote education alternatives. The CREST pilot will provide critical data on how the international humanitarian community can support learning continuity and community-centric response, complementing responses from governments and official development finance providers.

Where the CREST program provides support for learning continuity, the UNICEF Today & Tomorrow Initiative (TTI) provides funding for **education infrastructure and operations**, whilst supporting households and children adversely affected by natural hazards. Box 6 provides further detail on the UNICEF TTI programme, including use-of-proceeds and trigger mechanisms. However, the structure of UNICEF TTI is not clearly replicable with respect to the full spectrum of natural hazards that affect the education sector. For example, in its current stage, the UNICEF TTI does not directly target transportation networks or household incomes, two key causal mechanisms that directly connect natural hazards and education outcomes.

Box 6: UNICEF Today & Tomorrow Initiative

UNICEF TTI is the world's first integrated climate and disaster risk finance mechanism dedicated to providing pre-arranged parametric insurance for children and youth. Funding specifically targets climate resilient schools and shock responsive social protection. The Initiative's pilot program focuses on providing cover for up to 13.5 million children, women, and other vulnerable populations across eight pilot countries.

UNICEF TTI is piloting parametric insurance cover to offer rapid financial support during climate-related disasters that impact children and young people. Instead of waiting for damage

assessments after the disaster, parametric insurance kicks in automatically when objectively measurable quantitative indicators—like wind speed, rainfall, or cyclone intensity—reach a certain level. This means help gets to those in need much faster.

In Madagascar, severe cyclones have significantly impacted children's lives, with over 50 tropical storms and cyclones affecting more than six million people between 2000 and 2024. These events disproportionately burden the country's young population. To address this, UNICEF TTI have introduced a child-responsive parametric risk transfer product for cyclones, which aims to reduce children's vulnerability to future disasters, provide support for child-centred climate change adaptation and preparedness/anticipatory action so countries can avert, prevent and minimize climate and disaster risks, and strengthen vital social systems.

Similarly, UNICEF TTI is helping cyclone-affected children and families in Bangladesh while reducing future risks through disaster risk reduction, climate change adaptation, and advanced climate and disaster risk financing tools. This approach provided US$531,000 in cyclone-triggered insurance payouts in 2023 and 2024, reaching 190,000 people beyond those supported by traditional humanitarian responses.

Identifying and calibrating triggers is complicated by the specific causal impacts of each hazard on education in a given context, and depends on precise historical and real-time climate data, which might not always be reliable or available. Additionally, continuous funding is needed to keep the initiative active and any delay or non-payment of contributions from donor countries defeats the purpose of the initiative. Lessons from the TTI pilots should serve as the foundation for future efforts to scale the use of prearranged financing in education.

Lessons learned

The brief review of existing financing mechanisms and public data above suggests that **explicit financial management of disaster risk** in education systems in many low- and middle-income countries is limited. This means that much of the risk associated with natural hazards remain held *implicitly* by governments and households, who respond ex post with the scarce resources available. In particular, these risks tend to fall between two international financing landscapes:

- Education expenditures do not feature in most climate and DRF mechanisms, and where they do feature, the focus is primarily on protecting physical infrastructure.
- Climate and DRF instruments do not feature in most education sector funding mechanisms.

Mirroring the integration of DRF into social protection systems, **similar instruments can be used to support governments' preparedness and response** to natural hazards in the education sector. When governments are unable or unwilling to respond adequately, DRF instruments could be better integrated into non-governmental humanitarian funding mechanisms and response plans. Finally, extending the availability of DRF instruments at the micro level would mitigate vulnerability among households and private education providers that remain a vital component of education systems in many low- and middle-income contexts. The following section explores several indicative ways in which such a transition could be implemented in practice, based on a series of case studies from diverse contexts.

4. Case Studies

Section Takeaways

- There is significant potential to better integrate DRF into long-term government education plans and funding strategies, enhancing their shock-responsiveness.
- Steps are already being taken in this direction and more can be done by connecting existing DRF instruments to existing government education budgets and development projects supported by international partners.
- There is also potential to integrate DRF into humanitarian funding systems. To date, education appears not to have been a priority sector for pooled funds and risk pools, meaning that triggers and contingency plans are poorly tailored to the causal pathways described in earlier sections.
- Across both governmental and non-governmental humanitarian systems, DRF instruments for education should be designed to facilitate and incentivise more effective ex ante response planning.
- This means moving from high-level contingency plans to integration of DRF into longer-term systems and operations that combine system strengthening, risk reduction, emergency response, and longer-term recovery and reconstruction.
- Data availability varies significantly across contexts and should be enhanced as a priority. Scaling DRF options provides a clear incentive to improve availability of requisite data.

The following section provides further detail on these global funding dynamics through a **series of case studies** analysing specific shocks in a diverse range of low- and middle-income countries. These case studies aim to describe the existing funding landscape at the time of the shock, identify strengths and weaknesses in the response, and develop alternative funding models that could have mitigated shortcomings. The models proposed and analysed in this section include:

- Connecting existing DRF instruments to shock-responsive education systems and programmes (Model 1)
- Integrating education into national climate adaptation plans and developing education-specific risk financing instruments for government and non-government responders (Model 2)
- Using DRF to incentivise effective sector planning across the crisis arc, ensuring an effective transition from response to early recovery, to long-term reconstruction and rehabilitation (Model 3)
- Prearranged financing for low-severity, high-frequency events that disrupt learning and education outcomes (Model 4)

These case studies and alternative models are based on **desk review and analysis only** and are intended to stimulate debate. The intention is that, through such a dialogue, indicative models may be prioritised and developed into more compelling options for reform of climate and disaster risk financing in the education sector. In turn, a combination of models described above and developed below could be brought together in a more comprehensive financing *system* for natural hazard risk in the education sector.

Haiti: Hurricane Matthew

Context

Haiti is highly exposed to natural hazards, due to its geographic location in the centre of Atlantic Hurricane Belt, susceptibility to hydrometeorological disasters, and the characteristics of its topology. The GFDDR (2017) estimates that more than 96% of Haitians are exposed to at least two different hazards, with "threats compounded by high poverty levels, the vulnerability of critical infrastructure, unregulated urban expansion, and the fragility of government institutions including agencies dedicated to responding to disaster risks". Urban development in Haiti has predominately clustered around the country's valleys, increasing vulnerability of population centres to urban flooding and landslides.

In October 2016, Haiti was struck by Hurricane Matthew, a Category 4 storm which precipitated heavy winds, flooding, and landslides. The combined disaster impact of Hurricane Matthew is estimated to include 546 deaths, 1.4 million people in need of immediate humanitarian assistance, and extensive infrastructure damage (World Bank, 2017). Economically, 90% of crops and livestock were lost in the hardest impacted areas, with heavy damage to critical infrastructure, including housing and transportation infrastructure.

Education sector impacts

Hurricane Matthew's education sector impacts were significant. In a 2021 review of ten years reconstructing schools in Haiti, the Interamerican Development Bank (IDB) estimate that Hurricane Matthew damaged 3,452 schools and destroyed 521 more, representing 22% of all schools in the country (see Table 1). The World Bank estimates that damages and losses in the education sector reached US$134 million and at least 60 out of 100 schools financed under a flagship project remained closed in December 2016, two months after the hurricane.

Table 1: Impact of Natural Disasters on Haiti's School Buildings

Event	Damaged Schools	Destroyed Schools	Total Affected Schools	Percentage of All Schools
2008: Hurricanes	1,000	120	1,120	6%
2010: Earthquake	6,000	2,000	8,000	45%
2016: Hurricane Matthew	3,452	521	3,973	22%

At a micro-level, Cook and Beachy (2019) leverage a novel dataset of household surveys to determine the drivers of school non-attendance in Dessab, a rural mountain community susceptible to geographic isolation in natural hazard periods which destroy transportation links. Prior to the hurricane, 207 out of 273 children in the community were enrolled at the Institution Mixte du Progres, a tuition-funded school. After the storm, a survey of approximately 55 families revealed that 96 children—46% of those previously enrolled—dropped out.

The primary reason cited by parents was an income shock resulting from extensive crop damage and livestock deaths, which left families unable to afford tuition fees. The hurricane was found to have simultaneously destroyed crops, affecting current incomes, and swept away livestock, wiping out savings which are typically embedded in livestock assets. This combined negative wealth shock dramatically increases the vulnerability of households, causing income insecurity and

incapacity to pay for education. Notably, no parent attributed their child's departure from school to illness or injury, underscoring that the disruption was primarily economic rather than health related.

Response and financing considerations

Prior to Hurricane Matthew, Haiti received international education sector funding from a diverse range of sources. Part of this funding was repurposed after the hurricane struck to help finance immediate response and was complemented with additional ex post education in emergencies funding. For example:

- A US$24.1 million GPE grant covering 2014-2018, implemented through the World Bank-administered Education for All – Phase II Project, was restructured in response to Hurricane Matthew. While the restructuring was not finalised until seven months after the hurricane made landfall, agile management within the initial programme structure saw school health and nutrition activities scale up within two months of the hurricane; rehabilitation works at 20 schools nearly completed within five months; and within 16 months, 30 schools had been rehabilitated and 61 semi-permanent shelters within schools had been built. These rehabilitations primarily comprised replacement or repair of damaged roofs and allowed some 9,000 students to resume classes in early 2017. The impact on lifetime earnings led the World Bank to estimate internal rates of return from their intervention in the region of 19-25%.
- UNICEF mobilised more than US$30 million to scale its support to Haitian children across a range of sectors, including in education. An independent evaluation found UNICEF's response to Hurricane Matthew to be broadly proportionate and appropriate but identified operational and financial bottlenecks during the first weeks of the emergency. The response's reach gradually expanded as additional funds became available and implementing partners' capacity improved over time. The planned objectives of the emergency response were largely achieved by end-2017. However, the first two of ten recommendations made by the evaluation were to advocate with donors for more flexible funding and to strengthen internal UNICEF administrative and procurement capacities to improve preparedness and accelerate response. The evaluation also recommended establishment of sufficient contingent contracts and partnerships, and prepositioned stocks where possible.

In addition to education-specific resources, Haiti was the beneficiary of premium subsidy paid by the Caribbean Development Bank (CDB) into the CCRIF SPC. CCRIF was established in 2007 as "the first multi-country risk pool in the world and was the first insurance instrument to successfully develop parametric policies backed by both traditional and capital markets". CDB had provided co-funding for Haiti's annual contribution to the risk pool since 2010, ensuring the island nation's eligibility for a payout when Hurricane Matthew hit in 2016. Haiti received a total of US$23.4 million in payouts under two parametric insurance policies, comprising US$ 20.4 million under Haiti's tropical cyclone policy and US$3 million under its excess rainfall policy. While uses-of-proceeds are difficult to establish, a government statement at the time suggested that payouts were used inter alia to purchase medication and temporary shelter materials, and to replace roofs on schools, churches, and courthouses. An initial estimate of the total payout was made within 48 hours of the hurricane making landfall.

While IDB did not provide additional funding in the education sector following Hurricane Matthew, it did provide a US$20 million investment loan under its Immediate Response Facility (IRF) for Emergencies. The loan was intended to repair, stabilise, and protect road and electricity

infrastructure affected by Hurricane Matthew, thereby contributing to the restoration of access to basic services, resumption of normal economic exchanges, and the efficient flow of humanitarian aid. The Project Completion Report for the loan highlighted successful restoration of electricity access relative to a counterfactual. While IDB's performance was deemed 'adequate', capacity constraints on the part of the Government saw the borrower's performance assessed as 'partially unsatisfactory'. A key finding of the Report was that delays could have been mitigated by providing additional support to the Government during design and implementation, including in relation to the import of key inputs. Among other recommendations, this review proposed prepositioning model feasibility studies and prequalifying shortlists of local companies to conduct such works.

In total, the World Bank Group was able to **reallocate** US$50 million from ongoing projects to affected sectors and mobilised an **additional** US$100 million under the IDA Crisis Response Window, though none focused specifically on the education sector. In addition, the IMF mobilised US$41 million under its Rapid Credit Facility to help with urgent balance of payments needs.

The World Bank Group and IDB also supported the Government of Haiti in **rapid needs assessments**, through data gathered from field visits, phone surveys, and satellites and drones. A full damage assessment was delivered in less than two weeks from the Government's request, representing one of the fastest assessments to that date and the first multisectoral evaluation of socioeconomic impacts of the hurricane.

Lessons learned

This case study highlights at national- and micro-levels many facets of the global funding landscape described in earlier sections and underscores elements of collaboration between actors that can be systematised and scaled:

- Haiti received significant volumes of financial assistance from international funders prior to, during, and in the aftermath of the emergency response. This included funding from the multilateral development banks, the IMF, global education funds, and humanitarian responders.
- With the exception of the CCRIF payout, most response funding and operations were arranged ex-post, either through budget reallocations in existing projects or through the design of new operations funded by rapid response facilities and humanitarian appeals. For humanitarian actors, the availability of funding was a limiting factor on the speed of action.
- Within the education sector response, reconstruction of school infrastructure was a priority with less focus on the range of other barriers to resumption of schooling and learning identified in earlier sections of this paper. Conversely, expenditures and activities in transport and other sectors were vital enablers of children's return to school but would not have been labelled as education sector funding.
- Collaboration between GPE and the World Bank enabled education-sector expertise to be aligned with development bank firepower; however, fragmentation between disaster response funding and education sector funding envelopes was also evident.
- Inadequacies in preparedness, planning, and operational response capacity served as a major constraint on the speed and effectiveness of response, particularly on the part of a government managing multiple overlapping crises, structural development challenges, and a fragmented international funding landscape.

- The primary focus on the provision of funding through government appears at odds with the predominance of private education provision in Haiti at the time. Writing in 2015, the World Bank estimates that in the early 2000s, about 90% of the country's schools were private and on average parents spend US$130 to send a child to school each year. No data were publicly available on the extent to which CCRIF payouts reached private schools during the Hurricane Matthew response. In the future, DRF solutions should be intentionally tailored to the needs of both private and public providers.

Several of these lessons have **already been acted upon**. For example, more recent education sector programming from the World Bank integrated Contingency Emergency Response Components (CERCs). These unfunded components allow the Government to reprioritise funds within established education sector programmes to respond to qualifying unforeseen emergencies, including those created by natural hazards. This reprioritisation is subject to clear criteria established by the World Bank and agreed with the Government, based on the preparation of a CERC manual outlining a positive list of activities that can be completed with provided funding and agreed procurement. However, CERCs do not require the same detailed level of contingency planning involved in accessing some other DRF instruments.

Going further, with support of technical assistance funded by the Caribbean Regional Resilience Building Facility, the government and World Bank developed a US$42 million Development Policy Financing (DPF) with a **Catastrophe Deferred Drawdown Option (Cat DDO)** for Haiti in 2019. The DPF aimed to support the Government of Haiti in improving its capacity to manage disaster- and climate-related risks and improve management of socioeconomic and fiscal impacts of disasters. Among other components, the proposed programme would include the development of sectoral disaster risk management and contingency plans, in addition to strengthened financial management capacity. Complementary technical assistance focused on the education sector, including an education infrastructure disaster risk diagnostic and analysis. Publicly available information could not be found at the time of writing to ascertain whether the Cat DDO component was signed, but the underlying analytics will be enormously valuable to future climate and disaster risk financing initiatives in the education sector.

IDB's landmark report on **ten years of school reconstruction** also demonstrates learning and evolution, with a focus on operational constraints faced by the bank's staff and Government counterparts. Recommendations include simplification of contracting structures, by integrating design, construction, and supervision contracts and thereby transferring the entire project risk to one contractor instead of two or three separate contractors. Such a structure accelerates and simplifies contracting, though at the cost of reduced flexibility post-signature. Similarly, large and small batch contracting, alternative supervision arrangements, and prioritisation of reconstruction versus rehabilitation were all appraised. 35 detailed recommendations were proposed, in addition to reflections on scaling school construction countrywide in the future.

Model 1: Connecting existing parametric insurance to shock-responsive education systems and programmes

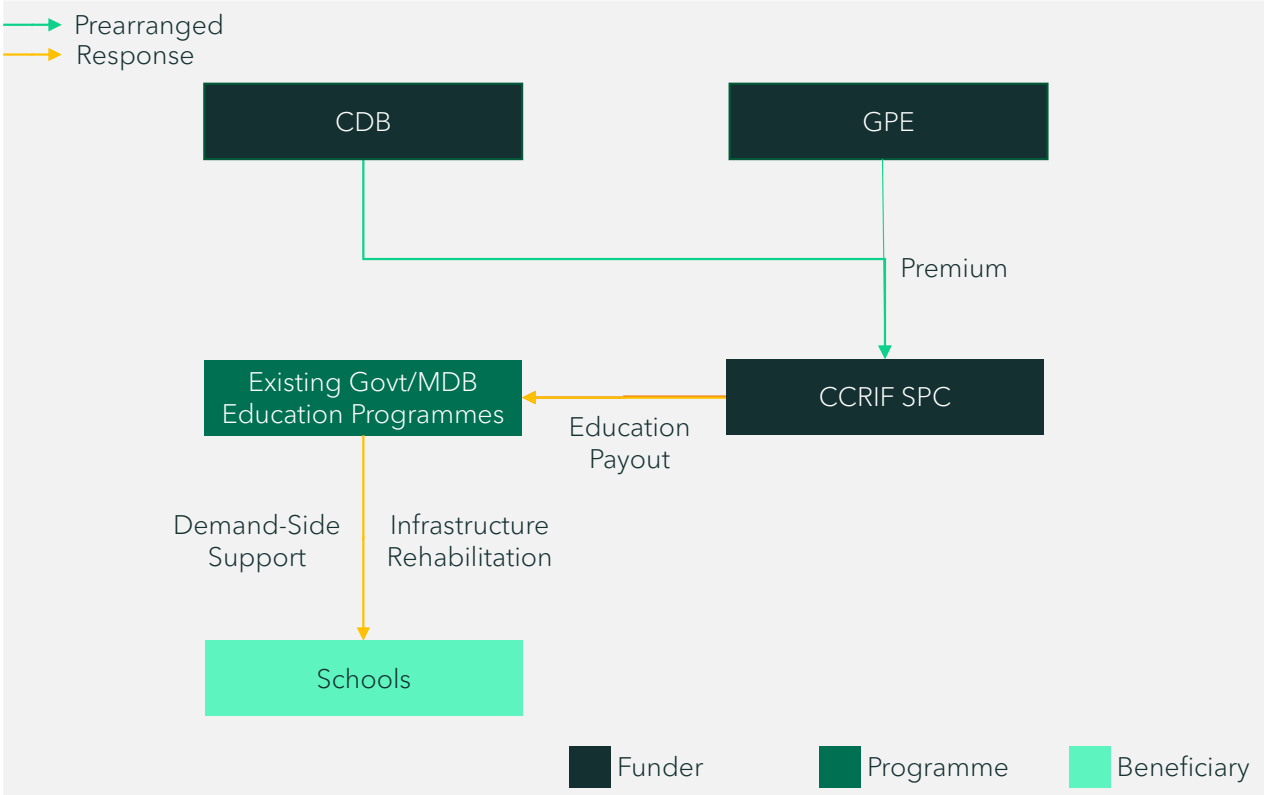
Taken together, the lessons described above, and a funding landscape characterised by multiple active education sector stakeholders and programmes, Model 1 envisages **integration of *existing* parametric insurance into *existing* education sector programmes**. Over time, the parametric insurance policy could be tailored to the specific needs of these programmes under priority natural hazard scenarios. While CCRIF's parametric triggers provide speed and a high degree of confidence over when each policy will pay out, the instrument does little to incentivise detailed operational contingency planning. Conversely, existing education sector programmes have

established operational capabilities but provide little certainty over when and how much funding will be made available in the event of an emergency, undermining ex ante planning and effective response.

The approach envisaged under Model 1 moves beyond high-level contingency planning to detail in advance the **precise conditions** under which funds are disbursed and the use-of-proceeds, including rules on when, to whom, through which channels, and how much funding is disbursed. Under Model 1 (see Figure 9), the Government would commit to allocate a minimum dollar amount of its CCRIF payout in a qualifying emergency to deliver predefined contingent operations in existing education sector programmes. These operations would cover both education infrastructure rehabilitation/reconstruction and demand-side support, in the form of school feeding and tuition fee waivers, reflecting the broad range of barriers to education access and learning identified in micro-level research following Hurricane Matthew.

Hardwiring CCRIF payouts into existing programmes would also **enhance complementarity** with contingent financing mechanisms already in place. For example, World Bank education programmes could be scaled using CCRIF payouts in the case of qualifying catastrophic events like Hurricane Matthew. Soft triggers for contingent components and drawdowns already available in these programmes would allow the authorities to top-up a CCRIF payout with additional funds in such a scenario, or to respond when the education sector is impacted by hazards that do not meet the hard parametric thresholds in CCRIF's policies. Combining and layering these financial tools *within* the operational framework of a long-term, established programme could significantly enhance shock-responsiveness in the education sector.

Figure 9 (Model 1): Connecting existing parametric insurance to shock-responsive education systems and programmes



The thesis behind Model 1 is that **speed and certainty** associated with the insurance payout could unlock more cost-effective and shock-responsive education operations when eligible risks manifest. Such a model would allow recipients of the CCRIF payout to implement operational innovations described above – such as entering contingent contracts, prequalifying contractors, and prepositioning resources – confident that when a qualifying hazard materialises, requisite funds will be made available to act.

Assuming that Haiti's annual premium would continue to be funded by CDB, the **primary *incremental* cost** associated with this model relative to the status quo would be foregone flexibility to tailor uses-of-proceeds to the specificities of the next qualifying event. Set against this cost would be the potential operational efficiencies identified by IDB and others, and, ultimately, a reduction in learning disruptions for affected students. While more detailed cost-benefit analysis is required, the World Bank's internal rate of return estimates discussed above would seem supportive of low *incremental* cost measures that could increase the likelihood of learning continuity.

Extensive research and evaluations undertaken since Hurricane Matthew and other comparable emergencies could even be used to arrange additional ***education sector-specific* CCRIF policies**. For example, IDB's ten-year review includes extensive data relating to the average cost of school reconstruction and rehabilitation for assets across the country, with estimates in the region of US$750,000 to US$1.5 million per school, US$70,000 to US$90,000 per classroom, or US$1,780 to US$2,250 per seat. Existing programmes similarly provide unit cost estimates for tuition fee waivers (~US$100 per student per year) and school feeding. Haiti's exposure to tropical cyclone and excessive rainfall risks are already well-documented and priced by CCRIF. Premium subsidies for an education-specific policy could be provided by CDB, which has funded Haiti's existing CCRIF cover, and GPE/Education Above All, which would bring sector expertise and experience from operations in Haiti to inform trigger design.

For the government, the opportunity cost of utilising scarce GPE/Education for All grants that could be deployed into steady state education programming would be **significant**. Centre for Disaster Protection analysis suggests a cost multiple from CCRIF before donor subsidy in the region of 1.6. This means that the premium could be expected to cost 1.6-times the expected payout. In addition to the potential operational efficiencies described above, in a detailed cost-benefit analysis this multiple should be set against the increased marginal utility of funding during the early days of a crisis relative to funding in steady state.

Ultimately, for parents in Dessab a variation of Model 1 could mean that their **children's schools are prequalified** for timebound tuition waivers and school feeding. Schools and school feeding value chains could enter contingent contracts and receive confirmation that these waivers will be honoured within 48 hours of a qualifying tropical cyclone or excess rainfall event. If a material event does not trigger a CCRIF payout based on its hard triggers, budget reallocations could be made based on softer triggers included in CERCs, a DPF Cat DDO (if it were to materialise), and other contingent funding arrangements.

Coalitions of private sector education providers could similarly seek **business continuity insurance** cover for natural hazards. This insurance could be layered in the context of cover provided by CCRIF described above: private insurance could cover high-severity events that are not extreme enough to trigger CCRIF, with private cover capped at the CCRIF policy's attachment point. At this point tuition fees would be funded by the CCRIF payout, ensuring efficient risk layering and continuity of learning across a range of severities. This would be an extension of educational continuity assurance products already provided in market, which provide insurance against the

potential inability to fund a child's education, though typically as a result of the death or permanent disability of a parent (PLIG, 2025). Relative to individual-specific educational continuity insurance, business continuity insurance at the level of a school or a network of schools would likely enable lower-cost coverage per child due to risk-pooling within schools.

Pakistan: Extreme heat and learning outcomes

Context

Pakistan ranks among the top ten countries worldwide most affected by climate change and natural disasters. INFORM (2025) ranks Pakistan fourth globally for hazard and exposure across multiple natural and human-caused perils. The frequency and intensity of extreme climate events has increased, and, between 1992 and 2021, the World Bank estimates climate- and weather-related disasters to have resulted in US$29.3 billion in economic damage, equivalent to 11.1% of 2020 GDP or approximately 0.5% of total GDP across that period.

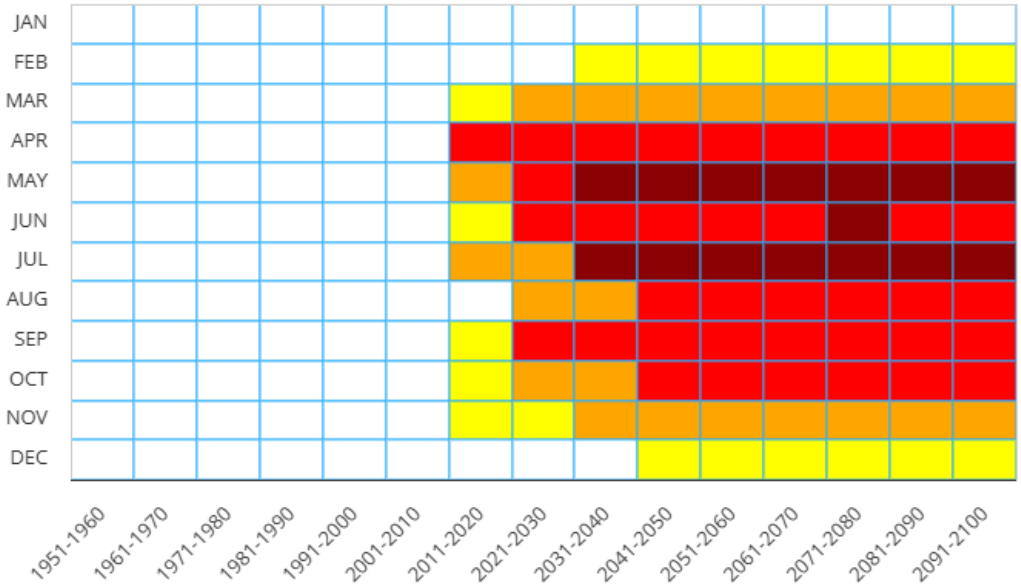
Climate change and exposure to natural hazards have become macrocritical issues for Pakistan, impacting the country's credit rating and as such access to funding. For example, Moody's credit rating agency gives Pakistan the lowest possible ESG Credit Impact Score rating and notes in its latest credit opinion that "ESG considerations have a pronounced impact on the current rating, which is lower than it would have been if ESG risks did not exist".

The credit impact score of the ESG rating indicates whether ESG attributes have a discernible negative impact on Pakistan's current rating, which is driven primarily by environmental and social risks. Among environmental risks, Moody's highlights vulnerability to climate change, unsustainable water management, and exposure to extreme weather events that can create "significant economic, fiscal, and social costs for the sovereign". Pakistan also has the lowest possible issuer profile score for social risk, in part because of "limited access" to education, especially in rural areas.

More directly, the International Monetary Fund's (IMF) Extended Fund Facility (EFF) and Resilience and Sustainability Facility (RSF) programmes for Pakistan emphasise the country's progress on scaling education funding and delivering robust climate preparedness reforms, respectively (IMF, 2025). In this context, there is a clear policy imperative and emerging funding linkages related to longer-term climate resilience and protection against natural hazards in the country's education sector.

Extreme heat risk is one such threat. Figure 10 shows the expected increasing frequency of extreme heat events by month, under a 2C warming by 2100 scenario. Increasing prevalence of dark red and red over time indicates more months with at least half a day at 45C and 40C respectively. The fraction of the population exposed to heatwaves is expected to increase by more than 30% by 2050. Saleem et al (2021) find historical warming trends to be strongest during the spring, including strong connections to La Nina events. Exposure to extreme heat has increased due to rapid migration to urban centres, which experience systematically higher temperatures due to the urban heat island effect. Under business-as-usual emissions scenarios, cities in Pakistan could be among the first globally to experience heat waves exceeding the survivability threshold of 35C.

Figure 10: Increasing prevalence of extreme temperatures in Pakistan



Fifteen extreme heat events during 1900-2020 led to almost 3,000 deaths, affected more than 80,000 people, and contributed significant economic damage. Extreme heat events in 2015 and 2024 demonstrate Pakistan's vulnerability to increasingly prevalent heatwaves. The 2015 heatwave led to more than 1,200 deaths, with extreme temperatures exacerbated by power and water supply outages. Vulnerability was elevated due to the heatwave coinciding with the holy month of Ramadan, with most Muslims fasting approximately 15 hours per day. The 2024 heatwave saw temperatures reach 49C in Pakistan's largest city Karachi, claiming the lives of more than 500 people across Sindh province in six days. Power outages for 12-14 hours per day again exacerbated vulnerability.

Education sector impacts

Beyond the immediate health risks, Pakistan's heatwaves have had severe impacts on its education sector, disrupting learning, damaging infrastructure, and exacerbating pre-existing educational inequalities. For example, in 2024, soaring temperatures prompted the Punjab Education Department to announce the closure of all public and private schools from 25 to 31 May, to protect students from heat-related illnesses. This decision affected approximately 26 million children, accounting for over half of the country's school-age population. The closures exacerbated existing educational disparities, especially in rural areas where children experienced prolonged interruptions in their education due to limited access to digital learning. This situation intensified a structural learning crisis, characterised by low literacy and school retention rates, especially among female students.

Pakistan's education sector is poorly adapted to extreme heat risks, with many rural schools lacking adequate and proper cooling, ventilation, and climate resilient building materials and designs. IRC household surveys conducted in 2023 found that 31% of respondents reported heatwave-induced school closures and nearly 14% of households confirmed that their children's education was disrupted due to heatwaves. In Sanghar, 92% of households reported a school closure due to heatwave with an average of 56 days of school closure per year. Across the whole sample, IRC (2023) found very little evidence of contingency planning for such extremes and recommended more explicit risk ownership and preparation of district-wide local adaptation plans that – where possible – prioritise remote learning.

Notably, heat waves were found to have a **shorter-term impact on education** than other hazards like floods, because extreme heat tended to coincide with the annual summer break. In this context, the increasing number of months expected to experience extreme heat each year (see Figure 8) could significantly increase such disruption if heatwaves are experienced outside the summer break, as was the case in May 2024.

A recent review of the (limited) global literature highlights the specificities of the **relationship between extreme heat and humidity and learning outcomes**, which differs significantly from broader health impacts. Elevated temperatures can have an acute physiological impact on children, increasing heart rates and affecting perception, spatial orientation, and cognition, ultimately undermining learning outcomes. Cumulative exposure in the months or even years preceding an examination can affect scores, and maintained exposure can reduce attendance and trigger dropouts. The review finds that extreme heat disproportionately impacts poorer regions and disadvantaged students or families within communities.

Critically, the cross-country evidence suggests that diminished activity and outcomes begin to occur at **relatively *un*extreme temperatures**. For example, Park et al (2021) find that standardised exam scores decrease by 0.18% of a standard deviation for every additional day above 26.7C/80F in three years prior to the exam. Looking at India specifically, Garg et al (2020) find that math and reading test performance fell with each additional day above 29C. In China, temperatures above 32C on test day relative to days with 22-24C led to decreased math scores, which Zhang et al (2024) equate to losing 0.23 years of education.

Figures 11 and 12 show Pakistan's **exposure to high temperatures**. The left-hand panel shows the number of days per year at temperatures above 30C forecast for 2020-2039 under a 2C warming by 2100 scenario. The right-hand panel shows the number of days per year at temperatures above 45C over the same period and scenario; 45C is the Extreme Heat threshold in Ahmedabad's Heat Action Plan. The figure shows that large parts of Pakistan will experience temperatures above thresholds for an impact on learning for more than 100 days per year, while extreme temperatures will remain relatively rare. This risk profile has implications for operational response planning and financing.

Extreme temperature prevalence, Pakistan

Figure 11: Days above 30C per year

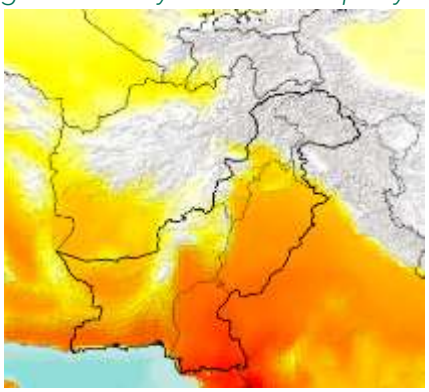
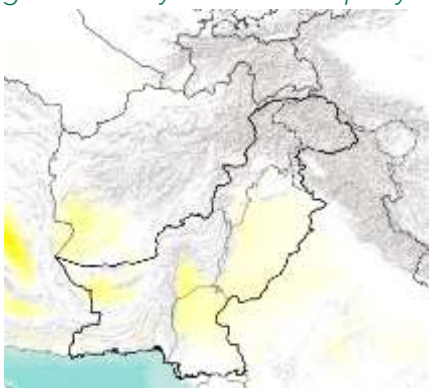


Figure 12: Days above 45C per year



Scale in days per year

Response and financing considerations

In line with this growing body of evidence, education has been included in **Pakistan's National Adaptation Plan (NAP)**. The NAP recommends mainstreaming climate adaptation into education sector plans, to both mitigate risks to education and ensure education provision prioritises an understanding of climate resilience. The NAP also calls for investment in climate-resilient education infrastructure, a mapping of schools vulnerable to heatwaves, and tracking data on education-day losses, student absenteeism, and other impacts. These calls are reflected in Pakistan's 2024 National Education Policy Development Framework, which highlights risks posed by extreme weather events in the education sector and calls for innovative financing to reduce disaster risk and mitigate the impact of possible disasters, including through corporate partnerships and setting up of specialised funds.

International development support to the education sector has shown some **responsiveness to the NAP's priorities**. For example, World Bank programming in Punjab state launched in the same month as the 2024 heatwave prioritised construction of 5,400 climate-smart classrooms, including low-cost heat insulation, natural ventilation, and reflective roofs to reduce extreme heat vulnerabilities. Notably, the US$150 million credit was arranged on short-maturity loan (SML) terms, which at the time of signature carried a six-year grace period followed by a six-year amortisation period during which interest rates would jump to 16.67%.

While most **humanitarian activities** relating to extreme heat events are focused on lifesaving health and WASH activities (including IRC's and Save the Children's response to the 2024 heatwave), UNICEF has also been working to develop climate-resilient educational strategies in Pakistan. These strategies include:

- Building climate-resilient education infrastructure, constructing and retrofitting schools to withstand extreme weather.
- Aligning education policies with climate change goals and integrating resilience into education frameworks.
- Training educators to teach climate change and adaptation techniques.
- Encouraging collaboration between schools and communities to create climate adaptation plans.
- Tracking progress and identifying challenges in climate resilience efforts.

UNICEF secured funding for these initiatives with partners like ECW and received US$2.5million in grants to support communities to proactively reduce the impact of future climate hazards on children's education by putting in place anticipatory measures that will keep children learning.

Progress is not uniform, however. For example, GPE's Partnership Compact with the Government of Punjab dated December 2023 includes no references to climate, heat, or natural disasters, despite the devastating impact of extreme heat on attendance less than six months later. Conversely, GPE's Partnership Compact with the Government of Sindh prioritises climate- and disaster-resilient infrastructure and improved data collection on exposure of education infrastructure to natural hazards. The Sindh Compact also commits to climate-sensitive education, by integrating climate messages into curricula and teacher trainings.

Despite some progress on adaptation, prearranged financing and operations for *response* to low frequency, extreme heat events are **almost completely lacking** in Pakistan; and what prearranged financing exists is inadequately sensitive to the needs of the education sector. For example, the World Bank's education sector programming in Punjab includes an unfunded CERC but the

Bank's Project Information Document has no reference to contingency planning for natural hazards.

Conversely, Start Network has invested significantly in **supporting local actors** to develop an extreme heat risk model and contingency plans; however, triggers are set at 42-45.5C in most cities covered by the model. This calibration reflects a 1-in-3 year return period but is not sensitive to the much lower temperatures at which children's learning outcomes can be affected. This insensitivity was seen when a 2020 anticipatory action alert triggered in Karachi due to six-day forecasts of 45.3C, exceeding the city's extreme heat trigger threshold. The observed temperature in the event peaked at 39.7C, well below the trigger threshold for Karachi. This led Start Network to assess the event as a 'false positive', despite significant evidence that such temperatures would likely have had a material impact on school attendance and learning.

Lessons learned

Extreme heat risk in Pakistan underscores **several lessons** for financing risks associated with climate change and natural hazards in the education sector across countries:

- Extreme heat has a significant, physiologically-induced impact on school attendance, learning outcomes, and long-term productivity.
- Increasing average temperatures and, critically, increasing incidence of extreme temperatures in previously cooler months outside summer school breaks, will require significant adaptation investments to maintain a feasible learning environment during longer, hotter summers.
- Infrastructure resilience is critical, particularly when schools were built without consideration for extreme heat. Power and related water supply outages during heatwaves exacerbated vulnerability of children and learning outcomes.
- Education is increasingly recognised as a vulnerable sector in national adaptation plans; however, prioritisation of adaptation funding for education has lagged other sectors, despite the extensive vulnerabilities captured above.
- Effective early warning systems and preparedness plans are both vital and feasible. During the 2024 heatwave, delays in receiving timely weather alerts meant that schools and communities were caught off guard. With robust early warning systems in place, administrators and parents could have prepared better by adjusting school hours or activating emergency protocols.
- The vulnerability of education activities and outcomes to extreme heat is poorly served by a current emphasis in response planning and financing on 'lifesaving' response activities for the peril. Education-specific disaster risk financing instruments with bespoke triggers are needed for extreme heat risk.
- Adaptation investments and response planning and financing appear only weakly integrated, potentially creating inefficiencies and delays when extreme weather events occur.

Model 2: Integrating education into climate adaptation plans and developing education-specific risk financing

This model envisages a (i) significant increase in the scale of **investment in adaptation** to extreme heat (and other natural hazards) in Pakistan's education sector, and (ii) **integration or alignment**

between adaptation spending and response planning, including a new cross-country risk pool for education-sector response to natural hazards.

Pakistan is eligible for a range of significant education and climate adaptation funding pools, which have not yet been fully utilised or aligned with one another and with national adaptation and education sector plans. For example, Pakistan is ideally placed to benefit from concessional finance for education investments guaranteed by IFFEd, which focuses on lower-middle income countries. Pakistan is one of several countries currently eligible for IFFEd. ADB is the founding MDB partner to IFFEd, with IFFEd guarantee cover to be extended to ADB education sector loans.

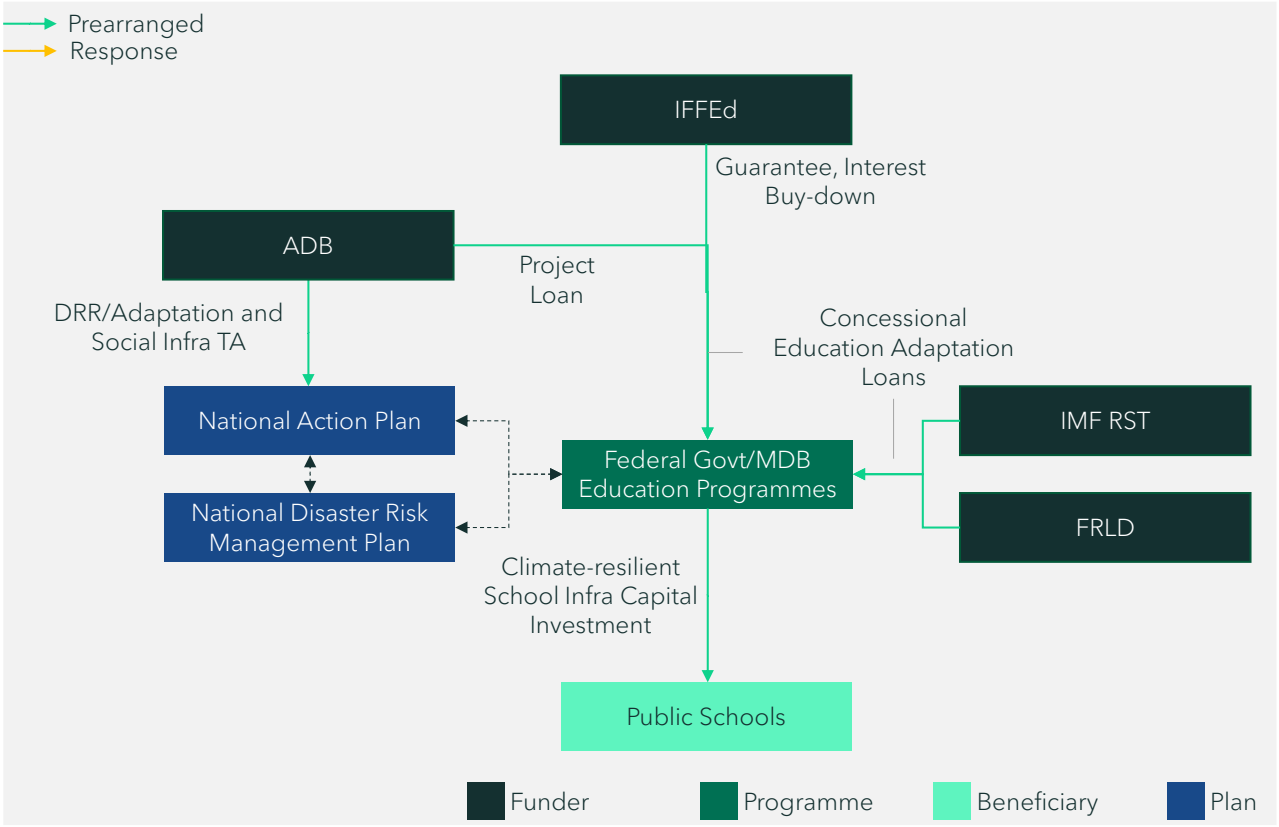
ADB signed a November 2024 loan agreement with Pakistan for its Climate and Disaster Resilience Enhancement Program. Under this loan, Pakistan will take steps to enhance institutional capacity, increasing disaster risk reduction and climate resilient investments, and operationalise a layered disaster risk financing framework. This US$400 million policy-based lending operation is combined with a US$500 million ADB Contingent Disaster Financing (CDF) operation with a five-year availability period.

In the same month, ADB announced its cross-country Strengthening Sustainability of Social Sector Infrastructure technical assistance project, which aims to enhance the sustainability of ADB-funded social infrastructure, including schools, by improving climate-sensitive infrastructure planning, budgeting, and asset management. In parallel to these ADB financings, at the time of writing Pakistan was in discussions with the IMF over a concessional US$1 billion programme under the Resilience and Sustainability Facility (RSF), focused on climate adaptation; and as one of the countries most acutely affected by climate change, Pakistan is ideally placed to benefit from the FRLD once operational.

In this context, concrete adaptation financing options described in Model 2a (see Figure 13) include:

- Combining ADB's technical assistance on adaptation and disaster risk reduction with its technical assistance on sustainable social infrastructure to:
    - ensure that education features prominently in design of national disaster risk management arrangements, by appointing a dedicated education adviser to both ADB and Government of Pakistan teams involved in the project; and
    - develop a new programme of climate-resilient education sector investments, which would be funded under a future ADB investment operation with IFFEd guarantee cover. This would reduce borrowing costs for Pakistan and ensure that ADB education sector investments align with the country's NAP, in a way that publicly available documentation would suggest has been lacking to date.
- Earmarking a minimum share of the IMF RSF programme and any future allocation from the FRLD to deliver Pakistan's NAP's commitments on education. This would ensure that a proportionate share of the US$1 billion in concessional financing from the IMF and additional adaptation resources are directed towards climate-resilient education investments. RSF and FRLD resources could be deployed through unfunded components in forthcoming World Bank operations and in harder to reach areas through non-governmental delivery partners, providing alignment with the country's national education plans and benefitting from existing oversight and accountability structures.

Figure 13 (Model 2a): Leveraging ADB TA and IMF RST to support resilient infrastructure



Pakistan's adaptation planning and financing could also be **integrated with response planning and associated prearranged DRF**, specifically tailored to the education sector. Temperatures well above optimal thresholds for learning are almost guaranteed in Pakistan's summer months and preparation for these hotter periods should be built into baseline budgets and operations, as described above. However, prearranged financing could be cost-effective in helping to manage:

- Extreme heatwaves *outside* summer months, when schools are most likely to be in session and therefore when disruption to learning is most likely.
- Outages to power and water supply that have rendered cooling and hydration mitigation measures obsolete in summer months, exacerbating vulnerability of education facilities and students' learning outcomes.

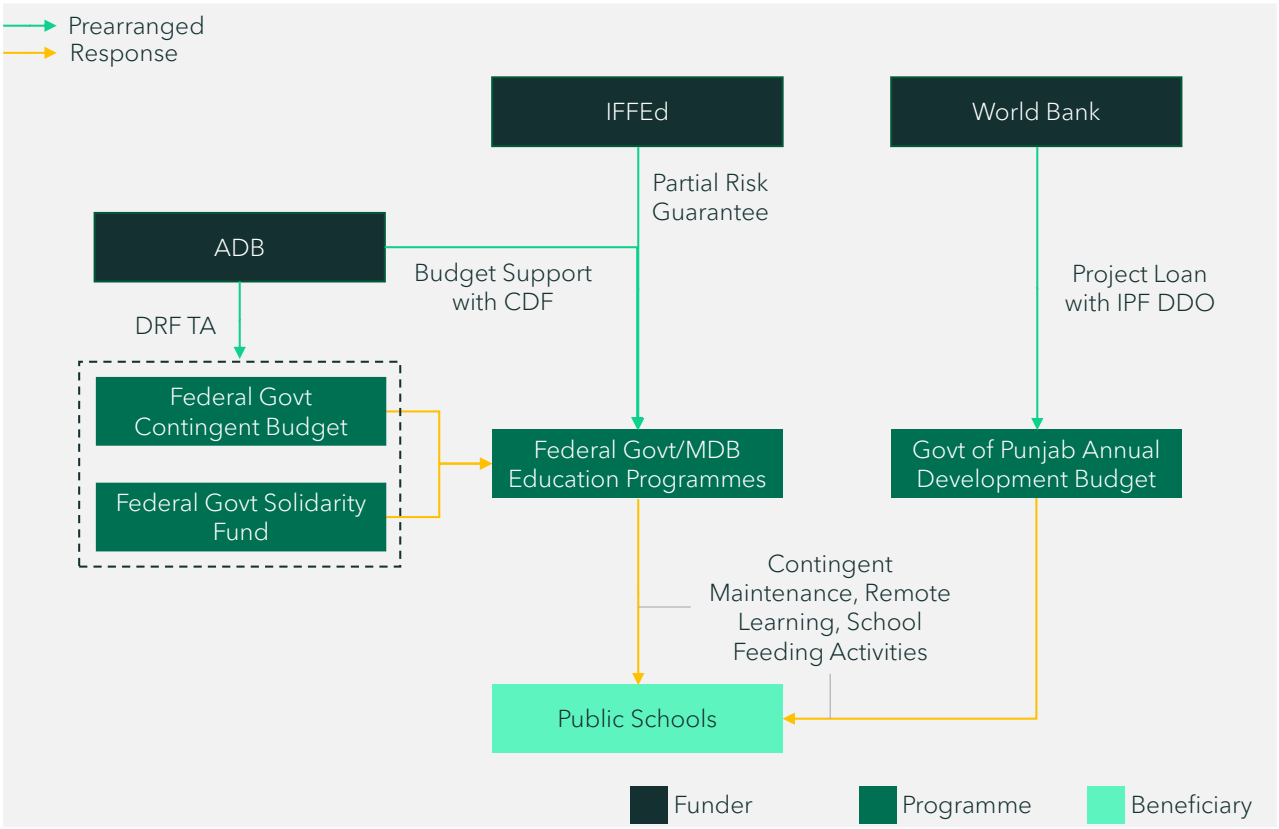
As in the case of Haiti, there are significant opportunities to **align or even integrate** prearranged financing into long-term education sector and adaptation and disaster risk management projects, to enhance both incentives for effective contingency planning and the speed and effectiveness of response when prearranged financing is triggered. These opportunities are reflected in Pakistan becoming the first country in Asia to conclude in-country processes under the Global Shield in November 2024, calling on international partners to support with increased pre-arranged financing. Concretely, Model 2b (see Figure 14) envisages:

- Forthcoming World Bank financing for education in Punjab state going further than the current CERC and including a prefunded Investment Project Financing (IPF) DDO. This instrument would require extensive risk mapping, analysis and contingency planning, and in return would provide confidence that funds would be made available when required. In turn, such confidence could unlock the use of contingent contracts to scale-up response activities, such as remote learning and emergency maintenance to mitigate power and water supply outages. The primary cost to the government would be the opportunity cost

of Pakistan's country allocation being utilised for contingent operations. For each US$1 of IPF DDO arranged, the country utilises US$0.5 of country allocation, which cannot be used for other purposes. These opportunity costs could be removed by a third party (e.g. donor or IFFEd) guarantee of the IPF DDO portion; such guarantees have allowed countries to borrow beyond their country allocation in other contexts. In light of strained development budgets and falling direct bilateral spending on education (Save the Children, 2025), guarantees provide a unique mechanism for donors to unlock emergency funding whilst multiplying the impact of donor capital by reducing the amount that needs to be spent or set aside up front.

- The recently signed ADB disaster risk management project described above envisages dedicated contingent budget allocations for high-frequency, low-impact events and a ring-fenced 'solidarity' or reserve fund for low-frequency, high-impact events. Education sector exposures, vulnerabilities, and expenditures should be incorporated explicitly into the design of these instruments when they are considered for the national budget. A multi-peril approach should be pursued, recognising that extreme heat is only one of several priority natural hazards facing Pakistan's education sector.
- More specifically, while CDF operations are not applicable to ADB investment loans, the impact of natural hazards on the education sector should feature prominently in ongoing and detailed contingency planning required for access to the recently signed US$500 million CDF operation. These contingency plans should continue to be refined in response to insights from the envisaged technical assistance on sustainable social infrastructure.
- Subject to adequate education-sector content, ADB CDF operations could receive partial risk cover from IFFEd, proportionate to the share of the government's contingency plan that is dedicated to the education sector. This could both reduce the cost of borrowing, particularly for countries ineligible for concessional funding from ADB, and (subject to consultation) could increase the total volume of CDF access beyond current ceilings, as ADB would be holding IFFEd risk for the guaranteed portion. Using IFFEd to cover policy-based lending operations in this way would incentivise inclusion of education in national disaster risk management and financing structures and plans and could be coupled with the requirement that education advisers participate in central disaster risk management and financing units. Again, the primary cost for a country like Pakistan of such an arrangement would be opportunity costs associated with using IFFEd guarantee cover for contingent funding that may not be drawn. This opportunity cost could be removed by earmarking an ideally additional portion of IFFEd guarantee cover for contingent financings.

Figure 14 (Model 2b): Leveraging World Bank IPF DDO funds for sector response

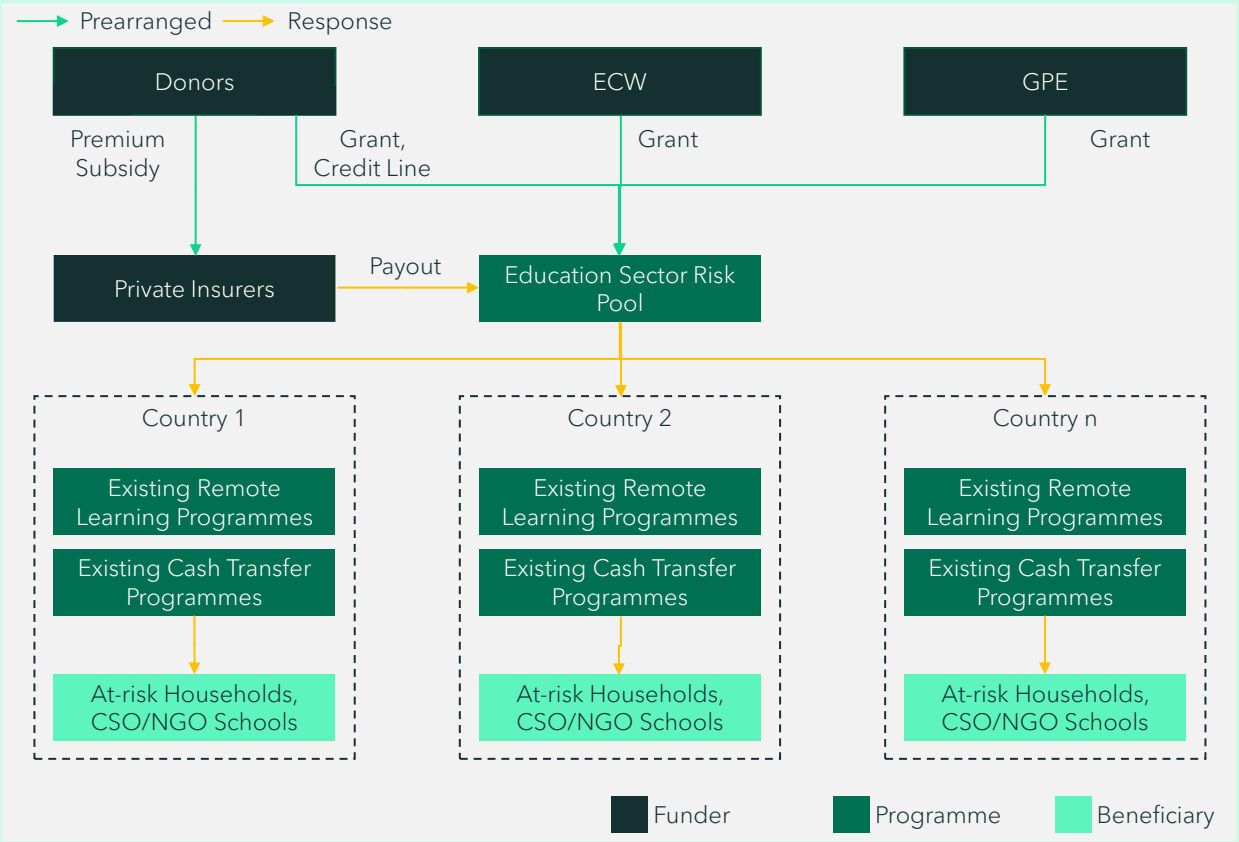


While the above could enhance government and international development operations, they would not mitigate **challenges faced by the humanitarian sector's approach** to DRF in Pakistan (and likely elsewhere). The insensitivity of existing hard triggers to perils like extreme heat in the context of specific vulnerabilities in the education sector highlight the need for a specialised financing mechanism. Box 7 provides a snapshot of what such a specialised education sector risk pool could look like, subject to further design.

Box 7 – The Skeleton of an Education Sector Risk Pool

Rationale: Education sector vulnerability to natural hazards differs systematically from threats to lives, livelihoods, and physical infrastructure. Tailored risk analysis, risk management, and risk financing are required. No such financing mechanism currently exists in the humanitarian sector. Figure 15 provides an overview of the envisaged structure.

Figure 15: Education Sector Risk Pool Flow of Funds



Hazards: The mechanism would build stepwise, prioritising those natural hazards of greatest salience to the education sector that are not well-covered by existing multiperil disaster risk financing instruments and where requisite data and models exist. Extreme heat could be one such candidate: relevant models exist – including in Pakistan – but triggers and response plans are poorly calibrated to education sector vulnerabilities.

Money out: Each country and community has alternative approaches and capacities for managing extreme temperatures and other natural hazards, meaning that contingency plans and delivery channels should be tailored to each context. Examples from education programming include remote learning when schools are closed, including learning through radio and television; AI-driven chatbots for social media, messaging platforms, SMS; and materials for home-based learning. Contingency plans could also include delivery of the supplemental resources required to enable learning while temperatures are significantly higher than expected, including additional drinking water and fuel for cooling appliances when access would otherwise be limited (e.g. in a refugee camp setting).

To maximise efficiency and effectiveness, wherever possible, funds should be deployed into existing systems and programmes and should pass through as few intermediaries as possible. The Start Network has established locally-led planning and governance mechanisms in many of the most vulnerable contexts worldwide, including Pakistan. The Network demonstrates how disintermediation can enhance both efficiency and effectiveness, seeing funds arrive sooner and align more fully with local priorities while also building local capacity.

Triggers: Critically, triggers would be calibrated to prioritised perils and the specificities of education sector exposures and vulnerabilities. The example given above highlights how temperatures above 26C can affect learning and school attendance, while existing extreme heat triggers tend to be at or above 40C. Naturally, when temperatures are *expected* to be above relevant thresholds, preparations should be built into baseline budgets. Therefore, triggers for

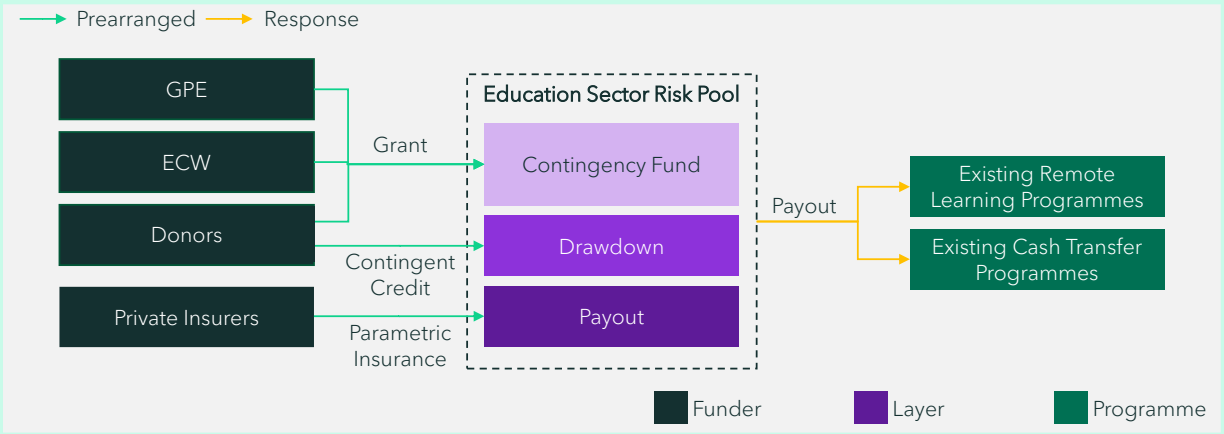
the envisaged risk pool would target lower-frequency extreme temperatures *outside* of summer seasons or in more temperate contexts. This would also respond to the elevated risk of learning disruptions while school is in session.

Triggers should be tailored to the specifics of each community/country's risk profile and contingency plan, though should target no higher frequency than a 1-in-3 to 1-in-5 year return period. For extreme heat, much lower probability events would suffer a similar insensitivity to education sector vulnerabilities, given the threshold effects in the relationship between temperature and learning described above.

Money in: The Education Sector Risk Pool would combine contributions from the current de facto risk holders, including national governments, education sector donors, and humanitarian actors. For example, a share of GPE, ECW, and others' resources that are used ex post to respond to or recover from natural hazards could be contributed to the risk pool. Humanitarian donors that back EiE programming through other mechanisms could fund the pool directly. Both could enhance the effectiveness of response with limited opportunity cost, as resources would have been deployed for similar purposes ex post.

In alignment with recent innovations developed by IFRC's Disaster Response Emergency Fund in partnership with the Centre for Disaster Protection, the risk pool could be structured in two layers: a standing contingency fund to cover expected losses on the underlying 'policies' and an insurance policy to cover years in which an extremely high number of eligible countries/communities experience eligible events. A third intermediate layer could be added for years in which a moderately high number of policies trigger, funded by a contingent credit line or overdraft from an MDB or donor on concessional terms (see Figure 16). Any drawdown would be repaid from future replenishments, netting out during years in which unexpectedly few policies trigger.

Figure 16: Education Sector Risk Pool Structure



Management: The landscaping above highlights that no existing institution currently possesses both education sector and DRF capabilities required to manage the envisaged risk pool. Education sector actors – such as ECW or GPE – would require new DRF capabilities, and DRF specialists – such as the Start Network or IFRC DREF – would require new education capabilities. Alternatively, a new, purpose-built management unit could be established, combining education and DRF expertise and approaches from the ground up. A detailed feasibility study and options appraisal would be required to design such an institution, though the upsides would be significant in positioning for scale and as a centre of excellence at this nexus.

Fiji: Cyclone Winston

Context

Fiji consists of over 300 islands and has a tropical climate, with warm temperatures and high humidity year-round. The economy relies on tourism, agriculture, and fisheries, with sugar exports playing a key role. Fiji is **highly vulnerable to climate change and natural hazards**, frequently experiencing cyclones, floods, and rising sea levels. These environmental challenges impact infrastructure, livelihoods, and education, making climate adaptation a national priority.

In February 2016, Tropical Cyclone Winston struck Fiji and at that time was the most powerful cyclone recorded in the Southern Hemisphere. It caused **widespread devastation** (see Table 2), resulting in 44 fatalities, nearly 120 injuries, more than 50,000 people displaced, with many losing their homes and livelihoods. The Cyclone also caused significant damage to infrastructure and the environment, with 41% of Fiji's health facilities affected and the total cost of loss and damage estimated at US$500 million.

Table 2: Damage from Tropical Cyclone Winston across Fiji

Rank	Town/region	Level of Damage
1	Koro Island	Complete devastation
2	Rakiraki	Severe damage to most buildings
3	Vanuabalavu	Extensive structural destruction
4	Taveuni	Severe home and school damage
5	Ba	Heavy damage to infrastructure
6	Tavua	Significant property loss
7	Ovalau (Lomaiviti)	Widespread damage

Education sector impacts

Cyclone Winston had devastating impacts on Fiji's education sector, causing **widespread school closures and damage to educational infrastructure**, classrooms, and teaching materials. One post-disaster damage needs assessment of educational sector infrastructure indicated that 494 primary and secondary schools (55%) were damaged or destroyed, disrupting schooling for 85,000 students. About 115 (13%) Early Childhood Care and Education (ECCE) centres were affected. Total damages in the sector were estimated at close to F$70 million, almost twice the damages in the health sector.

Response and financing considerations

In response, a coordinated national and international effort was launched for **immediate relief and recovery** with temporary learning spaces and essential services restored quickly. 92% of education activities prioritised under the joint Government of Fiji/UN emergency humanitarian Flash Appeal were funded, contributing to 99% of primary and secondary schools becoming operational within one month of the cyclone making landfall. Fiji's social protection scheme also scaled up Care and Protection Allowance with post-disaster benefits linked to the number and grade of school children in each eligible household. On average, 15% of top-up social assistance was spent on clothing and school supplies, representing the third highest priority for households after food and repairs, and ahead of medical expenditures. One evaluation found that among a sample of

schools, most communities had returned to pre-disaster attendance levels a year after the cyclone hit, with most schools returning to normal within 3-5 months.

Despite the speed and effectiveness of the initial response, the transition to longer-term recovery in the education sector was more challenging. Learning outcomes were undermined by lingering consequences of the cyclone, including unclean facilities, displacement of children to unfamiliar locations, and psychological impacts on children's ability to focus. Teachers observed that while almost all children faced performance issues on return, the recovery process was particularly difficult and prolonged for slower learners.

The evaluation referenced above found that as time went on immediate response activities became less effective. For example, temporary learning spaces were highly effective in enabling schools to reopen but were soon degraded by adverse weather and perpetuated a sense of 'delayed recovery'. Emergency school feeding programmes became increasingly irrelevant as food security improved soon after the cyclone for many communities. The evaluation team found that "in general, weak or non-context specific pre-disaster planning hampered effectiveness across all agencies and schools".

From a financing perspective, at the time of the cyclone, Fiji had approximately US$1.6 million available in prearranged instruments, primarily in the form of on-budget contingency funds. However, a post-disaster assessment found that at the time Fiji faced annual losses of US$85 million due to earthquakes and tropical cyclones alone, and in the next 50 years had a 50% chance of experiencing a loss exceeding US$806 million and a 10% chance of a loss exceeding US$1.6 billion. In any given year, there was a 57% chance that Fiji would experience government emergency losses exceeding the US$1.6 million contingency provision.

The lack of prearranged financing for tropical cyclone risk meant that the response to Tropical Cyclone Winston was predominantly funded ex-post, including by Fiji's international partners. The UN launched a Flash Appeal requesting US$38.6 million for immediate humanitarian assistance. By May 21, 2016, the appeal was 51% funded by a range of donors, including Australia (AUD 35 million) and New Zealand. UNICEF, WHO, and Save the Children played central roles in delivering Education Sector activities, reflecting their preexisting operational presence and relationships with the Government and other stakeholders. Fiji also received substantial financial assistance from international organizations to support recovery and reconstruction efforts including a US$50 million loan facility from the World Bank and US$50 million emergency assistance loan from ADB.

Lessons learned

While the immediate education sector response was assessed as being a success due to the speed and effectiveness of the emergency phase, the delayed transition from emergency response to early recovery and reconstruction was a significant weakness. Evaluators found that this was primarily due to a lack of contingency planning that reflected the extended duration of education sector impacts of major disasters. Flexible funding from international partners was welcomed by implementing agencies but appears to have perpetuated the emergency footing and undermined structured transition between phases of the response.

The response also highlighted the opportunities and operational challenges associated with integrating existing social protection systems with emergency aid to improve the effectiveness of disaster recovery. Technology-enabled cash transfers were leveraged to quickly provide support to affected populations, enabling households to buy school supplies and reducing opportunity costs associated with having children return to school. Social protection mechanisms also allowed for better targeting of vulnerable communities and households. Despite these successes, there were challenges in coordinating between education and social protection stakeholders, and

issues with data sharing and communication. Some marginalised communities also faced barriers to receiving assistance due to logistical issues and lack of access to technology.

Recommendations by international reviews of the response include:

- Risk mapping of schools integrated into Fiji's Education Management Information System (FEMIS) to ensure appropriate data was available to guide disaster preparedness and response efforts. For example, geographic, natural hazard, and FEMIS data could be overlayed to develop a risk register of highest risk schools, forming the basis of future policies, protocols, and insurance of individual assets.
- Development of an overarching response plan that clearly articulated roles and responsibilities through multiple phases of the response, as well as expectations of partner interventions. This overarching plan would be complemented with school-level response plans, based on standardised risk mapping (as above) and response plan templates covering emergency response, early recovery, and reconstruction.
- Preparation of an overarching DRF strategy based on detailed analysis of contingent liabilities associated with natural hazards. The strategy should consider additional risk financing tools beyond domestic reserves, including contingent credit and risk transfer.
- Alignment of multiple funding sources to mitigate fragmentation and inefficiencies observed during the Winston response.

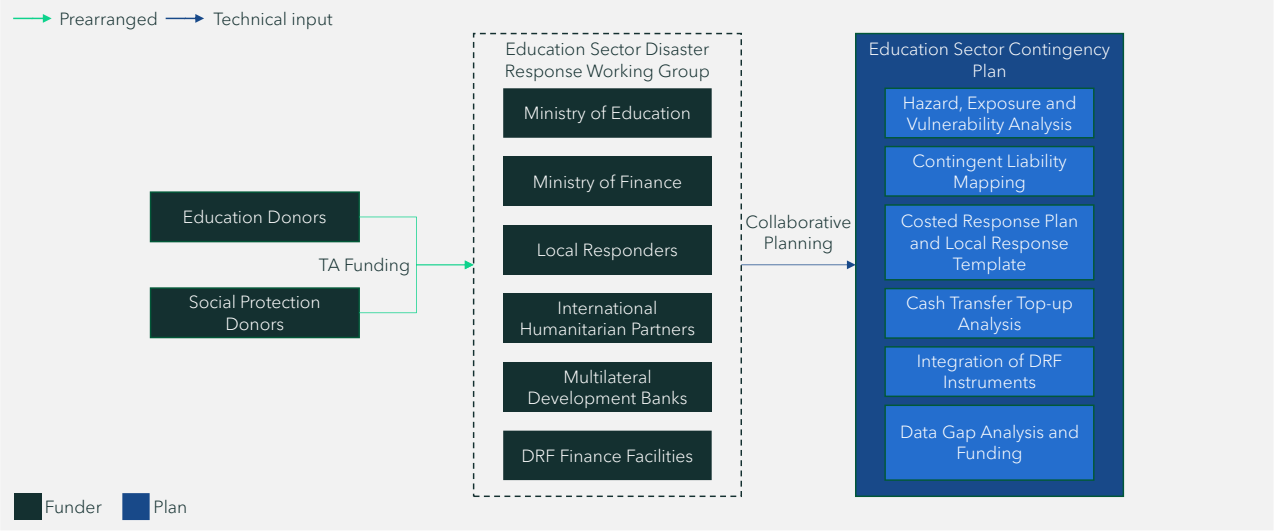
Model 3: Investing in effective response planning for long-term education sector impacts

Fiji has made significant progress in DRF and DRM since Tropical Cyclone Winston. However, a 2022 mid-term review of education programming funded by Australia suggests that recommendations related to contingency planning and prearranged financing in the education sector had not been systematically acted upon. Therefore, Model 3 (see Figure 17) envisages preparation of an Education Sector Contingency Plan that:

- Analyses education sector natural hazards, exposure, and vulnerabilities, as discussed above.
- Identifies contingent liabilities on the part of government and international actors.
- Articulates a costed, phased response plan and template for the development of local response plans for high-risk schools, explicitly disaggregating emergency action (e.g. temporary structures), through early recovery (psychosocial support), to recovery and reconstruction (shock-resilient classrooms).
- Articulates the expected contribution of social protection cash transfers in managing education sector vulnerabilities, particularly during the emergency response and early recovery phases.
- Identifies the range of funding sources available in the context of priority hazards, for example earmarked emergency response payouts from Fiji's growing suite of centralised disaster risk financing mechanisms and likely financing for early recovery and reconstruction from MDBs.
- Identifies any residual education sector protection gaps and advances DRF solutions under a comprehensive DRF strategy for the education sector, potentially including innovations described in Section 4.

- Under this strategy, integrates DRF instruments into longer-term education budgets and programmes with development partners.
- Identifies priority data gaps and measures to resolve them.

Figure 17 (Model 3): Funding Education Sector Contingency Plans



The thesis behind Model 3 is that effective contingency planning and prearranged financing in the education sector requires a **long-term, integrated approach**. Again, this model does not (necessarily) envisage that additional resources would be made available – the humanitarian education sector response to Tropical Cyclone Winston was well-funded and both World Bank and ADB assistance arrived in relatively short order. Rather, Model 3 focuses on the need for effective contingency planning that aligns contingent funding behind a holistic, phased response plan that combines education sector, social protection, and centralised DRM expertise and resources. In this sense, the incremental cost associated with this approach would be limited with a focus instead on enhancing effectiveness.

Philippines: Frequent Floods in Metro Manila

Context

According to the 2024 World Risk Index, the Philippines is the **most disaster-prone country globally**, struck by devastating tropical hurricanes almost annually (World Risk Report, 2024). Between 2009 and 2018, 43,810 Filipino schools have reported effects and disruptions from Natural Hazards (Department of Education, 2019). The World Bank (2023) estimated that 96% of Filipino students were vulnerable to multiple hazards, with 4,000 schools being damaged between 2021 and 2023.

In 2015, following a World Bank-supported nationwide catastrophe risk assessment, the Government of the Philippines implemented **one of the region's first national DRF frameworks**. Each financing mechanism of the framework was designed to provide funding at the national, local or individual level, with the former two dedicated to providing rapid financing for central disaster response initiatives and the latter designed to support households and small businesses to mitigate potential impacts on livelihoods.

Since the deployment of the framework, the country has implemented **multiple DRF innovations** across levels and has developed sector response plans across departments to support cohesive, robust response. For example, in 2023, the World Bank announced the approval of the Climate Development Policy Loan with a Cat DDO to provide US$500 million for government-led disaster

response, earmarked for school, heath, and community infrastructure rehabilitation and service provision (World Bank, 2023).

Uniquely, as detailed in Box 8, the Department of Education in the Philippines has made significant progress in building **dedicated institutional capacity** for DRM, prevention, and response in the education sector specifically. One key example is the National Indemnity Insurance Program (NIIP), launched in January 2024 to provide insurance coverage for "strategically important government assets" (Department of Finance, 2024a). The Program was launched with a pilot that specifically covers 130,000 Department of Education school buildings, estimated to be valued over US$14 billion (*PHP800 billion)*.

The NIIP is structured such that **insurance is provided to the Bureau of the Treasury** by the state-owned Government Service Insurance System (GSIS), which itself accesses global reinsurance markets to drive down premiums by blending the pilot Program's risk exposure with GSIS's broader mandate (Artemis, 2024). In July 2024, the Bureau of the Treasury filed for a claim under the NIIP to support recovery of public schools which sustained damage upwards of PHP 308.5 million during Typhoon Carina, channelling financing directly to the Department of Education for rehabilitation and reconstruction efforts (Department of Finance, 2024b).

Box 8: Philippines Department of Education, Disaster Risk Reduction and Management Office

In acknowledging the frequency and intensity of natural hazard vulnerabilities in the sector, the Department of Education created the "Disaster Risk Reduction and Management Office" (DRRMO), aligned with the National Disaster Reduction Act. The DRRMO is a unique example of disaster risk planning and implementation capacity tailored to education sector response. Its 2017–2022 strategic objectives focused on institutionalizing DRRM, Climate Change Adaptation (CCA), and Education in Emergencies (EiE) across all levels of the sector. This was achieved through three major thematic programmes—Prevention and Mitigation; Preparedness; and Response, Rehabilitation, and Recovery—which aligned with the three pillars of the global Comprehensive School Safety Framework.

The DRRMO's approach is comprehensive. It includes the development of risk-informed policies, plans, and standards; the formation of partnerships with both national and international stakeholders; and the enhancement of data systems and research to better track and respond to hazards affecting schools. Additionally, the initiative emphasizes resilience education by training teachers, school personnel, and DRRM coordinators and by integrating DRRM, CCA, and EiE into the K–12 curriculum. Response plans prioritise targeted interventions to ensure learning continuity during and after disasters, such as temporary learning spaces, clean-up and recovery funds, alternative delivery modes for education, and psychological first aid.

The DRRMS programme has already achieved significant milestones. Key outcomes include the development and implementation of multiple policies and guidelines, the establishment of coordinated contingency plans at various administrative levels, and the institutionalization of DRRM within schools. Notably, the programme has successfully trained over 240 DRRM coordinators and established robust monitoring and evaluation systems to track interventions.

These measures have improved the preparedness of schools to manage disasters—evidenced by rapid assessments using Rapid Assessment of Damages Reports (RADaR), supported by NGOs such as Save the Children; effective pre-emptive actions (such as early class suspensions); and coordinated recovery operations that minimize disruptions to education. In 2024, the Department of Education received US$291 million (*PHP17 billion)* for heat-resilient classrooms, driven in part by the Department's approach to risk identification and commitment to data collection (Eco-Business, 2024).

The Department of Education in the Philippines provides critical insight into the efficacy of disaster risk prevention and response through dedicated capacity and tailored sector risk management plans. Whilst accessing funding is essential for disaster risk reduction, institutional capacity strongly supports resilience and effective response within the education sector.

Even in the case of the Philippines, however, **recurrent, lower severity hazards** highlight the importance of strong institutional response and trigger design. Examples of DRF instruments mentioned above provide inadequate coverage to the full spectrum of hazards that affect the education sector in the Philippines. This case study focuses on the characteristics of less intense, but higher frequency hazard events on the education sector and learning outcomes.

Education sector impacts

Floods in Metro Manila represent a **recurring threat that disrupts the educational continuity** for millions of students in the Philippines capital. In addition to large-scale flood events—such as those triggered by typhoons like Ondoy (Ketsana) and Sendong (Washi)—small-scale flooding episodes are frequent and disruptive. Recurrent hazards such as tidal fluctuations, river overflow, and blocked drainage systems directly impact educational infrastructure and service provision.

While **major floods capture media attention** due to their dramatic impacts, small-scale floods occur routinely, often causing daily or weekly interruptions in school activities, without officially triggering a disaster declaration (Cadag et al., 2017). Small-scale floods are considered below the attachment point of insurance and disaster risk financing mechanisms that provide coverage for the Philippines (ADB, 2018).

In terms of the education sector, floods in Metro Manila have **quantifiable and wide-ranging impacts**. The Department of Education's records and supplementary studies indicate that approximately 34% of public schools in the National Capital Region were affected by floods during the 2009–2010 school year, with subsequent reports suggesting that over 800 schools in the region are situated in flood-prone areas (Cadag et al., 2017; GMA News Research, 2013). These events cause suspension of classes for extended periods, sometimes up to two weeks. Focus group discussions highlight that schools in socioeconomically vulnerable areas, such as those in the CAMANAVA region (Caloocan, Malabon, Navotas, and Valenzuela), lost classes twice a month during the rainy season due to inundation and safety concerns.

Most directly, school closures and learning disruptions associated with small scale floods are caused by **physical damage** to school facilities and learning materials. Floods also hinder student mobility, as roads become impassable and transportation costs soar during high-tide or flood events. This disproportionately affects students from poorer households, who may lack the resources to secure alternative transportation or replace damaged school supplies (Cadag et al., 2017; Department of Education, 2019).

Response and financing considerations

Post-disaster responses in Metro Manila have attempted to address the **recurring nature** of the hazard. In the wake of large-scale floods, government-mandated and financed responses include the temporary suspension of classes, clean-up drives, and the use of school facilities as evacuation centres. Specific schools have adopted measures such as early suspension of classes triggered by forecasted heavy rains and the establishment of communication channels via SMS and social media to coordinate emergency responses, with capacity being developed over time through bodies like the DRRMS. Initiatives under the Comprehensive School Safety (CSS) Framework—led by the Department of Education in collaboration with local government units and NGOs—have

aimed to rehabilitate affected learning environments, provide emergency supplies, and integrate disaster risk reduction into schooling systems more explicitly.

Despite emerging initiatives and capacity, key challenges to cohesive response persist. The lack of **systematic data** collection on the frequency and cumulative impact of small-scale floods, limited funding for risk reduction initiatives, and an **inconsistent implementation** of risk reduction measures across schools all hamper ongoing disaster preparedness and response in the education sector (Cadag et al., 2017; Global Alliance for Disaster Risk Reduction and Resilience in the Education Sector, 2017). Analysis of school locations relative to flood risk suggests that schools had been constructed in highly flood-prone areas despite data available prior to construction. The perceived sense of "normalcy" (Cadag et al., 2017) associated with lower-severity floods also drives non-reporting of these events, inhibiting adequate response and preparedness activities required. These structural gaps in disaster risk reduction and preparedness demonstrate the imperative for capacity building and dedicated disaster-risk programmes for higher-frequency, lower-severity events.

Lessons learned

The Philippines' experience demonstrates the feasibility and advantages of **DRF strategy and instruments** aligned specifically to education sector contingency plans. This approach was underpinned by recognition of the education sector's extensive vulnerability to natural hazards and investment in institutional capacity to identify, analyse, and manage these risks through disaster risk reduction and response planning and financing. These measures were tested and proved effective in 2024, with NIIP payouts flowing directly into education sector response activities.

Despite the suite of disaster risk financing mechanisms available, the analysis summarised above highlights how **lower-severity, higher-frequency hazards** that do not meet trigger thresholds of generic DRF facilities can create significant protection gaps in the education sector. Baseline school budgets do not have adequate buffers to respond swiftly to these events and/or staff and management at the school-level do not have the capacity to identify or implement the requisite interventions required to solve for recurrent hazards.

Model 4: Prearranged financing for low-severity, high-frequency events

In this context, Model 4 would see the creation of a dedicated window for these events under the existing DRF mechanisms available to the Department of Education, combined with clear institutional capacity to support the identification, evaluation, and planning of recurrent hazard response. This dedicated **small-flood contingency fund** would leverage support from education and climate financing pools that seek to support community and locally led resilience building initiatives.

Artemis (2020) reported that the Philippines had initially been **unable to secure bids** for its attempted reinsurance program to cover state-owned infrastructure, including school buildings under the NIIP. This signal from the reinsurance market suggests that additional risk coverage is likely to be costly, especially for DRF that is provided for activities beyond state-asset restoration, which do not have an asset value or a revenue stream. However, preventing the cumulative adverse effects of small-scale flooding is clearly aligned with the potential mandates of global education and climate finance providers that can leverage market positions to drive down the costs of reinsurance and coverage for the Philippines government.

As the FRLD has evolved in response to consultations with a range of stakeholders, it is evident that effective implementation will require a **community and locally centred approach** to

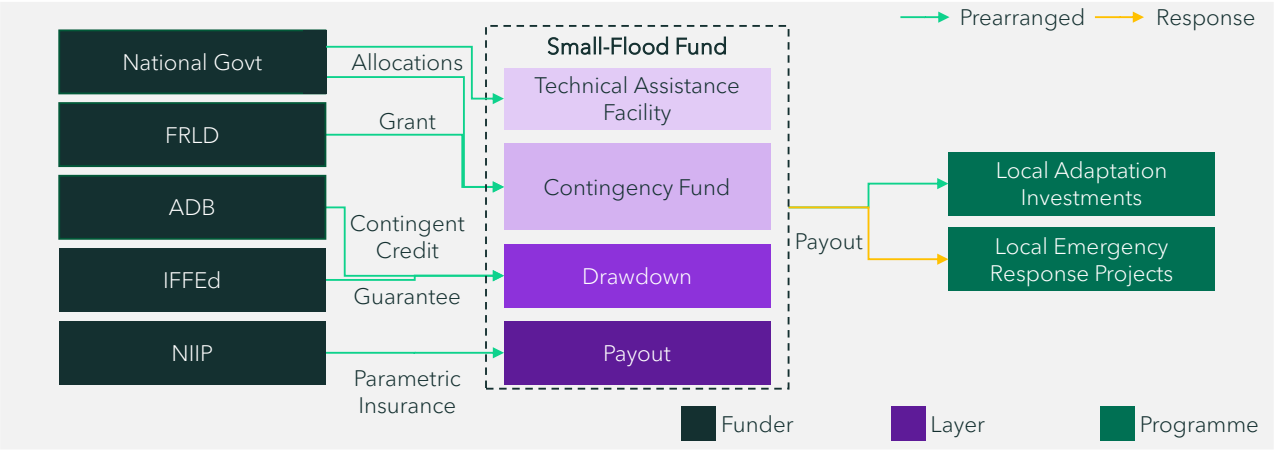
substantively fill the gaps left by other climate financing mechanisms like the Adaptation Fund or Green Climate Fund (ODI, 2024). However, to ensure efficient deployment, the FRLD also requires sufficient scale to maximise the impact of its capital.

Given the scope and cumulative impact of recurrent low-intensity hazards, a **tailored contingent financing facility** would provide the scale required for the FRLD to meet its deployment requirements, whilst still providing capital for critical, local response. Similarly, the Philippines is one of the founding countries eligible for IFFEd, with its mandate to support education sector investments without displacing other spending priorities. IFFEd needs a pipeline of projects that supports consolidation of resilience in the education sector, which could include providing capital to enable effective shock response to mitigate against losses and learning disruptions in existing educational service provision. The below model also provides a mechanism by which IFFEd can crowd in capital and support capacity building to insure against losses in potential educational impact of its other investments in the education sector (see Figure 18).

Whilst such a mechanism is aligned with the investment mandate of the FRLD and IFFEd, funding for high-frequency, lower-intensity hazards could **also be anchored by governments**, with other pools of climate and education finance providing additional funding support. Given the frequency of these hazards, sustainable funding should first seek to leverage budgetary allocations where feasible. However, whilst in the case of middle-income countries with sufficient fiscal space, budgetary earmarking for these hazards is possible, in the case of low- and lower middle-income countries, there is a clear role of external funding support from international funders like the FRLD and IFFEd.

Mechanically, the FRLD, or an equivalent funding body, would **capitalise the proposed contingency fund** with paid-in resources alongside the Government of Philippines, for expected nationwide losses from recurrent, low-intensity hazards that cannot be managed by baseline school budgets but can be accounted for when the risk is pooled nationally. A rolling three-year commitment would ensure adequate foresight for operational planning but would align with likely annual funding cycles for the FRLD. IFFEd would provide **guarantee cover** to allow the Philippines to access contingent policy-based financing from ADB above its country ceiling, to cover years in which a higher-than-expected number of schools experience qualifying events. A further insurance policy under the NIIP could be considered for tail-end events in which an exceptional number of schools experience an exceptional frequency of low-intensity floods.

Figure 18 (Model 4): Facility for Low-Severity, High-Frequency Hazards



As part of the envisaged ADB policy-based contingent financing and with parallel support from FRLD, the Government would commit to specifically **building capacity centrally and (primarily) at**

local levels to manage recurrent, lower intensity hazards. In this model we propose that dedicated smaller-scale financing facilities are deployed in active coordination with local education-sector disaster risk experts that support programme design, risk assessment, and provide technical assistance at the local government or school level. This tailored institutional capacity would support the development of a robust use-of-proceeds taxonomy to provide local schools with an understanding of what can be funded and under what circumstances.

Post-intervention reporting and learning support would also be made available to relevant institutions, allowing the DRRMS and Department of Education to account for the overall state and exposure of infrastructure, and evaluate and maximise cost-effectiveness on an annual basis. Over time, this model converges with the potential for high-frequency hazard response to be incorporated into budgetary allocation, once sufficient capacity has been built to identify and fund disaster response in this context. As such, the short- to medium-term funding support of external funders such as the FRLD and IFFEd would still be critical for shock response whilst internal capacity is built, and systems are developed. These case studies aim to describe the existing funding landscape at the time of the shock, identify strengths and weaknesses in the response, and develop alternative funding models that could have mitigated shortcomings.

Section Summary

This section sought to identify concrete ways in which education systems can be made more responsive to natural hazards. The models proposed and analysed in this section include:

- Connecting existing DRF instruments to shock-responsive education systems and programmes (Model 1)
- Integrating education into national climate adaptation plans and developing education-specific risk financing instruments for government and non-government responders (Model 2)
- Using DRF to incentivise effective sector planning across the crisis arc, ensuring an effective transition from response to early recovery, to long-term reconstruction and rehabilitation (Model 3)
- Prearranged financing for low-severity, high-frequency events that disrupt learning and education outcomes (Model 4)

Across all models, the intention is to enhance effectiveness by better connecting (i) DRF to education sector planning and budgeting frameworks, to make systems and programmes more shock-responsive; and (ii) DRF to adaptation and longer-term steady-state budgeting, to enhance coherence of operations and ultimately learning throughout the crisis arc. Each of these models requires investment in capabilities, data, and systems to be tested, tailored, and scaled.

.

5. Conclusions and Recommendations

This section summarises key messages from the above review and case studies and identifies key steps towards building a robust international architecture that bolsters resilient and shock-responsive education sectors across countries.

Climate change and natural hazards affect education sector activities and outcomes in multiple interacting ways, in turn putting at risk longer-term economic and social development. The sector tends not to be an explicit focus for DRF and climate finance facilities; and education sector financing mechanisms have not integrated prearranged financing instruments that are increasingly considered in other sectors, including social protection. Funding challenges are set to become more acute as aid budgets contract and disaster risks continue to escalate. Innovative financing solutions are required to mobilise additional resources and maximise value-for money.

While coherence between DRF, climate, and education sector financing mechanisms is required in both government and non-governmental education systems and programmes, the majority of DRF instruments that could be utilised in the education sector are designed for governments. New instruments may be required to bring tailored financing to non-governmental actors serving communities that cannot be reached by government systems. Recent and forthcoming pilots provide direction that could be scaled globally.

In addition to integrating education and DRF financing instruments, the case studies presented above highlight the need to integrate longer-term investments to reduce exposure and vulnerability to natural hazards with DRF to enhance short-term response and recovery and reconstruction over time. This is particularly true in complex and protracted crisis contexts, where governments and partners deal with numerous natural hazards, conflict episodes, and public health shocks. Surging response financing through existing service delivery and infrastructure projects, which themselves integrated resilience and risk-reduction components, could enhance coherence in such contexts.

The recommendations below offer a blueprint for adjustments to existing mechanisms and potential new financial instruments, with potential to align climate finance and DRF with education priorities, while strengthening both global coordination and domestic institutional capacity.

1. All new education sector programmes from development finance and global education facilities should incorporate DRF instruments into their education loan and grant frameworks.

MDBs and global education financing facilities should incorporate existing climate and prearranged financing instruments into their education loan frameworks. By doing so, these loans can be enhanced in affordability and scale through supplementary guarantees provided by institutions such as IFFEd or directly by donor countries. These guarantees reduce premium and interest costs and can increase the scale of provision of such instruments, ensuring that education financing not only covers standard operational needs but also mitigates the financial shock of natural hazards. This integrated approach aims to align financial resources behind existing education sector operations, enhancing climate resilience and risk reduction in the sector and operational continency planning and response when residual risks manifest.

2. Education sector risks and responses should be integrated into all new contingency plans for regional risk pools. Parallel policies could also be structured for education-specific risks.

Leveraging established regional disaster risk pools, such as the CCRIF, can provide a highly targeted approach to education recovery. CCRIF's model, which pools risk among participating countries and disburses rapid payouts following a trigger event, offers a proven mechanism for channelling funds quickly to where they are most needed. The confidence created by hardwiring a minimum share of funding from payouts for existing policies to education sector contingency

plans could significantly enhance the effectiveness of operational response, particularly if confidence in funding flows led to contingent downstream contracting, prequalification of suppliers, and prepositioning of supplies. Parallel policies could also be structured for education-specific risks, based on historic education sector responses to catastrophic events.

Developing specific education disaster response plans within these risk pools would involve close collaboration with MDBs and global education financing mechanisms. These partners can offer technical assistance and design expertise to tailor financial instruments and response plans that address the unique needs of education systems. Basis risk caused by current instruments' insensitivity to the distinct vulnerability profile of education activities and outcomes (for example, to lower severity events) would be one clear area in which further analysis and innovation is required, to optimise regional risk pools and arrange complementary financing for this purpose.

3. International climate finance pools should include dedicated education sleeves and should be integrated where possible with DRF mechanisms to ensure seamless transition from preparedness to response and recovery.

International pools of climate finance should include dedicated education sleeves that are fully integrated with disaster risk financing mechanisms. This alignment would enable countries to access resources to both reduce risk and respond under integrated education sector strategies, much as the Philippines has endeavoured to do. Such strategies would outline key decision makers, data considered, eligible use-of-proceeds, triggers for accessing funding, and specific expertise and capacities required within national and subnational institutions. By tapping into climate finance resources, education responders can secure additional funding that has traditionally been out of reach.

This approach explicitly unlocks more funding through multilateral climate funds like the GCF but also extends to pushing for education sector inclusion in the eligible use of proceeds for instruments like the FRLD and the IMF's RSF. The capacity to scale investments made from climate finance pools towards education depends on having clear use-of-proceeds with evidence linking it to adaptation outcomes (e.g. climate-resilient school buildings).

4. Education sector adaptation and DRF instruments should be scaled in the humanitarian sector; a new cross-country education risk pool could fill the protection gaps identified in case studies above.

Where national governments and their international development partners lack capacity, access, or inclination to support children and young people affected by natural hazards, humanitarian actors should be equipped with similar financing options. Both CREST and UNICEF TTI demonstrate the potential for such innovation, but scale and cross-country risk pooling for education is required. A new facility that combines DRF instruments with education-specific analytics, triggers, and response plans could fill the significant protection gaps identified in case studies above. However, establishment of such an instrument should also learn from the international response to Tropical Cyclone Winston, ensuring that humanitarian action complements and does not delay transitions to government-led early recovery and reconstruction efforts.

5. Existing technical assistance pools should prioritise investment in institutional capacity, further research and analysis, and foundational data required to make education systems and programmes more shock-responsive.

Strengthening domestic and international institutional capacity on DRM and DRF in the education sector is key. The Philippines has shown that this could include building dedicated DRM units in

Ministries of Education. Lower capacity governments may prefer to integrate education expertise into central DRM teams. Alongside these measures, each case study above recognised the need for a concerted effort to map existing education assets and services, generating risk-informed data and insights to underpin future financing and operations. Future education and policy-based financings and technical assistance programmes should make such data collection, analysis, and capacity building a priority.

Towards a pact for resilience and disaster risk financing in education

Together, these five actions form a strategic blueprint for building a resilient, globally coordinated education sector. By integrating existing financial instruments, building on regional capacities, and strengthening both international and domestic education and disaster risk financing infrastructure, the international community can ensure that education systems are resilient to the ever-increasing frequency and intensity of natural hazards.

Delivering even individual elements of such a blueprint will require commitment and coordination among many actors. Indeed, this was the principal finding of earlier sections of the paper: fragmentation between education and climate/disaster risk financing leads to critical protection gaps locally, nationally, and globally. Delivering coordinated action to remedy these gaps will require political commitment by leaders to work across sector boundaries more effectively, potentially under an Education Resilience Finance Pact.

Such a Pact would be comparable to major policy frameworks that have solved coordination problems in other sectors, committing partners to actions that are mutually beneficial when undertaken in concert.[5] An Education Resilience Finance Pact would embody commitments by international, national, and local actors to:

1. Recognise the threats posed by climate change and natural hazards to learning and long-term human capital accumulation.
2. Recognise that education sector threats are unique in their nature and so require tailored operational and financial solutions.
3. Commit to integrating education into climate finance and disaster risk financing mechanisms and commit to integrating climate and disaster risk financing instruments into education sector plans and programmes.
4. Commit to investing in requisite institutional capacity, planning, data, and analysis, required to ensure effective stewardship of shock-responsive education sectors.
5. Commit to equitable climate and disaster risk financing in education, including coverage of communities and children outside national systems.

By its nature, the Education Resilience Finance Pact would require complementary actions by several stakeholders:

- National, state, and municipal governments should
    - Review disaster risk management and adaptation plans to ensure adequate consideration of risks to education assets, activities, and outcomes.
    - Review existing financing plans for disaster risk reduction, adaptation, and DRF, to identify whether and how education risks can be adequately and efficiently mitigated and managed.

[5] For example, see the Global Compact on Refugees.

  - Integrate DRF instruments alongside adaptation investments into forthcoming education sector budgets and programmes.
  - Build requisite capacity and systems, including data systems, to ensure that education sector risks can be quantified, monitored, and financed.

- Development finance actors should
  - Engage education specialists in the design of all forthcoming DRF operations, to ensure that the sector is appropriately and proportionately reflected in contingency plans and that triggers are tailored to the causal mechanisms summarised above.
  - Consider integration of DRF instruments in all future education sector operations, enhancing the shock-responsiveness of long-term programming and government systems.
  - Pilot and scale the use of guarantees to cover contingent financing instruments for the education sector, reducing financial and opportunity costs associated with prearranged instruments.
  - Undertake additional analysis of risk management and DRF options for their own balance sheets, as education sector contingent liabilities build over time.
  - Fund complementary technical assistance and capacity building to enhance requisite analytics and systems.

- Non-governmental humanitarian organisations should
  - Align education sector activities to the extent possible with national disaster risk management plans and processes, including through replica DRF instruments that align government and non-governmental plans, processes, triggers, and payouts.
  - Develop the concept of an Education Sector Risk Pool described above, offering requisite scale and diversification to develop tailored DRF instruments for humanitarian responders.
  - Provide expertise and capacity building to national governments and development finance actors on the specific risks faced by the most vulnerable groups served by the humanitarian community.

- Government and philanthropic donors should
  - Encourage integration of DRF into education systems, funding instruments, and specific programmes by financing technical assistance and where appropriate through timebound premium subsidy for pilot projects.
  - Encourage consideration of unique risks facing the education sector in DRF, disaster risk reduction, and adaptation financing facilities.
  - Utilise the full range of financing instruments available to each donor in support of shock-responsive education systems, including direct guarantees, loans, equity investments, and technical assistance options alongside traditional grants.
  - Support further research, analysis, and data collection, including a detailed study of explicit and implicit education sector contingent liabilities facing governments, households, and the international community.
  - Ensure that premium subsidies are carefully targeted where they are most needed and avoid doing harm with subsidies that distort decisions.

References

1.8 million children out of school as South Asia floods (2022). Available at: https://www.savethechildren.org.uk/news/media-centre/press-releases/children-out-of-school-as-south-asia-floods-put-education-at-risk (Accessed: 27 February 2025).

AID CUTS DISRUPT EDUCATION FOR 1.8 MILLION CHILDREN SUPPORTED BY SAVE THE CHILDREN (2025) Save the Children International. Available at: https://www.savethechildren.net/news/aid-cuts-disrupt-education-18-million-children-supported-save-children (Accessed: 15 May 2025).

Allocations by Sector | CERF (2025). Available at: https://cerf.un.org/what-we-do/allocation-by-sector (Accessed: 20 February 2025).

Are Natural Disasters Disastrous for Education? Evidence from Seven Asian Countries (2025). Asian Development Bank Institute. Available at: https://doi.org/10.56506/RYSP7608.

Artemis (2024) *Philippines uses cat bond payout to fund pilot government asset insurance - Artemis.bm*, *Artemis.bm - The Catastrophe Bond, Insurance Linked Securities & Investment, Reinsurance Capital, Alternative Risk Transfer and Weather Risk Management site*. Available at: https://www.artemis.bm/news/philippines-uses-cat-bond-payout-to-fund-pilot-government-asset-insurance/ (Accessed: 27 February 2025).

Asian Development Bank (ADB), 2016. Fiji Emergency Assistance Loan for Cyclone Recovery. Available at: https://www.adb.org/countries/fiji/main [Accessed 28 February 2025].

Cadag, J.R.D. *et al.* (2017) 'Hidden disasters: Recurrent flooding impacts on educational continuity in the Philippines', *International Journal of Disaster Risk Reduction*, 25, pp. 72–81. Available at: https://doi.org/10.1016/j.ijdrr.2017.07.016.

Carmichael, F. *et al.* (2023) 'The Contribution of Girls' Longer Hours in Unpaid Work to Gender Gaps in Early Adult Employment: Evidence from Ethiopia, India, Peru and Vietnam', *Feminist Economics*, 29(1), pp. 1–37. Available at: https://doi.org/10.1080/13545701.2022.2084559.

Centre for Disaster Protection. (n.d.). Glossary. Retrieved from Centre for Disaster Protection: https://www.disasterprotection.org/glossary

CERI. (2023). Falling Short: Addressing the Climate Finance Gap for Children. Children's Environmental Rights Initiative.

Chen, S. (2018) 'Education and transition to work: evidence from Vietnam, Cambodia and Nepal', *International journal of educational development*, 61, pp. 92–105. Available at: https://doi.org/10.1016/j.ijedudev.2017.12.006.

Cook, A.C. and Beachy, D. (2019) 'The Impact of Hurricane Matthew on School Attendance: An Analysis from Rural Haiti', *International Journal of Environmental Research and Public Health*, 16(1), p. 55. Available at: https://doi.org/10.3390/ijerph16010055.

COVID-19 Aftershocks: Access Denied | World Vision (2020). Available at: https://www.wvi.org/publications/report/coronavirus-health-crisis/covid-19-aftershocks-access-denied (Accessed: 10 April 2025).

Dräger, J., Klein, M. and Sosu, E. (2024) 'The long-term consequences of early school absences for educational attainment and labour market outcomes', *British Educational Research Journal*, 50(4), pp. 1636–1654. Available at: https://doi.org/10.1002/berj.3992.

Drought stops world's largest man-made lake from producing electricity (17:31:28 +02:00) *euronews*. Available at: https://www.euronews.com/green/2024/10/14/ongoing-african-drought-has-plunged-zambia-into-daily-blackouts-as-hydroelectric-dam-unabl (Accessed: 12 May 2025).

Drzewiecki, D.M. *et al.* (2020) 'The association between educational attainment and resilience to natural hazard-induced disasters in the West Indies: St. Kitts & Nevis', *International Journal of Disaster Risk Reduction*, 47, p. 101637. Available at: https://doi.org/10.1016/j.ijdrr.2020.101637.

Ebola: Beyond the health emergency - Summary of research into the consequences of the Ebola outbreak for children and communities in Liberia and Sierra Leone - Sierra Leone | ReliefWeb (2015). Available at: https://reliefweb.int/report/sierra-leone/ebola-beyond-health-emergency-summary-research-consequences-ebola-outbreak (Accessed: 10 April 2025).

Eco-Business (2024) *Hell or high water: Filipino schools lashed by climate extremes*, *Eco-Business*. Available at: https://www.eco-business.com/news/hell-or-high-water-filipino-schools-lashed-by-climate-extremes/ (Accessed: 27 February 2025).

'Education Continuity Assurance – PLIG' (2025). Available at: https://www.prudential.com.gh/plans/education-continuity-assurance-plan/ (Accessed: 12 May 2025).

European Investment Bank (EIB), 2016. Fiji Infrastructure and Climate Resilience Support. Available at: https://www.eib.org/en/projects/pipelines/2022-2022 [Accessed 28 February 2025].

GCF (2023) *The Green Climate Fund, the Global Partnership for Education and Save the Children launch the world's largest investment for green schools at COP28*, *Green Climate Fund*. Green Climate Fund. Available at: https://www.greenclimate.fund/news/green-climate-fund-global-partnership-education-and-save-children-launch-world-s-largest (Accessed: 27 February 2025).

Global Alliance for Disaster Risk Reduction & Resilience in the Education Sector (GADRRRES) (2021) *2022-2030 Comprehensive School Safety Framework for Child Rights and Resilience in the Education Sector*. GADRRRES. Available at: https://www.gadrrres.net/files/cssf-2022-2030-summary-en.pdf (Accessed: 28 February 2025).

GEM Report UNESCO (2025) *Education finance watch 2024*. GEM Report UNESCO. Available at: https://doi.org/10.54676/NSCT2115.

Grau, N., Hojman, D. and Mizala, A. (2018) 'School closure and educational attainment: Evidence from a market-based system', *Economics of Education Review*, 65, pp. 1–17. Available at: https://doi.org/10.1016/j.econedurev.2018.05.003.

Green Climate Fund, 2016. Fiji Resilience and Infrastructure Reconstruction Projects. Available at: https://www.greenclimate.fund/ [Accessed 28 February 2025].

Haiti: Six months after the earthquake, more than 4 out of 5 schools destroyed or damaged are yet to be rebuilt (2025). Available at: https://www.unicef.org/lac/en/press-releases/haiti-six-months-after-earthquake-more-4-out-5-schools-destroyed-or-damaged-are-yet-to-be-rebuilt (Accessed: 3 February 2025).

Haiti's path to building resilience to multiple disaster risks in a fragile context | GFDRR (2020). Available at: https://www.gfdrr.org/en/publication/haitis-path-building-resilience-multiple-disaster-risks-fragile-context (Accessed: 24 February 2025).

How GPE supports education in 8 countries affected by emergencies | Blog | Global Partnership for Education (2020). Available at: https://www.globalpartnership.org/blog/how-gpe-supports-education-8-countries-affected-emergencies (Accessed: 28 February 2025).

HPC - Project Module: View Project (2020). Available at: https://projects.hpc.tools/project/155321/view (Accessed: 24 February 2025).

Hurricane Matthew three months on: Life for Haiti's children | UNICEF (no date). Available at: https://www.unicef.org/stories/hurricane-matthew-three-months-life-haitis-children (Accessed: 24 February 2025).

IFRC. (2024). 2024 Triggers First-Ever Insurance Payout for Disaster Fund. Retrieved from IFRC Press Releases: https://www.ifrc.org/press-release/2024-triggers-first-ever-insurance-payout-disaster-fund

IMF Reaches Staff-Level Agreement on the First Review for the 37-month Extended Arrangement under the Extended Fund Facility (EFF) and a New 28-month Arrangement Under the Resilience and Sustainability Facility (RSF) (2025) *IMF*. Available at: https://www.imf.org/en/News/Articles/2025/03/25/pr-2576-pakistan-imf-reaches-agreement-1st-rev-37mo-ext-arrang-eff-new-28mo-arrang-rsf (Accessed: 15 May 2025).

Isa, S., D'Angelo, S. and Barón, J.D. (2024) *Missing School - The Effect of Crises on Students and Teachers in Pakistan*. Washington, DC: World Bank. Available at: https://doi.org/10.1596/41639.

Kanu, I.A. (2024) 'Disasters and Child Education in Eastern Africa: Towards an Epistemology of Disasters', *Tuijin Jishu/Journal of Propulsion Technology*, 45(03), pp. 301–311. Available at: https://doi.org/10.52783/tjjpt.v45.i03.7112.

Karim, A. and Noy, I. (2016) 'Poverty and Natural Disasters: A Regression Meta-Analysis', *Review of Economics and Institutions*, 7(2), p. 26. Available at: https://doi.org/10.5202/rei.v7i2.222.

Kidman, R. et al. (2022) 'Returning to school after COVID-19 closures: Who is missing in Malawi?', International Journal of Educational Development, 93, p. 102645. Available at: https://doi.org/10.1016/j.ijedudev.2022.102645.

Kóczán, Z. (2024). Lasting Scars: The Long-term Effects of School Closures on Earnings. World Development, 176.

McDermott, T.K.J. (2012) 'The Effects of Natural Disasters on Human Capital Accumulation'. Rochester, NY: Social Science Research Network. Available at: https://doi.org/10.2139/ssrn.2011768.

Meenan, C., & Stefan, C. (2023). Beyond Parametric: Insuring the IFRC Disaster Response Emergency Fund. Retrieved from Centre for Disaster Protection: https://www.disasterprotection.org/blogs/beyond-parametric-insuring-the-ifrc-disaster-response-emergency-fund

Meltzer, G. Y., Zacher, M., Merdjanoff, A. A., Do, M. P., Pham, N. K., & Abramson, D. M. (2021). The effects of cumulative natural disaster exposure on adolescent psychological distress. *The journal of applied research on children: informing policy for children at risk*, 12(1), 6.

Mustapha, S., & Benson, C. (2024). Demystifying Pre-Arranged Financing for Governments: A Stocktake of Financial Instruments from International Financial Institutions.

OECD. (2023). PISA 2022 Results (Volume I): The State of Learning and Equity in Education.

Owais, A. et al. (2023) 'Assessing the hidden burden and costs of COVID-19 pandemic in South Asia: Implications for health and well-being of women, children and adolescents', PLOS Global Public Health, 3(4), p. e0001567. Available at: https://doi.org/10.1371/journal.pgph.0001567.

Independent evaluation of the African Risk Capacity | Oxford Policy Management (2022). Available at: https://www.opml.co.uk/projects/independent-evaluation-african-risk-capacity (Accessed: 10 April 2025).

Panwar, V., Wilkinson, E. and Nur, L. (2023) 'Financial arrangements for addressing losses and damages'.

Pelli, M. (2024) 'Storms, Early Education, and Human Capital', (743). Available at: https://www.adb.org/publications/storms-early-education-human-capital (Accessed: 3 February 2025).

Raccanello, D., Rocca, E., Barnaba, V., Vicentini, G., Hall, R., & Brondino, M. (2023). Coping

strategies and psychological maladjustment/adjustment: A meta-analytic approach with children and adolescents exposed to natural disasters. In Child & Youth Care Forum (Vol. 52, No. 1, pp. 25-63). New York: Springer US

Save the Children (2025) *Post-Disaster Educational Continuity in Fiji and the Impact of Disaster Risk Reduction and Education in Emergencies Programming*, *Save the Children's Resource Centre*. Available at: https://resource centre.savethechildren.net/pdf/fiji_post_winston_edu_continuity_report_eng_2017.pdf/ (Accessed: 3 February 2025).

Segarra-Alméstica, E. *et al.* (2022) 'The effect of consecutive disasters on educational outcomes', *International Journal of Disaster Risk Reduction*, 83, p. 103398. Available at: https://doi.org/10.1016/j.ijdrr.2022.103398.

Tang, B., Liu, X., Liu, Y., Xue, C., & Zhang, L. (2014). A meta-analysis of risk factors for depression in adults and children after natural disasters. *BMC public health*, 14, 623. https://doi.org/10.1186/1471-2458-14-623

Rapidly Assessing the Impact of Hurricane Matthew in Haiti (no date) *World Bank*. Available at: https://doi.org/10/20/rapidly-assessing-the-impact-of-hurricane-matthew-in-haiti.

UN Office for Disaster Risk Reduction. (n.d.). Glossary. Retrieved from Sendai Framework Terminology on Disaster Risk Reduction: https://www.undrr.org/terminology/exposure

UN (2016). Flash Appeal for Cyclone Winston. Available at: https://www.unocha.org/ [Accessed 28 February 2025].

UNICEF. (2025). Learning Interrupted: Global Snapshot of Climate-Related School Disruptions in 2024.

'Unlocking opportunity for the world's underprivileged children and youth: International Finance Facility for Education (IFFEd) commits to $1.5 billion for global education and skills in LMICs' (2023) *IFFed*. Available at: https://iff-education.org/unlocking-opportunity-for-the-worlds-underprivileged-children-and-youth-international-finance-facility-for-education-iffed-commits-to-1-5-billion-for-global-education-and-skills-in-lmics/ (Accessed: 28 February 2025).

World Bank (2021) 'Disaster Risk Financing and Insurance (DRFI) Program'. Available at: https://www.worldbank.org/en/programs/disaster-risk-financing-and-insurance-program. (Accessed 28 February 2025).

World Bank (2024) *Choosing Our Future: Education for Climate Action*. Washington, DC: World Bank. Available at: https://doi.org/10.1596/42098.

World Bank. (2024). Building Safer and More Resilient Schools in a Changing Climate. Retrieved from Results Briefs: https://www.worldbank.org/en/results/2024/03/08/building-safer-and-more-resilient-schools-in-a-changing-climate#:~:text=Natural%20hazards%2C%20some%20fueled%20by,million%20students%20across%2035%20countries.

World Bank. (2024). Education Finance Watch. World Bank.

World Bank. (2024). Indonesia's Experience in Designing and Implementing a Public Assets Insurance Program: A Five-Year Journey. World Bank.

World Bank Disaster Risk Financing and Insurance Program. (n.d.). Disaster Risk Finance: A Primer. Retrieved from Global Shield Financing Facility: https://www.globalshieldfinancingfacility.org/sites/default/files/2020-04/DRF%20Primer_5.pdf

World Bank Delivers Financial Boost to Philippines to Strengthen Climate Preparedness at Schools, Health Facilities, Communities (no date) *World Bank*. Available at: https://www.worldbank.org/en/news/press-release/2023/11/17/wb-delivers-financial-boost-to-

ph-to-strengthen-climate-preparedness-at-schools-health-facilities-commu (Accessed: 25 February 2025).

World Bank, 2016. Cyclone Winston Reconstruction Support. Available at: https://www.worldbank.org/en/country/fiji [Accessed 28 February 2025].

Zulaika, G. et al. (2022) 'Impact of COVID-19 lockdowns on adolescent pregnancy and school dropout among secondary schoolgirls in Kenya', BMJ Global Health, 7(1). Available at: https://doi.org/10.1136/bmjgh-2021-007666.