HELPDESK CLIMATE WINDOW: REQUEST RESPONSE

Intersectional linkages between climate effects and education provisions in Myanmar

REQUEST SUBMISSION

Myanmar faces compounded crises: escalating conflict, displacement, and recurrent climate shocks, with a high vulnerability to climate change. Frequent extreme weather events have severely disrupted education continuity through damaged infrastructure, school closures, and reduced attendance, and there is little available evidence for policymakers and planners on how climate and education programme interventions can be integrated in simple, cost-effective, and practical ways.

In response, this rapid evidence review aims to examine how intersecting climate hazards affect education continuity and to identify practical, low-cost interventions to strengthen resilience in the education system. The review is guided by three research questions: (1) how climate factors and education outcomes interact, (2) what practical and low-cost adaptation strategies can support schools, and (3) what guidance can be provided for integrating climate resilience into education programming.

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EXECUTIVE SUMMARY

Myanmar is among the world's most climate-vulnerable countries, **ranking second in the Climate Risk Index for exposure to extreme weather events** between 1995 and 2024, with climate change intensifying cyclones, floods, droughts, and extreme heat. Children are particularly affected, with over **91% exposed to multiple climate-related shocks** (UNICEF, 2021). These hazards disrupt education through school closures, damaged facilities, and reduced attendance.

The scope of this rapid evidence review seeks to (1) diagnose how climate hazards disrupt education continuity in Myanmar, and (2) identify cost-effective, practical interventions donors can fund to strengthen climate preparedness and resilience. Drawing on a desk review and interviews with 26 stakeholders, the rapid review examines the **polycrisis** shaping educational provision in Myanmar, addressing the following questions:

1. What are the intersectional linkages between climate events and education provisions?

Climate hazards in Myanmar such as floods, cyclones, extreme heat, and pollution disrupt schooling, reduce attendance, and damage infrastructure, affecting millions of children. Students face health risks, trauma, and cumulative learning loss, while teachers experience increased workloads. Schools often close or serve as shelters, and damaged infrastructure, armed conflict, and economic pressures limit access to schools. Chronic underinvestment, conflict, and fragmented governance hinder climate adaptation, emphasising the need for resilient, context-sensitive education systems.

2. What practical and low-cost climate adaptation strategies exist for schools?

- Consult communities, civil society organisations (CSOs), and local education authorities to identify locally relevant, low-cost climate adaptation strategies for schools (as explored Chapters 4–6).
- For extreme heat, use natural ventilation, shade trees and bioclimatic designs to reduce indoor temperatures.
- Improve water storage and resilient WASH systems support health and learning.
- Improve retaining walls, build raised foundations, provide sandbags, improved roofing, and local riverbank or wetland restoration to reduce flood and landslide risk.
- Incorporate climate adaptation into existing emergency preparedness, early warning systems, and civilian evacuation strategies and structures (e.g. air-raid shelters).

3. What guidance exists for integrating climate resilience into education programming?

Integrating climate resilience requires context-specific, conflict-sensitive approaches that prioritise community knowledge and partnerships with civil society organisations and local leaders, and which use low-cost, locally sourced materials. Key strategies include off-grid energy for cooling and remote learning, improving WASH and water storage, climate- and conflict-sensitive shelters with early warning systems, and longer-term measures such as reforestation and resilient school infrastructure. Operational support is available through international climate funds (GCF, MAP, GEF), technical tools (CCRI, INFORM Risk, GIS mapping) and sectoral guidelines (CSSF, SAFE, WiA, Safe Schools framework).

This report makes a range of suggestions for supporting climate change-adapted education in Myanmar. Success requires 1) local ownership (in a context where most stakeholders prioritise the immediate hazards of armed conflict above climate change risks), and 2) the willingness of donors to mobilise technical, financial, and policy-political support.

CHAPTER 1: INTRODUCTION

Myanmar faces overlapping climate, conflict, and humanitarian crises that severely undermine children's well-being and education continuity. Escalating armed conflict, mass displacement, and recurrent natural disasters, including extreme weather events (EWEs), air pollution, and unseasonal rainfall, have weakened education systems. Humanitarian assessments estimate that 19.9 million people need assistance in Myanmar, including 3.5 million internally displaced persons (IDPs), with schools frequently damaged, closed, or repurposed as shelters during emergencies (Humanitarian Action, 2026; KI 23). In conflict settings, climate change acts as a threat multiplier, compounding pre-existing vulnerabilities and intensifying risks to children's safety, learning, and long-term development (Datzberger and Pacifico, 2026).

Myanmar's Climate Vulnerability

Myanmar is among the world's most climate-vulnerable countries (Messmer et al., 2026), ranking **second in the Climate Risk Index** for exposure to and impact from EWEs between 1995 and 2024 (Adil et al., 2025). Climate change is intensifying cyclones, floods, droughts, and extreme heat (IPCC, 2023; Vogel et al., 2024). Between 2008 to 2023, **324 natural disaster** events were reported, resulting in over **7 million displacements** predominantly from floods and storms (IOM-UN, 2024; UNICEF, 2024a). The hazards outlined in **Table 1** unfold amid conflict, disease outbreaks, and undernourishment, amplifying both exposure and sensitivity to climate shocks (Chambers, 2026; IPCC, 2023). Climate awareness must take account of short-onset and longer-term hazards and, at present in Myanmar, many stakeholders have limited awareness of climate change issues (KII 6).

Table 1. Significant environmental shocks affecting education in Myanmar

Environmental Shock	Key Events / Evidence	Impacts
Tropical cyclones / storms	Major storms include Cyclone Nargis (2008), Cyclone Mocha (2023) and Typhoon Yagi (2024).	Widespread loss of life, infrastructure and livelihoods; repeated disaster shocks.
Riverine flooding	Recurrent flooding along the Chindwin, Ayeyarwady and Salween Rivers (eg. 2025 floods).	Displacement; damage to homes, affecting 65% of the Ayeyarwady Delta population
Extreme heat and rising temperatures	Temperatures projected to increase 2.07°C by 2060; recent heatwaves reached 47–50°C.	Severe heat stress and mortality. Over 1,500 deaths from heatstroke from April–May 2024.
Environmental degradation	High deforestation, mangrove depletion and unregulated gold and rare-earth mining.	Weakening of natural protective buffers; increased floods and landslides; pollution.
Slow-onset climate processes	Sea-level rise and prolonged drought.	Salinisation of coastal areas; declining agricultural productivity.

Compounding vulnerability factors	Climate hazards intersect with conflict, disease outbreaks and undernourishment.	Increased exposure to climate shocks; disruption of livelihoods, economies and learning centres.

Sources: *Chambers, 2026; Kyed and Chambers, 2026; Kyed et al., 2026; Messmer et al., 2026; Thiri, 2026; Adil et al., 2025; UNICEF, 2024a; IPCC, 2023; Woods et al. 2021; Horton et al, 2017.*

Impacts on Children and Education

Children face particularly severe impacts. According to UNICEF's **Children's Climate Risk Index**, Myanmar's children experience high exposure to environmental hazards and significant vulnerability in access to essential services. More than **91% of children are exposed to three or more climate-related shocks** (Mimansha et al., 2023; UNICEF, 2021).

These hazards directly disrupt education: thousands of schools have been damaged by recent cyclones and extreme heat has triggered multi-day closures (UNICEF, 2025a-n; 2024a-c). Displaced children, girls, and differently-abled children face especially high risks of learning loss (Chambers et al., 2026). Despite commitments by global institutions to advance inclusive education and climate resilience, such as through the Green Climate Fund (2025), there is still limited operational evidence for practical, cost-effective interventions at the activity level in Myanmar.

Conflict in Myanmar

Efforts to strengthen climate resilience in education must account for ongoing armed conflict. Myanmar has experienced some of the world's longest civil wars (Buchanan et al., 2013), with the 2021 coup further intensifying violence and fragmentation. Multiple resistance actors control territory and operate their own governance systems (Thawngmung and South, 2025). The collapse of a central administration has deepened an already fragmented governance, with arrangements ranging from localised systems to township-level structures linked to the National Unity Government (NUG), alongside longstanding Ethnic Armed Organisations (EAOs) exercising state-like functions including administering education systems (KII 20). Across the country, overlapping patterns of single, dual, and contested authority persist (Jolliffe, 2023; South, 2023).

Climate- and conflict-related displacement increasingly overlap, directly disrupting education and worsening vulnerabilities (Sturridge and Holloway, 2022; ICRC, 2020). Climate-induced resource pressures and extreme weather events can heighten territorial tensions, while accelerated environmental degradation, driven by timber, jade, and rare earth extraction, fuels deforestation, pollution, erosion, and conflict (Meehan et al., 2025; OHCHR, 2023). Slow-onset climate stresses and conflict combine to fragment governance, damage infrastructure, and undermine the education system's adaptive capacity (Sabarwal et al., 2024; UNICEF, 2021).

CHAPTER 2: METHODOLOGY

The Education Research in Conflict and Protracted Crisis (ERICC) conceptual framework provides four interconnected drivers of learning—access, quality, continuity, and coherence—that assist in explaining the linkages between climate change effects and educational provision in Myanmar. **Access** enables safe participation and attendance, **quality** shapes the effectiveness of resources and relationships for holistic child development, **continuity** ensures sustained learning and

progression over time despite disruption, and systems **coherence** aligns policies, resources, and decision-making across levels to support these conditions (Kim et al., 2026). A '**polycrisis**' lens that incorporates the interaction between an assemblage of causally interlinked factors informs this framing, including natural and human-induced environmental shocks and protracted armed conflicts (Falk et al., 2024).

This study was guided by three main objectives (see Appendix 2 for a full list of research questions):

1. Understand the intersectional linkages between climate events and education provisions, including in reference to access, quality, continuity and coherence;
2. Identify practical and low-cost climate adaptation strategies for schools; and
3. Develop guidance for integrating climate resilience into education programming.

The data collection involved a desk review, Key Informant Interviews (KII), and Focus Group Discussions (FGDs). The desk review assessed impact and other relevant studies, programme reports, peer-reviewed articles, and media reports to investigate (i) Myanmar's vulnerability to natural and human-induced environmental shocks, (ii) regional and global evidence for linkages between education provisions and climate change, and (iii) connections between education, climate crisis and conflicts in Myanmar.

Semi-structured KIIs and FGDs were drawn from Chin, Kachin, Kayah, Kayin, Mon, Rakhine, and Shan States and Bago, Sagaing, Yangon, Mandalay, Ayeyarwady and Tanintharyi Regions, enabling analysis of regional variations in education provision and climate-related experiences. The sample included 19 KIIs and 7 FGDs. Participants included 6 education/climate change experts and representatives from 8 support organisations and 12 education service providers (See Appendix 1 for further description). Written or verbal informed consent was obtained for all interview participants. All individual identities have been anonymised to protect those in conflict settings.

Rapid review limitations and caveats

While this review sought to include diverse voices, the education service provider and support organisation KIIs skew toward local grassroots actors, particularly ethnic education service providers (EESPs) in remote or conflict settings. There was also limited direct engagement with schools in coastal areas and no engagement with personnel or structures directly linked to the de facto authorities in Naypyitaw.

CHAPTER 3: RESEARCH CONTEXT

Regional Environmental Vulnerabilities in Myanmar

Myanmar faces severe and compounding natural environmental shocks (see Figure 1), including record-breaking heatwaves, high-intensity cyclones, and recurrent flooding, alongside geological risks from earthquakes (UNOCHA, 2025a; WWF, 2017). These risks are further intensified by human-induced environmental shocks from unregulated mining, rampant deforestation, and industrial pollution. Across all regions, chronic underdevelopment, limited investment in social and environmental systems, conflict, and restricted humanitarian access amplify vulnerability to climate risks (Mekong Eye, 2026; Saint San Aye, 2026; George and Dearden, 2019; KII 25).

1. Central Dry Zone (Mandalay, lowland Sagaing, Magway)

Since 2021, the Central Dry Zone has experienced some of Myanmar's most intense conflict, marked by widespread human rights abuses, mass displacement, and acute protection and humanitarian needs (UNOHCHR, 2026). **Table 2** shows how **extreme heat** and **erratic rainfall** increasingly define the climate, compounding long-standing environmental and socio-economic vulnerabilities and declining agriculture. For example, in Kale (Sagaing Region), soaring fuel prices have made irrigation unaffordable, while conflict and landmines have restricted access to farmland (Kyed et al., 2026). Climate projections suggest the Dry Zone will warm faster than coastal regions, with shifting rainfall patterns that may bring heavier June precipitation alongside overall seasonal declines in precipitation (Messmer et al., 2026). Projections suggest that Sagaing Region could experience up to 1.8°C and 2.5°C warming in the hot season by mid-century, depending on the global emissions scenario, and over 3.0°C by the end of the century (ibid.). Climate impacts in lowland areas include flood damage to schools, resulting in closures and relocations, and psycho-social impacts (KII 6).

Table 2. Summary of environmental shocks affecting the Central Dry Zone

Environmental Shock	What's Happening	Why It Matters (Impact)
Drought	Water sources drying.	Water scarcity and livelihood impacts. Direct impact on health.
Climate variability	Erratic rainfall and flash floods.	Disrupted schooling and stresses on agriculture, community resilience and local livelihoods.
Extreme heat events	44–50°C temperatures. Extreme heat days projected to occur 7-14 days per month in-season (up from one day historically).	Direct impact on health including illnesses and mortalities; disrupted schooling.
Deforestation (human-induced)	Increased firewood use despite less logging.	Loss of shade, disrupted social life; long-term impacts on local agriculture and livelihoods.

Sources: *Kyed et al., 2026; Messmer et al., 2026; UNICEF 2025a-c; South 2023; Horton et al., 2017*

2. Coastal regions (Ayeyarwady, Mon, Rakhine, Tanintharyi, Yangon)

Vulnerability in Myanmar's coastal regions is driven by **intensifying cyclones, sea-level rise, and salination** and the **depletion of natural protective ecosystems** (see Table 3). For example, in Sittwe (Rakhine State), rising sea levels and the loss of up to 75% of mangroves have led to severe farmland salinisation, reducing harvests from two cycles per year to one (Kyed et al., 2026). Coastal areas are projected to remain highly exposed to extreme weather such as cyclones and storm surges. Rising temperatures combined with high humidity from the Bay of Bengal and Andaman Sea are also

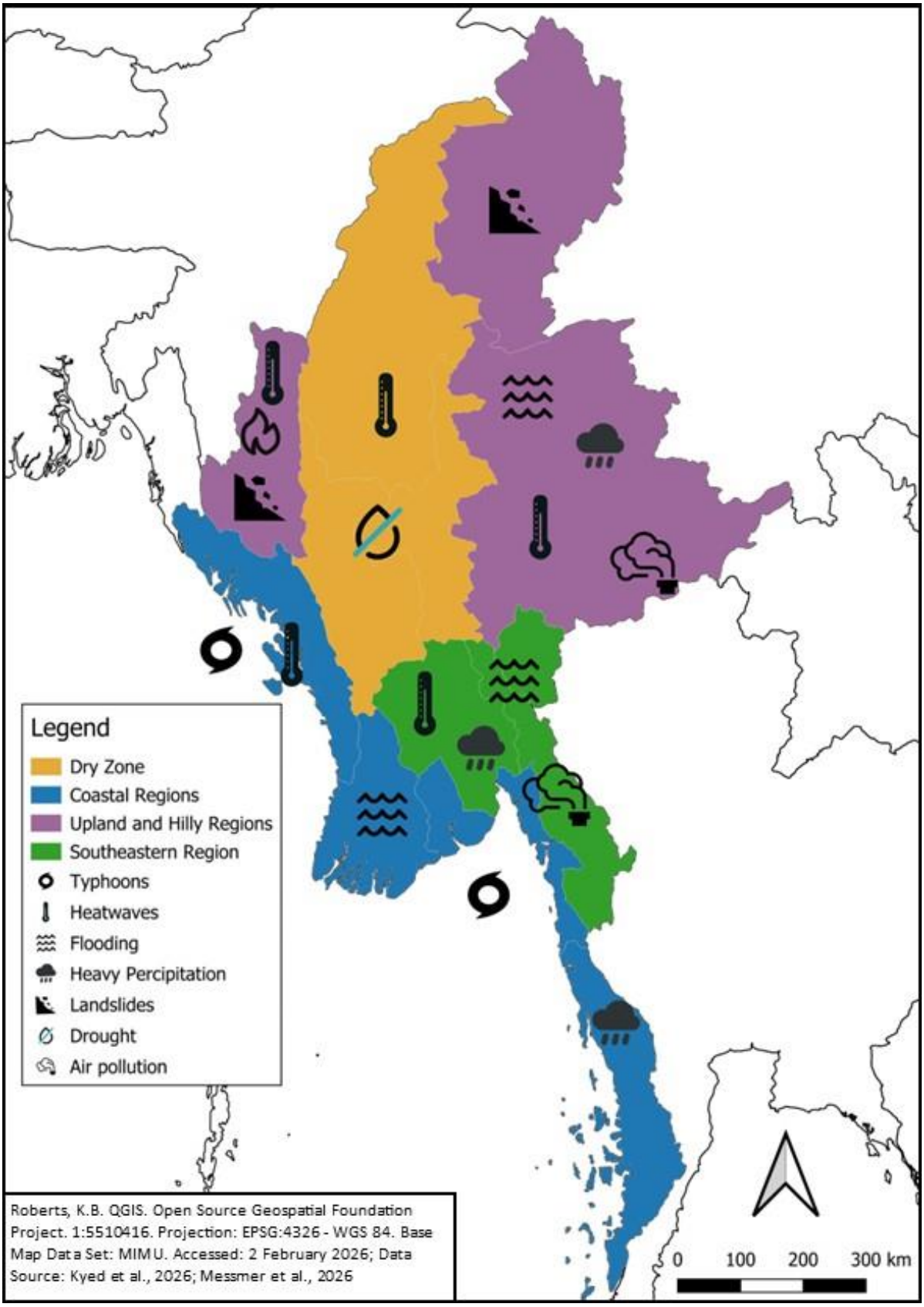
expected to create dangerous heat conditions in the rainy season, particularly in June, through the **wet-bulb effect** where the human body can no longer cool itself effectively (Messmer et al., 2026). Although these models can underestimate historical precipitation along the western coastline, southern Myanmar, especially Tanintharyi Region, is projected to experience a 10–20% decline in annual rainfall (around 500–600 mm) (ibid.).

Table 3. Summary of environmental shocks affecting coastal regions

Environmental Shock	What's Happening	Why It Matters (Impact)
Increased frequency & intensity of cyclones	Cyclone Nargis (2008) caused ca. 140,000 fatalities; Cyclone Mocha (2023) damaged ca. 400,000 buildings in Rakhine State; Typhoon Yagi (2024) caused mass flooding.	Direct impact on schooling (schools destroyed and closed, students and teachers killed); Indirect impact on agricultural and community resilience, livelihoods, and health.
Flooding & storm impacts	Heavy rains and Typhoon Yagi (2024).	Nearly 2.4 million people exposed to flooding; more than 10,000 schools damaged.
Loss of natural coastal protection (human-induced)	Mangrove destruction in Tanintharyi and Rakhine reducing natural storm barriers.	Rising sea levels have caused farmland salinisation, reducing harvests to one per year.
Resource pressure & ecosystem degradation (human-induced)	Increased pressure on natural resources; fishing restrictions and militarisation in Tanintharyi.	Overexploitation of coastal resources is degrading already fragile marine ecosystems.

Sources: *Chambers, 2026; Kyed et al., 2026; Messmer et al., 2026; Thiri, 2026; UNICEF, 2024a-b*

Figure 1. Climate vulnerabilities by region



3. Upland and hilly regions (Chin, Kachin, Shan, upland Sagaing)

Upland and other ethnic minority-populated parts of the country have suffered decades-long civil wars, and the 2021 coup has only increased the level of armed conflict, widespread displacement, and humanitarian vulnerability. **Table 4** shows how in these upland regions, climate vulnerability is shaped by **landslides, flash floods, and drought**, some of which can be directly linked to **environmental degradation** from unregulated mining and logging (Roberts, forthcoming; Kyed et al., 2026; South, 2023; KII 22). Complex topography drives highly variable rainfall through orographic lifting, making these areas sensitive to shifts in atmospheric circulation and moisture (Messmer et al., 2026). Models project stronger warming in upland areas than in coastal zones. Although currently up to 10°C cooler than central lowlands, they are expected to experience some of the country's fastest temperature increases, especially in northern regions during May, at the start of the rainy season (ibid.). However, rainfall projections diverge regionally and vary with different emissions models. For example, the Shan Hills are expected to see precipitation declines of roughly 10% to 20% by mid-century. In contrast, in the more extreme SSP5-8.5 emission model, the Chin Hills may experience significant wetting, with rainfall increasing by 40–60% by century's end (ibid.).

Table 4. Summary of environmental shocks affecting upland and hilly regions

Environmental Shock	What's Happening	Why it Matters (Impact)
Extreme rainfall and landslides	Heavy monsoon, typhoon rains and unseasonal rains.	Infrastructure damage to homes and schools; inaccessible roads and conflict complicates repairs.
Drought	Prolonged droughts, erratic monsoons.	Crop failures, livelihood loss and health impacts.
Water scarcity	Drying sources in highland and central regions (especially Kayah).	Social tensions, reduced access to drinking water and to sanitation.
Wildfires	Natural and human-induced fire hazards.	During seasonal burning and cyclical rat infestation (*mautam*) increased fire hazards, long-term impacts from smoke inhalation.
Environmental degradation (human-induced)	Increased unregulated extraction (coal, gold, rare earth, logging) since 2021 threaten local environments and micro-climates.	Deforestation, river pollution, flooding, farmland degradation and localised temperature increases.

Sources: *Roberts, forthcoming; Thiri, 2026; Messmer et al., 2026; Saw Ner Dhu Da, 2026; Kyed et al., 2026; Roberts and Mai, 2025; UNICEF, 2024b; Horton et al, 2017; Meiktila Township, 2017; KII 8*

4. Southeastern Myanmar (Mon, Kayah, Kayin, Bago, Tanintharyi)

Southeastern Myanmar faces a "triple burden" of intensifying climate hazards, armed conflict, and governance breakdown, increasing vulnerabilities in livelihoods and infrastructure, while also constraining adaptation efforts (Kyed et al., 2026; Mosberg, 2026; South 2023). **Temperatures** are projected to rise by 0.9°C to 2.7°C by the end of the century, with higher increases in upland areas and peak heat in June, reaching up to 4.4°C in southern coastal zones (Messmer et al., 2026). **Rainfall patterns will become more variable**, with shifts in seasonal distribution despite some localised increases in annual totals. For example, compared to most other upland areas; the Karen hills are expected to retain greater moisture in coming decades, which may aid resilience (ibid.). At the same

time, rising heat and humidity (**wet-bulb temperatures**) may push conditions beyond safe human tolerance, particularly at the start of the rainy season in June in lowland and coastal areas, posing severe health risks. **Table 5** shows how this increasing climate variability will heighten pressures on agriculture, water systems and disaster preparedness (ibid.).

Table 5. Summary of environmental shocks affects southeastern Myanmar

Environmental Shock	What's Happening	Why It Matters (Impact)
Extreme weather events	Increased storms such as Typhoon Yagi (2024), Mon tornado (2025) and hailstorms in upland areas.	Large-scale displacement; damage to infrastructure, food systems and water supply.
Extreme heat and water scarcity	Record temperatures (50°C in Bago in 2024); rising temperatures increase dry-season water shortages.	Heat-related illness and deaths, especially among IDPs. Power outages limit cooling Declining yields, crop failure and rising economic insecurity.
Rainfall variability, flooding and landslides	Erratic, heavy rainfall with shorter rainy seasons; flooding and increased landslides; the Sittaung River in Bago dried in 2023 and flooded in 2024.	Displacement, livelihood loss and damaged infrastructure drive economic insecurity. Conflict limits adaptation.
Salinisation of coastal water Sources	Rising saline intrusion in coastal Mon and Kayin States.	Contaminated drinking water and increased health risks
Air pollution (human-induced)	Endemic seasonal haze (smog) along and beyond the Thai/Myanmar border.	Rising respiratory issues and decreased economic productivity.

Source: *Kantarawaddy Times, 2026; Mosberg, 2026; Messmer et al., 2026; Saw Ner Dhu Da 2026; Kyed et al., 2026; UNICEF 2025b; CIDKP, 2024; KNU, 2024; UNICEF 2024a,b; MEI, 2017a; KII 18*

The polycrisis

Summarised in **Table 6**, intensifying extreme weather in Myanmar, especially **heatwaves, flooding, cyclones, and drought**, interacts with ongoing conflict to increase displacement, disrupt markets, and limit humanitarian access. **Economic fragility** reduces the capacity of households and systems to absorb shocks, while **weakened governance** undermines service delivery, environmental management, and disaster preparedness. These interconnected dynamics create reinforcing cycles of risk that exacerbate poverty, undermine resilience, and disrupt essential services, including education. Addressing these challenges requires integrated approaches that underscore the urgent need for targeted, context-sensitive adaptation strategies to safeguard lives, livelihoods, and continuity of education.

Table 6. Climate Polycrisis Interactions and Implications

Dimension	Interaction with Climate Hazards	Implications
Conflict	Climate shocks occur in areas of active conflict (including airstrikes on schools), restricting mobility, damaging infrastructure and limiting access for responders.	Reduced reach and effectiveness of interventions; need for conflict-sensitive and access-adapted programming (e.g. working with existing civilian protections).
Economy	Climate impacts on agriculture, fisheries and labour coincide with inflation and declining livelihoods.	Increased poverty and food insecurity (which impacts school attendance); need for shock-responsive livelihoods and social protections.
Governance	Weak or fragmented governance limits disaster preparedness, service delivery and environmental regulation.	Gaps in early warning, infrastructure and basic services; need to work through local systems and non-state actors where appropriate.
Displacement	Climate and conflict drive displacement, with IDPs often located in hazard-prone, resource-scarce settings.	Heightened exposure and protection risks; need for integrated shelter, WASH and resilience support in displacement settings.
Protection Risks	Inadequate shelters; flooding shifts landmines into safe areas	Increase in insecurity and injury/death risk for IDPs. Some shelters are not suited to climate shocks.

CHAPTER 4: CLIMATE EVENTS AND EDUCATION PROVISIONS

Climate-related hazards severely disrupt education in Myanmar and comparable low- and middle-income contexts (LMICs) by reducing student attendance, impairing learning outcomes, and damaging physical infrastructure. UNICEF (2025o) reported that in 2024, South Asia, East Asia, and the Pacific were the most affected regions globally by climate-related school disruptions, impacting 128 million students and 50 million students respectively. South Asian countries border Myanmar and share similar climate pressures, while East Asia includes Myanmar. Disruptions include **school closures, shortened hours, preponed vacations, postponed reopenings, displaced students and staff, destruction of school facilities, and effects from rising food and oil prices** due to climate hazards (KIIs 8, 9, 22, 23, 26; UNICEF, 2025o).

Children are particularly vulnerable to EWEs and toxic environmental exposure as they have less capacity to protect themselves, regulate body temperature, or secure food and water. Moreover, their developing bodies are more susceptible to lasting harm from pollution and toxins (UNICEF, 2021). Vulnerability is compounded for children living in poverty or without social protection (ibid.).

Key Climate Risks

Flooding, Landslides and Cyclones: In Myanmar, **10.29 million children** are highly exposed to coastal or riverine flooding and **4.39 million** to cyclones (Mimansha et al., 2023). Flooding and landslides disrupt school access, destroy infrastructure, and exacerbate health risks. Agricultural losses can push children to work, affecting attendance and learning (Asadullah et al., 2021; Agamile and Lawson, 2021).

Heat Stress: Myanmar is projected to warm 0.9°C by mid-century and 2.7°C by 2100 under SSP2-4.5, or up to 4.4°C under SSP5-8.5 (Riahi et al., 2022). Already in Myanmar, **2.29 million children** are exposed to **heatwaves,** and **610,000 children** are highly exposed to **water scarcity** (Mimansha et al., 2023). Projected warming of 1.5–1.8°C by mid-century, peaking up to 3.4–4.4°C by century's end, coincides with the start of the rainy season, creating **dangerous wet-bulb conditions**, which threatens student health and learning (Raymond et al., 2020; Horton et al., 2017).

Human-Induced Environmental Pollution: Approximately **17.19 million children** are highly exposed to PM2.5 pollution in Myanmar, **4.7 million** to lead pollution, and **8.58 million** to pesticides (Mimansha et al., 2023). Seasonal haze arises from agricultural burning, swidden practices, and atmospheric conditions (Sriyai and South, 2024). Pollutants (PM2.5, nitrogen dioxide, lead, pesticides) impair cognitive development, reduce test scores, increase absenteeism, and exacerbate respiratory illness (World Bank, 2024; UNICEF, 2021; Chen et al., 2018). Flooding can mobilise contaminants such as lead and pesticides, increasing exposure risks, particularly among displaced or conflict-affected children (Chambers, 2026; IPCC, 2023; UNICEF, 2021). Contamination also drives waterborne diseases, undermining school WASH and household food security (UNICEF, 2025e, l, m; MEI, 2016; 2017a, c-e).

Student Attendance and Enrolment

School Closures: Extreme weather events, including storms, flooding, and heatwaves, trigger closures affecting millions globally; between 2022–2024, 404 million students were impacted (Sabarwal et al., 2024). Key informants in Myanmar reported closures lasting up to two weeks, compounded by the March 2024 earthquake and rising temperatures affecting student and teacher health (KIIs 4–7, 9, 22, 23). This is in addition to closures due to conflict.

Schools as Shelters: Schools frequently serve as emergency shelters (UNICEF, 2025o; UNICEF, 2024a–c; Sabarwal et al., 2024). Exclusive use prolongs closures and disrupts learning (Marin et al., 2024; UNICEF, 2021). In contested ethnic minority regions in Myanmar—such as Kayin, Kachin, and Kayah States—schools also act as shelters during conflict (KIIs 1, 11, 22, 23).

Access Barriers: Damaged roads, bridges, and industrial hazards (e.g. fly ash from coal mining) hinder safe travel (Roberts and Mai, 2021; KIIs 1, 2, 6, 7, 9, 20, 22). For instance, a key informant noted that in one village, up to 50% of school-age children were out of school because floods and landslides frequently blocked access to the secondary school (KII 20).

Economic Pressures: Climate-related shocks reduce agricultural productivity, undermining livelihoods and food security. This limits household income and families' ability to support children's education, and in some cases pushes children into labour or early marriage (Kyed et al., 2026; UNICEF, 2023; MEI, 2017a, c-f; KIIs 1, 3, 4, 7, 22). This particularly impacts secondary school students, who already face a risk of forced conscription due to the ongoing conflict. As one key informant:

> *"The economy has declined, and many students' parents are facing financial difficulties, which limits children's access to education. Fuel costs have also increased significantly,*

making it difficult for parents to send and pick up their children from school. As a result, some students are no longer able to continue their studies due to their families' financial hardship after the coup." (KII 4)

Climate impacts on agriculture are increasingly observed by farmers in Myanmar, although non-farming populations have yet to experience major tipping points (KII 1). One key informant (7) reported that some students along the India-Myanmar border attend school as few as 90 days per year because they need to help their families farm. Girls can be disproportionately affected, as families experiencing livelihood stress often prioritise boys' education, and boys also have the option of entering the monkhood (KII 1, 3, 15).

Learning Outcomes and Well-being

Heat Stress: Heatwaves affected **171 million students globally** in 2024. Rising temperatures reduce concentration, processing speed, and test performance and contribute to teacher fatigue, shortened school days, and absenteeism (Marin et al., 2024; Brink et al., 2021). Optimal classroom temperatures range from 19.5–23.3°C, but learning can decline at higher temperatures: above 26.7°C in one study, above 29°C for reading in India, and above 32°C for math in China (UNICEF, 2025o; World Bank, 2024). In Myanmar's Central Dry Zone, students report that it is too hot to study, and teachers say it is increasingly difficult to teach safely during the hot season (KIIs 4, 5, 7, 9, 21).

Additionally, at and **above 37°C**, people experience 'heat stress,' which can be debilitating or fatal without shade and adequate water, especially for children (IPCC, 2023). Teachers are also at risk of heatstroke. In Thailand, authorities sometimes halt in-person teaching to protect them (UNICEF, 2025o; KII 23). In Myanmar, extreme heat days, **defined as 38°C on the coast and 39°C inland**, pose life-threatening risks to children and teachers (Adil et al., 2025; Horton et al., 2017; KII 21).

Health Impacts: Seasonal health risks increase student and staff absences, including **malaria, dengue, heat rash and other illnesses**. Flooding worsens indoor conditions, with mould and poor air quality causing headaches, dizziness, and reduced concentration (Chalupka and Anderko, 2019; Kim et al., 2007). Education providers in upland areas report more absences during the **rainy season** from **tuberculosis, vector-borne diseases, and waterborne illnesses**, while the **hot season** brings **heat-related stress, dehydration, and respiratory problems** (KIIs 4, 5, 7, 9). As one teacher noted, "Younger children are more vulnerable to disruptions caused by bad weather … they tend to get sick more easily" (KII 5).

Psychological Impacts: Trauma from disasters, pollution, and poor air quality reduces academic progress through reduced concentration and cognitive inhibition (World Bank, 2024). When EWEs further limit access to schools, sanitation, and health care, this disproportionately affects children with disabilities (UNICEF, 2025n; 2024b). Monastic educators and EESPs discussed how **teachers** experience significant **emotional distress** following disasters; yet, in the aftermath of shocks, they are often expected to provide **psychosocial support to students** while simultaneously managing their own recovery and trauma (KIIs 6, 9; World Bank, 2024).

Increased Teacher Workload: Disasters increase teacher responsibilities without compensation, including coordinating shelters and conducting make-up classes (KIIs 4, 5, 7, 9; World Bank, 2024). School closures and absences result in wider classroom learning gaps. Teachers must find ways to adapt instruction for students who have suffered varying degrees of learning loss, which is highly challenging without specialised tools or guidance (KIIs 4, 5, 7, 9; World Bank, 2022).

Cumulative Learning Loss: LMICs lose approximately **18 school days per year** to climate shocks, versus 2.4 in high-income countries (World Bank, 2024). Repeated disruptions can accumulate to years of learning lost by the end of high school, with heat alone potentially causing up to 1.5 years of lost learning (Schady et al., 2024).

School Infrastructure

Climate hazards **directly damage education infrastructure**, as floods, cyclones, and landslides destroy classrooms and facilities (KIIs 8, 9, 22, 23, 26). For example, Typhoon Yagi damaged over 10,000 schools in Myanmar (Kyed et al., 2026; UNICEF, 2025i and k). Many learning spaces, especially those built from bamboo or mud bricks, collapse under extreme weather (KII 9). Physical risks such as falling branches, coconuts, and deteriorated indoor conditions (mould, poor air quality) further threaten student and teacher health (Chalupka and Anderko, 2019; Kim et al., 2007). Loss of resources, including textbooks, stationery, and WASH facilities, compound existing inequities (KII 8).

Systemic bottlenecks

Myanmar's education system faces systemic bottlenecks to climate adaptation due to chronic under-development and under-investment, ongoing political crises, and armed conflict. The combination of conflict and climate risks, and geo-political tensions (including fuel shortages), have a profound **impact on supply chains**, further marginalising many rural communities. Key informants emphasised that conflict is currently viewed as a more immediate threat than climate change, though both are interconnected, compounding challenges for emergency response, school resilience, and education management (KIIs 2, 3, 7–9, 11). **Resilient delivery through EESPs and civil society organisations (CSOs) is therefore critical to navigate these overlapping risks**.

Primary and Secondary Education: Some key informants (KIIs 14, 24) distinguished between **access** to participate in education and **quality** of resources and relationships. Prioritisation decisions in a resource-limited context reflect broader debates in the Disaster Risk Reduction (DRR) and crisis response community. Access to primary school is generally adequate, although some conflict areas previously reliant on national provision have experienced system collapse (KIIs 7, 8). The main concern at primary level is quality: meaningful learning and well-being through adequate resources and supportive processes. At the secondary level, access is a greater constraint, particularly in rural areas, where students travel further and face risks such as forced conscription (KIIs 5, 7–9). This suggests prioritising **quality in primary education** and **access in secondary**, with implications for addressing climate impacts on infrastructure and holistic outcomes.

Under-investment in Education and Infrastructure: Myanmar has persistently **under-invested in education**, allocating and unevenly dispersing as little as 13.7% of the Myanmar government budget in 2017/2018 while prioritising military expenditure, with limited climate finance and low policy prioritisation for education (Mosberg, 2026; World Bank, 2024). This chronic underfunding constrains both state and non-state capacity to build disaster-resilient infrastructure and implement school safety planning, further compounded by **inflexible and short-term funding** that limits climate-adaptive anticipatory action (KII 7; UNICEF, 2023). Targeted measures such as removing school fees or providing subsidies can support re-enrolment following climate shocks (Marin et al., 2024; World Bank, 2024).

Access and Aid Delivery: Military restrictions and state and non-state armed checkpoints have blocked education aid and relief in disaster-affected zones, leaving students vulnerable, such as in areas impacted by Cyclone Mocha and 2025 flooding (Chambers et al., 2026; KIIs 3, 7, 9, 11). At the same time, climate hazards intersect with ongoing conflict, further reducing adaptive capacity. For

example, in Karen areas, airstrikes and artillery amplify vulnerabilities, as communities already affected by violence are less able to respond to floods, heatwaves and pollution (KII 1).

Institutional Priorities: Education management school resilience and school safety planning are constrained by security concerns (KIIs 3, 9, 11). Key informants indicate that in contexts of protracted conflict, planning for resilient infrastructure, school safety for extreme weather or climate adaptation is deprioritised. One informant observed:

> *"We have that dream [for climate change resilience] … but since we are in a chaotic situation, we are not really prioritising those institutional visions when it comes to infrastructure or policies"* (KII 9).

In many regions, there is a chronic low prioritisation of funds for environmental health in schools and a lack of clear, mandated regulatory oversight or systematic indicators for assessing school infrastructure (KIIs 14, 21, 25, 26).

Polycrisis: The evidence highlights that climate impacts on education in Myanmar are integrated with the polycrisis rather than additive: climate hazards amplify and are amplified by conflict, economic stress, governance gaps, and displacement. **Table 7** demonstrates how **system-wide disruption** across access, quality, continuity, and coherence underscore the need for integrated programming that addresses climate resilience alongside these structural drivers.

Table 7: Polycrisis dynamics across education drivers

Polycrisis Dynamics	Climate Interaction Pathway	Resulting Education Impacts
Conflict	In contested areas insecurity restricts movement and limits humanitarian access. Schools are repurposed as shelters. Local civilian protection strategies need to be further investigated and integrated with climate adaptation.	Prolonged school closures, reduced attendance, disrupted service delivery and weakened system coordination.
Economics	EWEs damage agrarian livelihoods, increase food insecurity and raise costs (e.g. transport, fuel), pushing households into debt and negative coping strategies, including child labour.	Stress, malnutrition and resource constraints increase dropout and reduce attendance and learning outcomes.
Governance	Weak or fragmented governance limits disaster preparedness, infrastructure investment and oversight. Conflict deprioritises education planning, although EESPs do have capacity and networks amongst different school systems.	Inadequate school infrastructure, limited climate adaptation, poor learning environments and gaps in service delivery.
Displacement	Climate and conflict jointly drive displacement into informal, hazard-prone settings with limited shelter, WASH and education provision. Emergency evacuation centres are rarely climate change adapted.	Irregular attendance, unsafe or temporary learning spaces, reduced learning quality and heightened protection risks.

Env. degradation	Pollution and ecosystem degradation (e.g. air pollution, salinisation) interact with climate hazards to worsen health and learning conditions.	Irregular attendance, reduced concentration and increased health risks.

CHAPTER 5: SCHOOL CLIMATE ADAPTATION STRATEGIES

*See **Table 8** for a summary of region-specific climate hazards, adaptation strategies, and maladaptation risks. See **Appendix 3** for a list of ranked climate adaptation strategies.*

Interventions for extreme heat from Myanmar and beyond

1. Temperature Control Measures

Planting trees around school grounds lowers ambient temperatures **by 1–5°C**, reduces glare and UV exposure, and improves student comfort and learning conditions. **Cost per student is roughly USD 0.33** (Marin et al., 2024). Shade trees can also serve as educational or community awareness tools (May Thiri, 2026). However, shade tree species and planting location needs to be determined in consultation with community members, using locally relevant species (KII 19). Supporting school farms, orchards, and tree-planting initiatives already occurring in Myanmar can enhance climate resilience and community engagement (KIIs 1, 2, 12, 16).

Painting school rooftops with **solar-reflective white paint** significantly reduces indoor temperatures. In India, new white roofs are significantly cooler in afternoon sunshine than older and darker roofs, translating to a **2–5°C reduction** in indoor temperatures. In Ahmedabad, the Heat Action Plan 2017 implemented white roof coatings at a cost of approximately **USD 0.66 per student** (World Bank, 2024). Painting roofs white, however, may be maladaptive in areas in Myanmar where airstrikes commonly occur.

2. Bioclimatic and Structural Adjustments

School design that incorporates **natural daylight, cross-ventilation, and shade structures** can significantly reduce reliance on energy-intensive cooling systems while improving thermal comfort (Marin et al, 2024; Chalupka and Anderko, 2019). In locations with reliable electricity, ventilators can also assist in cooling. These climate-responsive school designs are **strengthened by local materials and strong community ownership**, drawing on local knowledge of building methods, environmental conditions, and risks. For example, adaptations can include clay-based, naturally ventilated structures like Gando Primary School in Burkina Faso (World Bank, 2024; KII 9). Communities may also employ techniques like thatched roofing for cooling (though this can introduce fire risks) or develop innovative solutions such as floating schools in flood-prone areas (e.g. Cambodia (KII 21)).

Disaster response and other actions are most effective when supported through policy commitments, such as Kenya's Green Economy Strategy that promotes climate-responsive construction to improve learning conditions during high temperatures (Marin et al, 2024; Odero, 2022). **Box 1** shows a Karenni Interim Executive Council (IEC) approach. The Rural Indigenous Sustainable Education (RISE) team in Myanmar highlighted IEC's use of natural and indigenous materials such as bamboo in school construction (KII 20)—an approach shared by several EESPs working on school quality improvement planning (KII 14).

Box 1. Climate-adapted schools in Kayah

Environmental Curriculum: The Karenni IEC Department of Education integrates climate and environmental education into basic schooling to teach children to value and understand environmental change (KII 12)

School Construction Guidelines: IEC and CSOs provide training through Township Education Departments and local committees, combining external expertise with community knowledge. Designs maximise natural light, ventilation, energy efficiency and safety during airstrikes, while teacher training includes early warning and evacuation protocols.

Challenges: Many IDP schools still use tarps for roofing, causing overheating and vulnerability to storms, highlighting the need for resilient, context-appropriate infrastructure (KII 12).

In parallel, schools and community buildings can serve as critical emergency shelters. The design of emergency shelters—including those for families, communities, and schools—must also account for rising temperatures, integrating strategies such as natural ventilation, wherever possible to maintain safer and more habitable conditions (KIIs 2, 16).

3. Water Storage and WASH Solutions

Resilient water infrastructure, including diversified water sources such as water tanks and storage systems, is essential to ensure reliable access during the hot and dry season, particularly in climate-affected and conflict-prone areas, where multiple key informants (7-9) highlighted concerns about children lacking adequate WASH facilities. Limited funding and ongoing armed conflict limits the development of resilient infrastructure.

During heatwaves, insufficient water limits children's ability to hydrate and regulate body temperature, directly impairing concentration and learning outcomes (UNICEF, 2025o; UNICF, 2022). Water scarcity also forces households to prioritise drinking over hygiene, increasing disease transmission risks (Mimansha et al., 2023; UNICEF, 2021). As one key informant (9) noted, "*When you have a drought, when you don't have steady water supply… kids can't have proper WASH facilities,*" underscoring the direct link between climate variability and WASH access.

Interventions for floods and landslides from Myanmar and beyond

Low-Cost School Infrastructure Adjustments include options such as **retaining walls** to mitigate landslide risks costing approximately **USD 22 per student** depending on scale, while **sandbags** provide temporary, **low-cost** protection for classrooms during gradual flooding (World Bank, 2024; KIIs 9, 26). Elevating classrooms on stilts or raised foundations, as practiced in Vietnam and other flood-prone regions, further reduces inundation risk and should prioritise locally available materials and construction techniques (Marin et al., 2024). Improvements to roofing, such as replacing leaky thatch with more durable materials, help prevent water damage during heavy rains and flooding (KII 8). Highlighting possible maladaptation trade-offs, some traditional materials like thatch may still be used strategically for cooling despite potential fire and leaking risks.

Water Management interventions such as water storage and rainwater harvesting help to ensure reliable supply during droughts while also reducing localised flooding; low-cost approaches can include improvised gutters made at **practically zero-cost** from cut plastic bottles (Marin et al, 2024; Singh and Shah, 2022 Mitchell and Borchard, 2014). A key priority across all education institutes is **access to WASH facilities**. At the systems level, effective drainage and sewage infrastructure are

equally critical to prevent contamination during climate-induced flooding (UNICEF, 2021). Broader adaptation efforts highlight scalable solutions, including rooftop rainwater harvesting in Kenya and water purification distribution in Vietnam (Marin et al., 2024; Sabarwal et al, 2024; UNICEF, 2023), with evidence from Myanmar demonstrating that infiltration gallery wells combined with solar-powered pumping and water metering can sustainably regulate water use, reduce waste, and strengthen long-term climate resilience (UNICEF, 2023).

Nature-based and Environmental Activities at community and school levels reduce climate risks to children and infrastructure. Mangrove and coastal wetland restoration, led by communities and CSOs, can cut coastal flooding, preserve freshwater, and limit salinisation costs **two to five times cheaper** than some engineered solutions; median restoration costs are **USD 0.10/sq. ft** for salt marshes and **USD 0.01/sq. ft** for mangroves (Sabarwal et al., 2024; UNICEF, 2021; KII 19). Wetland, forest, and riverbank restoration also mitigates riverine flooding, supports livelihoods, and can be integrated into school management and curricula with local authority support.

Anticipatory Measures Supporting Educational Continuity: System-level adaptations, such as adjusting academic calendars to avoid peak rainy seasons, as considered in Shan State, can improve school access but risk maladaptation if students face extreme heat during the dry season, highlighting the need for context-sensitive planning (KIIs 7, 8, 20, 26). Informants emphasised that anticipatory action is crucial for working with communities and civil society to enhance resilience and maintain educational continuity during climate-related shocks (KIIs 14, 15, 24).

Low-cost, practical innovations can reduce risks for children in flood-prone areas, exemplified by the **floating backpack.** They combine buoyancy, usability, and safety, and have been endorsed by the Vietnamese government and distributed via CSOs (Mitchell and Borchard, 2014; UNDP Vietnam, 2012). Complementary measures during the rainy season, such **as rain boots, umbrellas and waterproof backpacks** have already been proven to further support safe school access, for example among young children in remote parts of Chin State (KII 7).

Other Strategies

Education systems in Myanmar can learn from practical interventions applied in other regions facing climate, conflict, and disaster risks. Key strategies focus on preparedness, adaptive infrastructure, continuity of learning, and mitigation of environmental hazards.

1. Emergency Preparedness and Early Warning Systems (EWS)

Emergency preparedness and EWS are critical for protecting children and school infrastructure, yet they require funding to be effective. In the Philippines and Indonesia, schools have implemented disaster preparedness measures—including evacuation protocols, safe shelters, and real-time mobile platforms such as InaRISK—to support drills and reduce damage from floods, typhoons, and earthquakes (Marin et al., 2024; World Bank, 2024; KII 19). Bangladesh similarly demonstrates the effectiveness of community-level disaster risk management, combining early warning dissemination with preparedness education to reduce mortality and school disruption during cyclones (Asadullah et al., 2021; UNDRR, 2023). This is a model adaptable for Myanmar, though trust in warnings varies by community, with local armed-political actors (such as EAOs) generally better trusted than military sources (Mosberg, 2026).

In Myanmar, the World Food Programme (WFP) emergency preparedness interventions that account for local conflict conditions (KII 22) and the Karen National Union (KNU) are developing an underfunded network of weather stations and early warning systems for temperature, precipitation,

and hazards, alongside a civilian protection framework—including evacuation, trauma care, relocation to safe spaces, airstrike alerts, pre-positioning of relief supplies, and basic shelter construction—that could be integrated with explicit climate adaptation strategies, and potentially serve as a model for other actors.

Table 8: Region-Specific Climate Hazards, Adaptation Strategies and Maladaptation Risks

Regional Key Climate Risks	Adaptations (Myanmar and comparable contexts)	ERICC Drivers Affected	Maladaptation Risks (Polycrisis)
Central Dry Zone: Extreme heat, drought, water scarcity, erratic rainfall	Tree planting for shade, agroforestry/school gardens, cool/white roofing, bioclimatic design, water storage systems, WASH solutions, adjusted school calendars	**Access:** conflict, absenteeism **Quality**: WASH, infrastructure, learning conditions **Continuity**: calendar disruption	Reduced instructional time due to heat-based scheduling; seasonal misalignment of schooling; WASH trade-offs that increase health risks
Coastal Regions: Cyclones, flooding, storm surges, salinisation, high humidity	Temporary learning spaces; mangrove restoration; schools used as shelters; local evacuation systems; elevated/stilted cyclone-resilient schools; early warning systems	**Access**: closures, displacement **Continuity**: recurrent disruption **Quality**: damage and infrastructure instability	Reliance on temporary structures increases exposure to storms and heat; schooling-as-shelter disrupts learning continuity
Upland and Hilly Regions: Landslides, flash floods, drought, environmental degradation	Community-led school construction; use of local materials; flexible calendars; EESP delivery models; retaining walls; slope stabilisation; improved drainage; remote/radio-based learning	**Access**: geographic isolation, conflict. Displacement **Quality**: limited resources and infrastructure **Continuity**: seasonal disruption	Flexible calendars reduce instructional time; monsoon-related access barriers; conflict–climate interactions weaken adaptation effectiveness
Southeastern Myanmar: Flooding, landslides, extreme heat, seasonal haze/pollution	Community learning spaces; remote and flexible learning; school feeding programmes; early warning and civilian protection systems (e.g. KNU systems); climate education; catch-up programmes; DRR training	**Access**: displacement barriers **Continuity:** informal settlement instability **Quality**: temporary infrastructure and learning constraints	Informal displacement increases exposure to hazards; reliance on temporary shelters (e.g. tarpaulins) worsens heat stress and storm vulnerability

2. Continuity of Learning During Environmental Shocks

Keep schools open: Minimising disruptions where possible remains important. This includes avoiding the prolonged use of schools as shelters and ensuring rapid deployment of temporary learning structures (Marin et al., 2024; KIIs 7, 9). As one informant (26) noted, "*It's difficult to make temporary*

or emergency learning structures climate resilient; nevertheless, this should be a priority because we know that the impact of climate change will only increase over time."

Temporary learning arrangements, such as community-built classrooms or shared spaces, help maintain education when schools are damaged or closed. After Cyclone Mocha, students at Waymaker Learning Centre used a community "fire house" (KII 7), while at Pinnya Tagar, bamboo and plastic tarp classrooms were employed following floods (KII 9). In Ta'angland, classrooms were sometimes relocated or held outdoors due to cold or flooding (KIIs 3, 11). Preparedness and rapid recovery are essential for safe school reopening (Marin et al., 2024; KIIs 7, 9).

Remote and flexible learning models can significantly reduce disruption-related learning losses; for example, in Brazil, students with online access saw no decline in test scores during flood days, compared to a 33% reduction for in-person–only students (Marin et al., 2024; World Bank, 2024). In Myanmar, expanding access to technologies such as Starlink creates opportunities for **online and hybrid learning**, alongside **temporary learning spaces** during EWEs, though effectiveness depends on teacher training, student preparedness, and reliable electricity and connectivity (Marin et al., 2024; KIIs 3, 11, 18). In Myanmar a **context-specific mix of delivery modalities** is required. **Virtual learning** in connected areas, and **radio-based education** or **community-led approaches** in low-connectivity settings, with examples from Chin State and the Karen Education and Culture Department (KECD), highlight the importance of **community-driven resilience** (KIIs 1–3, 8–11, 26).

Attendance and catch-up programmes after school closures or prolonged absences is critical for recovering lost learning (Marin et al., 2024). Strategies include catch-up tutoring and supplementary lessons through after-school sessions, with adequate teacher support and funding (KIIs 7, 9, 20). Measures such as school mergers, community awareness of climate risks, and climate-adapted livelihoods further strengthen continuity. Active parent and community engagement is essential to sustain attendance and learning, especially in remote or conflict settings (Marin et al., 2024; KIIs 7, 8, 20).

Schedule adjustments, including modifying academic calendars, curricula, and daily classroom timetables, can help schools accommodate seasonal hazards such as smoke, flooding, malnutrition, and extreme heat, often through reduced workloads or shortened terms (KIIs 4, 5, 9, 14, 18). However, national curriculum and testing requirements may limit flexibility. Though maladaptation may still expose children to heat or unsafe home environments (KIIs 4, 7, 8, 14, 23, 25), one teacher noted (KII 4) moving lessons to cooler times or shaded areas can aid concentration:

> *"When students cannot focus on learning due to the heat, we concentrate our teaching in the morning, only conduct light activities such as drawing in the afternoon. Sometimes, we move under the shade of trees … to increase student concentration on learning. However, since the students are still young, when we move outside for shading, they just play and do not focus on learning as well."*

School feeding programmes play a critical role in improving attendance and learning outcomes in contexts of climate-driven food insecurity, with key informants noting that the WFP school feeding programmes help to keep children in school (World Bank, 2024; Agamile and Lawson, 2021; KIIs 1, 7, 22). Additionally, linking schools to climate-adapted livelihoods and nature-based solutions—such as agroforestry, school gardens, and tree planting—further enhances resilience, supports nutrition, and engages communities.

Mitigate human-induced environmental degradation: Seasonal haze from agricultural burning in Myanmar and Thailand significantly affects learning outcomes (Sriyai and South, 2024). Local programmes addressing environmental hazards, including plastic pollution, improve school health and safety, while community-led initiatives such as the Salween Peace Park show that indigenous and CSO-driven natural resource governance, including reduced burning practices, can mitigate air pollution and enhance climate resilience even amid ongoing conflict (Chambers and Supajakwattana, 2025; Sriyai and South, 2024).

Building capacity and climate literacy equips students and teachers with training in DRR, climate awareness, adaptive practices, and psychosocial support after disasters (World Bank, 2024; UNICEF, 2021). Mobile teacher training supports multi-grade classrooms in displacement settings, while community awareness and climate-adapted agriculture strengthen resilience (KIIs 17–20). Integrating early warning, indigenous knowledge, and sustainable livelihoods into curricula empowers communities, with basic disaster preparedness training costing **around USD 4.19 per student** (Sabarwal et al., 2024).

CHAPTER 6: RECOMMENDATIONS

Hyperlinks are included in-text when useful resources are mentioned.

6.1. Top three actionable approaches

1. Invest in climate-resilient, locally adapted infrastructure

Investing in climate-resilient and context-appropriate infrastructure is a foundational intervention for **improving both access to and quality of education** in climate-affected contexts. This is particularly the case across much of Myanmar, where armed conflict exposes many schools and communities to acute threats; adaptation strategies should be adjusted to local civilian protection priorities, while civilian protection should be climate change adapted.

Evidence highlights that infrastructure is among the education investments with the highest potential for both climate adaptation and mitigation (Ambasz et al., 2022). Yet, local education and governance bodies, donors, and other international partners must **prioritise infrastructure investment** and have funds available. Moreover, a central principle is **localisation**: infrastructure should be designed and implemented by communities, EESPs, CSOs, and local authorities, drawing on local knowledge and context-specific risks (KIIs 20, 22, 25). In practice this involves:

- **Context-appropriate and conflict-sensitive infrastructure upgrades,** including site selection and reinforcement for local risks, designed to avoid exacerbating local tensions or exposure to conflict, and feasible under varying governance and access constraints.
- **Low-cost, resilient materials and design**, using locally available resources (e.g. bamboo, hempcrete) and natural ventilation.
- **Climate-resilient WASH systems**, including rainwater harvesting, filtration, and gender-responsive sanitation.
- **Access-enabling infrastructure**, such as roads and bridges, to maintain school access during shocks.

2. Flexible and adaptive delivery models

A second critical approach is to ensure that education systems can **continue delivering learning during climate, disaster, and conflict-related disruptions**. This requires adopting **Education in Emergencies (EiE)** approaches that prioritise flexibility, redundancy, and adaptability (KII 26). System-level measures are essential to ensure resilience and continuity. Establishing standardised learning continuity and safety management systems enables schools to maintain instruction during disruptions and recover more rapidly afterwards (ERICC Helpdesk, 2025). This should include input from parents, education and governance authorities, and technical experts. **Local 'ownership'** (including teacher and student) of remote learning strategies aids in success. Key interventions include:

- **Flexible learning modalities**, including adjusted schedules, outdoor lessons, and community-based spaces.
- **Expanded remote learning**, supported by teacher training and appropriate technology.
- **Remedial learning strategies**, including small-group or catch-up instruction to address learning losses (MoPME, 2025; ERICC Helpdesk, 2025).
- **Weather-adapted student support**, such as rain gear and waterproof learning materials to sustain access during extreme weather.

3. Anticipatory action, early warning systems, and community-led adaptation

A third priority is shifting from reactive to **anticipatory, community-led climate adaptation** within education systems. Engaging CSOs, parents, and local stakeholders (including relevant EAOs and their civilian line-departments) in planning, delivery, and evaluation strengthens relevance, ownership, and sustainability, while aligning interventions with early warning, DRR, existing evacuation protocols, and protection systems. Infrastructure should be designed to address both climate and conflict risks (KIIs 24, 26). In alignment with existing civilian protection and local coping strategies, this includes**:**

- **Embedding early warning and evacuation protocols** within School Safety Plans (ERICC Helpdesk, 2025).
- **Shift to anticipatory action**, moving from "responders" to "anticipators".
- **Pre-positioning of supplies** (e.g. seasonal medicines, seeds, learning materials) and planning for predictable climate risks.
- **Scenario and contingency planning** for climate and conflict risks including regular drills to reinforce preparedness and response capacity.
- **Fast-access recovery funding** to enable rapid repairs, cleaning, and timely school reopening.
- **Community Engagement:** Involve students and teachers in risk management and local environmental protection.

6.2. Aligning Approaches with Myanmar Education Policies

Mainstream climate as a cross-cutting priority

A central entry point is to position climate change as a **cross-cutting issue in education policy, planning, and delivery**, rather than as a separate sector. This aligns with international guidance emphasising that climate considerations should be integrated across all aspects of education systems (KII 23). In practice, many relevant activities—such as reforestation, school agriculture, or infrastructure improvements—are **already being implemented, but not labelled as "climate action."**

Existing practices can be **reframed and connected** to climate objectives. Key **cross-cutting alignment** actions include:

- **Integrate climate adaptation into education planning and financing** through sector and sub-national frameworks, including EESPs, to strengthen system resilience.
- **Incorporate climate risk into management systems** at national and school levels, including disaster preparedness, DRR, early warning and anticipatory action, including in relation to widespread armed conflict (often targeted at schools).
- **Promote inclusive planning** by integrating gender, disability, and social inclusion (GEDSI) to address unequal climate impacts.
- **Implement climate-safe building codes** across systems (where possible, such as with EESPs that are developing school maintenance and repair policies), risk-informed locations, and structural adjustments to withstand floods, cyclones, and heatwaves.
- **Support student and staff well-being** through psychological support and trauma recovery, especially in conflict or disaster-prone areas (KII 6).

Integrate climate into curricula, awareness, and system-wide practices

Embedding climate considerations into curricula, teaching, and community engagement is essential to strengthen awareness and support behavioural change in Myanmar, where **understandings of climate change vary widely**. Leveraging students and teachers as agents of change can strengthen awareness, support behavioural change, and engage students in risk management (KII 6; Marin et al., 2024). Key **integration** actions include:

- Supporting development of **environmental and climate curricula** through collaboration with education authorities, teacher training colleges, and CSOs (KIIs 2, 25).
- Linking school-based **learning with community awareness-raising** on climate-adapted agriculture, natural resource management, and local energy solutions.
- Promoting **whole-school approaches**, including measures to reduce pollution (e.g. limiting plastic waste), to strengthen resilience through visible environmental improvements (KII 26).
- Encouraging **green skilling** by identifying small steps for children and youth to enter a job market dominated by the agriculture sector in Myanmar (KII 23).

Align with decentralised governance systems

Given Myanmar's fragmented governance context, alignment must **engage with a diverse set of actors**, including local armed-political actors, EESPs, township-level authorities, and community-based structures. Key strategies include:

- **Support locally led policy and advocacy:** Develop school construction and climate adaptation guidelines through local education bodies, and advocate with armed actors and local authorities to integrate climate considerations into education (KII 25).
- **Foster multi-level coalitions:** Link communities, local governance actors, and international partners to enable coordinated, effective climate action. Many organisations have developed sophisticated humanitarian, emergency, and development policies. A notable example is the KNU's Kawthoolei Climate Action Plan (KNRECC, 2025).
- **Support marginalised schools:** Smaller EESPs and autonomous, community, and monastic schools often struggle to access international funding; in these cases, local communities lead initiatives, sometimes with overstretched local donor support.

Leverage and strengthen coordination frameworks

Build on existing international and grassroots coordination and financing mechanisms. The **Education Sector Representative Group (ESRG)** is the decision-making body for Global Partner for Education funds, linking donor and development support within Myanmar. The **Education Cluster** coordinates humanitarian funds. The **Ethnic Education in States and Regions Forum** (EESRF), while not a decision-making body, brings together a wide range of EESPs. Strengthening localisation requires engaging such platforms earlier in the policy design process and enabling greater input from local education authorities, as policy development remains largely donor-led. Enhanced coordination across existing mechanisms could also improve responses at the intersection of conflict and climate risks: with the Education Cluster focusing on immediate response to climate and weather-related shocks, the ESRG supporting longer-term resilience and anticipatory action, and the EESRF contributing more substantively to programme design as well as implementation. Key approaches include:

- **Local coordination:** Sub-national Cluster groups (Education Cluster) work with township authorities, NGOs, CSOs and communities to align crisis response with decentralised governance.
- **Humanitarian–development link:** ESRG connects emergency response with longer-term education planning, including ethnic education providers and local authorities.
- **Local capacity:** Involve CSOs, community education groups and EESPs in planning, response and transitions to development coordination.
- **Joint Response Framework (JRF):** Next phase should integrate climate change, strengthen education–emergency coordination and support access, quality, and anticipatory action (KIIs 6, 14, 15, 22, 25, 26).
- **Grassroots mechanisms:** In areas outside of Naypyitaw governance, local authorities, civil society, and communities coordinate on protection and emergency response (e.g.in Karen areas as shown in Box 2).

Box 2. Example of potential local partners (Kayin)

- **Karen Education and Culture Department (KECD)**. *KNU (civilian) line department.* Administers 1,738 schools and 149,728 students; delivers MTB-MLE curriculum.
- **Karen Teachers Working Group (KTWG)**. *Teacher training and support.* Provides mobile teacher training; administers three teacher training colleges in Kawthoolei; main channel for donor-funded teacher stipends in ethnic education systems.
- **KNU Governance Capacity Strengthening Committee & Kawthoolei Environmental Protection Committee (KEPC)**. *Inter-departmental coordination.* Whole-of-government policy coordination bodies. Likely to be superseded by the Kawthoolei Governing Council, though core functions are expected to continue.
- **Karen Youth Organisation (KYO) & Karen Women's Organization (KWO)** *Affiliated civil society bodies.* KNU-linked but operationally independent.
- **KESAN & TRIPNET**. *Environmental civil society organisations*. The two leading Karen env. CSOs.
- **KNU Governance Capacity Strengthening Committee & School of Governance and Public Administration (SGPA)**. *Capacity building and training.* Supports governance capacity development through formal training initiatives.
- **Karen Refugee Committee, Education Entity (KRCEE)**. *Refugee education provider.* Responsible for education in Karen refugee camps, with limited international support.
- **Kawthoolei Teachers Union**. *Professional association*. Teachers' union / CSO.
- **Parent–teacher associations**, *Community structures*. Present in most KECD and associated community schools.

6.3. Resources, tools, and funding sources

A wide range of **financial, technical, and knowledge resources** are available to support practitioners in implementing climate-responsive education strategies. These resources span global climate finance mechanisms, analytical and planning tools, operational guidance, and practitioner networks. However, access and applicability in Myanmar are shaped by conflict dynamics, localisation constraints, and the need for flexible, context-sensitive delivery. Given the fragmented and donor-driven nature of financing and implementation in Myanmar, effective climate–education programming benefits from a sequenced approach that prioritises local grounding, risk analysis, flexible financing, and alignment with global frameworks.

Across all steps in **Box 3**, donors and INGOs should prioritise **locally led design, flexible financing, and iterative adaptation**, recognising that in crisis-affected education systems, coherence is built through coordination—not prescription.

Box 3: Sequenced entry points for climate–education programming in Myanmar

Step 1: Start with local systems, needs, and constraints (coherence foundation)

Begin engagement with local education authorities, communities, teachers, and parent–teacher associations, alongside EESP networks (e.g. **Rural Indigenous Sustainable Education (RISE)**). This ensures programming reflects lived realities and avoids externally imposed designs.

Step 2: Ground decisions in risk and vulnerability analysis (access, continuity, quality)

Use diagnostic tools to understand climate–education risks and ensure evidence-based and context-specific interventions before making financing or design decisions.

- **Children's Climate Risk Index** and **INFORM Risk** for exposure and vulnerability
- **Multiple Overlapping Deprivation Analysis** and **Vulnerability and Capacity Assessments** for multidimensional deprivation
- GIS mapping for hazard–school location analysis
- **WASH Bottleneck Analysis Tool** and sectoral diagnostics for infrastructure gaps

Step 3: Align with global frameworks for structure and accountability (coherence strengthening)

Anchor programme design in established frameworks to ensure consistency across actors.

- **Sendai Framework** (Target D on critical infrastructure, including schools)
- **Words into Action (WiA)** implementation guidance
- **Safe School Approach** (i.e. Comprehensive School Safety Framework)
- **Education in Emergencies (EiE)** and **SAFE** for continuity and adolescent protection
- **IASC Guidelines**, **Humanitarian Inclusion Standards**, and GEDSI guidelines

Step 4: Mobilise and blend financing streams (enable implementation)

Once needs and frameworks are aligned, draw on multiple financing sources. Blended financing is particularly important in Myanmar due to conflict constraints and delivery fragmentation.

- Global funds: Green Climate Fund, Global Environment Facility, Global Partnership for Education, Central Emergency Response Fund
- Regional mechanisms: Mekong–Australia Partnership (MAP)
- Humanitarian/development actors: World Food Programme (climate-resilient school feeding and infrastructure), UNICEF, World Bank
- Donor engagement: DFAT and other bilateral partners integrating climate–education priorities
- Localised funding: flexible community grants (PTAs, VECs), FRIDA-type youth funds

Step 5: Implement through adaptive, networked delivery models (continuity and quality)

Partnerships such as RISE demonstrate scalable, locally embedded models for reaching learners in crisis-affected areas. Delivery should prioritise:

- Local implementers (e.g. schools, NGOs, EESP networks)
- Flexible and anticipatory programming (e.g. calendar adjustments, remote learning)
- Climate-resilient infrastructure and WASH systems
- Integrated DRR and climate education approaches

Step 6: Embed knowledge exchange and iterative learning (system coherence over time)

Sustain learning and adaptation through:

- Platforms such as PreventionWeb and socialprotection.org
- Networks like Capacity for Disaster Reduction Initiative and Global Alliance for Disaster Risk Reduction and Resilience in the Education Sector for coordination and technical support
- Regional peer learning exchanges (e.g. Bangladesh, Thailand, Vietnam) to adapt comparable climate–education strategies

6.4 Recommended Future Research

During the research process, several significant evidence gaps came to light and are recommended as topics for future research. This could include:

- **Curriculum and Awareness**: Investigate effective integration of climate change into school curricula and community awareness, including early warning and local protection mechanisms.
- **Ethnic Education and Governance**: Map evolving policies and practices of local armed-political actors (such as EAOs) and EESPs on education and climate adaptation.
- **Sector-Wide Frameworks and Resilience**: Develop and evaluate adaptation frameworks for schools, including resilient infrastructure, disaster preparedness, and anticipatory action strategies (KII 23).

- **Further Education and Community Engagement**: Examine climate risks and vulnerabilities in further education, creating case study-based toolkits to strengthen local engagement (KII 26).
- **Trauma and Psychosocial Support**: Strengthen evidence on climate- and conflict-related physical and mental health impacts, identifying effective support strategies for learners and education personnel (KII 20).
- **Resilient Infrastructure**: Support technical research, pilot projects and prototype construction of flood-, fire-, and airstrike-resilient school and community buildings, testing scalable and context-appropriate designs.
- **Lack of Localised Knowledge:** Address the knowledge vacuum on subnational climate patterns and their impacts on school communities, integrating Indigenous and community knowledge to ensure culturally grounded adaptation (KIIs 1, 2, 10, 11).
- **Women and People with Disabilities:** More knowledge is required on the gendered dimension of climate change induced impacts and adaptations in the education sector, and the vulnerabilities and agency of people with disabilities (KII 1, 3, 15).

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APPENDIX 1. DESCRIPTION OF KIIS/FGDS

KII #	Participating Organisation	Description, # of interviewees	Date
1	Karen Ed. and Culture Dept. (KECD)	Ethnic education service provider, 1	8/2/26
2	Karenni: IEC Dept of Education	Ethnic education service provider, 1	13/3/26
3	Ta'angland Education Council (TLEC)	Ethnic education service provider, 2	3/3/26
4	Karen Secondary School	Ethnic education service provider and faith-based school, 1	19/3/26
5	Kachin Primary School	Faith-based school, 1	19/3/26
6	Monastic Ed. Development Group (MEDG)	Monastic education, 4	24/3/26
7	Waymaker Learning Center	Autonomous/individual primary and secondary school, 1	13/3/26
8	Chin State Education	Community-based schools, 1	9/3/26
9	Pinnya Tagar, Kachin State	Post-secondary community school, 1	4/3/26
10	Mon National College, Mon State	Autonomous higher education institute, multiple KII	13/2/26
11	Ta'ang Land Council (TLC)	Local governance administration, 5	3/3/26
12	Karenni State Consultative Council and Interim Executive Committee, and Karenni State Interim Parliament (KSCC-IEC & KSIP)	Karenni politician and activist, 1	26/2/26
13	MyClimate project (CMU partnership)	Academic researcher, 2	9/2/26
14	Education consultant	Myanmar expertise, 1	25/3/26
15	Education consultant (London)	Myanmar expertise, 1	19/3/26
16	Earth Mission, northern Karen State	Civil engineer and autonomous teaching hospital, 1	10/3/26
17	Payap University, Klermoo Natural Farming School	Agriculture/adaptation expert, 1	7/2/26

18	Climate Change expert	Southeast Asia researcher, 1	6/3/26
19	Climate Change and Education expert	Southeast Asia regional NGO, 1	28/2/26
20	Rural Indigenous Sustainable Education (RISE)	National NGO, 6	24/3/26
21	Save the Children (Yangon)	INGO, 2	25/3/26
22	World Food Program (WFP)	UN, 1	17/3/26
23	UNESCO	UN, 1	23/3/26
24	International Committee of the Red Cross (ICRC)	INGO, 1	24/3/26
25	Foreign, Commonwealth and Development Office (FCDO)	UK Embassy, Yangon, 1	20/3/26
26	Department of Foreign Affairs and Trade (DFAT)	Australian Embassy, 3	19/3/26

APPENDIX 2. TOR OBJECTIVES SUMMARY ANSWERS TABLE

Objective 1: Understand the intersectional linkages between climate events and education provisions (access, quality, and continuity)		
1.1 How do climate-related hazards (e.g. extreme heat, flooding, landslides) currently affect student attendance, learning outcomes and school infrastructure in Myanmar and similar contexts?		
Impact Area	**Specific Effects**	**Examples / Evidence**
Student Attendance & Enrolment	**School closures**	Extreme weather trigger closures; up to 404 million students globally affected (2022–2024). In Myanmar, closures can last up to two weeks due to storms, flooding and heat.
	Schools used as shelters	Schools repurposed as emergency shelters during disasters, prolonging closures—especially in ethnic minority areas (e.g. Kayin, Kachin, Kayah).
	Economic pressures	Climate impacts reduce agricultural productivity, pushing children into labour or early marriage; attendance may drop to approximately 90 school days/year.
	Health-related absences	Increased illness (malaria, dengue, heat rash) leads to seasonal absenteeism.
	Access barriers	Flooded/damaged roads and bridges and environmental hazards (e.g. coal fly ash) make travel unsafe and limit school access.
Learning Outcomes	**Heat stress**	Temperatures above 24°C can begin to reduce concentration and performance; extreme heat (38–39°C) causes severe health risks and learning disruption.
	Cumulative learning loss	Repeated disruptions can lead to years of lost learning; heat exposure alone may result in up to 1.5 years of lost education.

	Instructional time loss	LMICs lose approximately 18 school days/year due to climate shocks (vs. 2.4 days in high-income countries).
	Psychological & health impacts	Trauma, pollution and poor air quality reduce cognitive performance and academic progress, especially for children from poor socio-economic backgrounds.
School Infrastructure	**Direct physical damage**	Floods, cyclones and landslides destroy school buildings; e.g. Typhoon Yagi damaged 10,000+ schools in Myanmar.
	Weak construction materials	Schools built with bamboo or mud bricks are highly vulnerable to collapse in extreme weather.
	Loss of learning resources	Destruction of textbooks, school supplies and WASH facilities exacerbates inequities.
	Indoor environmental hazards	Flood-related mould and poor air quality cause headaches, dizziness and reduced concentration.

1.2 What evidence exists on the enabling or disabling role of climate adaptation measures in improving education outcomes?		
Adaptation Dimension	**Enabling Role (Improves Education Outcomes)**	**Disabling Role (Constrains Education Outcomes)**
Education Management & Planning	Integrating climate risk into education planning strengthens system resilience and preparedness. School-level management enables coordinated emergency response and continuity.	Limited capacity and prioritisation (especially in conflict settings) weakens planning and response effectiveness.

Learning Continuity Strategies	Keeping schools open, creating temporary learning spaces and avoiding prolonged closures help sustain access. Remote and flexible learning allows continuity during hazards. Catch-up programmes support recovery from learning loss. Adjusted schedules align schooling with climate risks.	Temporary learning spaces may be low quality and not climate-resilient. Online learning is constrained by limited infrastructure, teacher readiness and electricity/internet access. Catch-up programmes require additional teacher time and funding. Schedule adjustments may increase exposure to risks or conflict with national curricula.
School Infrastructure	Climate-resilient buildings, safe site selection and WASH systems reduce disruption and protect students. Investments in cooling, ventilation and flood mitigation improve safety and learning conditions.	Temporary/emergency structures are often difficult to make climate-resilient. Lack of investment leaves schools vulnerable to repeated damage.
Teacher & Student Capacity	Climate literacy builds adaptive skills and awareness. Teacher training improves delivery of climate education and psychosocial support. Community engagement strengthens local resilience and participation.	Inadequate teacher training leads to ineffective or incorrect implementation. Curriculum overload can burden teachers without improving outcomes.
Socio-Economic & Well-being Support	School feeding programmes improve attendance and learning, especially during food insecurity. Financial incentives support re-enrolment. Mental health services help students recover from trauma and improve academic performance.	Limited funding and support reduce the effectiveness and sustainability of these programmes. Marginalised groups may lack access, reinforcing inequities.
Systemic & Policy Context	Strong policy frameworks and financing enable scaling of adaptation measures and long-term resilience.	Gaps in climate finance and low prioritisation of education constrain implementation. Equity challenges persist for remote, poor and differently-abled students.

Maladaptation Risks	—	Use of schools as shelters prolongs closures and disrupts education. Poorly designed interventions or lack of community engagement can undermine outcomes.

1.3 Which climate risks are most critical for education systems in Myanmar and comparable geographies?			
Climate Risk	**Level of Exposure / Trend**	**Impacts on Education Systems**	**Key Vulnerabilities / Amplifiers**
Flooding, Landslides and Cyclones	10.29 million children exposed to flooding; 4.39 million to cyclones. Risks expected to intensify.	School closures, infrastructure damage, loss of materials, unsafe access routes and increased absenteeism. Livelihood shocks push children into labour and early marriage.	Combined effects of poverty and conflict reduce resilience; rural and coastal communities particularly vulnerable.
Heat Stress (including Wet-Bulb Effect)	2.29 million children exposed to heatwaves; temperatures projected to rise 0.9°C (mid-century) to 2.7–4.4°C (by 2100).	Reduced concentration, learning performance and attendance; increased health risks and potential school closures during extreme heat.	High humidity limits body cooling; peak heat periods (May–June) intensify impacts; limited cooling infrastructure in schools.
Air and Industrial Pollution	17.19 million children exposed to PM2.5; 4.7 million to lead; 8.58 million to pesticides. Seasonal haze common.	Impaired cognitive development, lower test scores, respiratory illness and increased absenteeism.	Agricultural burning, industrial exposure and weak regulation; children more biologically vulnerable to pollutants.
Water Pollution & Waterborne Disease	Widespread river contamination; linked to flooding and poor WASH systems.	Increased illness (e.g. typhoid, cholera), absenteeism and strain on school sanitation systems; indirect effects via reduced household income.	Flooding mobilises toxins; weak WASH infrastructure; higher exposure among displaced and low-income communities.

Compounding / Cascading Risks	Climate hazards interact (e.g. flooding spreading pollutants; heat and humidity increasing health risks).	Simultaneous disruptions to attendance, learning and infrastructure; prolonged recovery times.	Low adaptive capacity, poverty and conflict amplify impacts across all education dimensions.
Intersection of Conflict and Climate	Widespread in conflict-affected regions; climate hazards overlap with fragile settings.	Disrupts schooling continuity, limits emergency response and reduces system capacity to adapt to shocks.	Ongoing violence weakens institutional response, displaces communities and heightens risks for children's education.
1.4 Where are the systemic bottlenecks (school safety planning, alternative modalities, supply chains)?			
Bottleneck Area	**Key Constraints**	**How It Affects Adaptation (School Safety, Modalities, Supply Chains)**	**Underlying Drivers**
School Safety Planning & Education Management	Limited institutional capacity; de-prioritisation of long-term planning; collapse of formal systems in some areas.	Weak or absent school safety plans; inability to integrate climate risk into education management; limited preparedness for disasters and emergencies.	Conflict, post-coup system disruption and competing priorities within a polycrisis context.
Alternative Learning Modalities (Remote, Temporary, Flexible)	Low technical capacity; limited teacher training; inadequate infrastructure (electricity, internet); lack of resources for temporary learning spaces.	Inconsistent or low-quality remote learning; difficulty scaling flexible education models; temporary schools often not climate-resilient.	Underinvestment, conflict disruption and weak system coordination.

Education Supply Chains & Aid Delivery	Blocked or restricted humanitarian access; disrupted transport routes; unreliable delivery systems for materials and aid.	Delays or failures in delivering learning materials, WASH supplies and infrastructure support; inability to respond effectively after climate shocks.	Military restrictions, checkpoints and insecurity in conflict-affected areas.
School Infrastructure Development	Chronic underfunding; limited investment in resilient construction; lack of maintenance capacity.	Inability to build or retrofit climate-resilient schools; repeated damage from hazards; unsafe learning environments persist.	Historical underinvestment in education and prioritisation of military spending.
Objective 2: Identify practical and low-cost climate adaptation strategies for schools			
2.1) What simple, low-cost interventions can reduce the impact of extreme heat on learning environments?			
Intervention Type	**Specific Measures**	**How It Reduces Heat Impacts on Learning**	**Cost & Feasibility Considerations**
Temperature Control (Immediate Cooling)	Reflective white roofs (solar paint)	Reduces indoor temperatures by about 2–5°C (or more), improving concentration and comfort during lessons.	Very low cost (US$0.66 per student); easy to apply to existing buildings.
	Shade trees around schools	Lowers ambient temperature (1–5°C), reduces glare and UV exposure, and improves outdoor learning conditions.	Very low cost (US$0.33 per student); requires locally appropriate species and community input.
	Misting / water spraying	Provides short-term cooling during heatwaves, reducing heat stress and improving student focus.	Potentially higher recurring costs (water access required); best as a supplementary measure.
Ventilation & Passive Cooling	Natural ventilation (building orientation, windows, airflow design)	Enhances air circulation, reduces heat buildup and improves indoor air quality and comfort.	Low cost when integrated into design or repairs; relies on local materials and knowledge.

	Cross-ventilation and shaded structures	Maintains cooler indoor environments without energy-intensive cooling systems.	Highly cost-effective; feasible in both new construction and retrofitting.
Bioclimatic & Structural Design	Climate-responsive school design (daylighting, shading, local materials)	Reduces indoor heat exposure and reliance on artificial cooling, supporting sustained learning.	Low-cost when incorporated into rebuilding/repair; scalable with local expertise.
	Simple, climate-adapted emergency shelters (including schools/bomb shelters)	Protects from extreme heat to improve concentration and reduce fatigue for teachers and students	Low cost when utilizing local construction methods and materials.
2.2) What practical measures can schools implement to mitigate flooding and landslide risks without significant financial investment?			
Intervention Type	**Practical Measures**	**How It Reduces Flood/Landslide Risks**	**Cost & Feasibility Considerations**
Nature-Based & Environmental Solutions	Mangrove restoration (coastal areas)	Reduces coastal flooding, storm surge impacts and salinisation risks affecting schools and communities.	Low-cost, community-driven; requires local ecological knowledge and time to mature.
	Wetland, riverbank and rain garden restoration	Absorbs excess rainfall, reduces runoff and lowers riverine flood risks near schools.	Cost-effective and sustainable; can be implemented locally with community participation.
Nature-Based & Environmental Solutions	Forest conservation / reforestation	Stabilises soil, reduces landslide risk and improves watershed management.	Low-cost where community-managed; long-term benefits for both environment and livelihoods.
Low-Cost Infrastructure Adjustments	Sandbags and simple barriers	Provides immediate, low-cost protection against gradual flooding and water ingress into classrooms.	Very low cost; easily deployable in emergencies.

	Retaining walls (small-scale)	Stabilises slopes and reduces landslide risks in vulnerable school locations.	Variable cost; small-scale/local versions feasible with local materials.
	Raised foundations / stilts	Prevents floodwater from entering classrooms and damaging infrastructure.	Moderate cost but feasible using local materials and traditional practices.
	Improved roofing	Prevents water leakage and protects classrooms and materials during heavy rain.	Low to moderate cost; can be done incrementally.
	Simple drainage & rainwater harvesting (e.g. improvised gutters)	Diverts and manages excess water, reducing localised flooding around schools.	Very low cost; can use recycled/local materials (e.g. plastic bottles).
Education Continuity Measures	Remote/online learning (where feasible)	Maintains learning during floods and school closures, reducing disruption.	Limited by electricity/internet access; scalable in connected areas.
	Community-based learning	Enables continued education when schools are inaccessible or damaged.	Highly feasible in low-resource settings; relies on local organisation.
	Radio-based education	Reaches students without internet access during disasters.	Very low cost and accessible in remote/conflict-affected areas.
Early Warning & Preparedness	Community-based disaster planning	Establishes evacuation plans, safe shelters and pre-positioned supplies to reduce disruption and risk.	Low cost; depends on coordination among schools, communities and local actors.
	Training (students, teachers, communities)	Builds capacity to respond to floods and landslides, improving safety and preparedness.	Low cost; high impact when integrated into school activities.

	Early warning systems integration	Enables timely school closures, evacuation and protection of materials.	Cost-effective when linked to existing local systems.
	Protective adaptations (e.g. floating backpacks)	Protects learning materials and improves student safety during floods.	Very low cost; simple and scalable.
Climate-Resilient Shelter & Protection	Climate-adapted emergency shelters (including school-based or community shelters)	Provides safe spaces during floods and landslides while maintaining some learning continuity.	Requires careful site selection; can use low-cost, locally available materials.

2.3) Which strategies have been successfully applied in similar contexts and could be adapted for Myanmar?

Strategy Area	Example & Context	What Was Implemented	Relevance & Adaptation Potential for Myanmar
Emergency Preparedness & Early Warning Systems	Philippines (typhoon- and flood-prone)	Comprehensive school disaster preparedness plans (evacuation protocols, safe shelters, coordination with authorities).	Can inform school safety planning in Myanmar, especially integrating evacuation procedures and coordination with trusted local actors in conflict settings.
	Indonesia (InaRISK platform)	Real-time mobile early warning system enabling alerts, drills, and anticipatory action.	Adaptable for Myanmar through localised, trusted systems (e.g. ethnic service providers or community-based networks) to ensure uptake and trust.
	Bangladesh (cyclone preparedness)	Community-based disaster risk management and early warning dissemination.	Strong model for community-driven preparedness and reducing school disruption in flood- and cyclone-prone areas.

	Myanmar (KNU & CSO-led systems)	Community-based early warning, evacuation, first aid and pre-positioning of supplies in conflict areas.	Highly relevant local model; can be expanded to integrate climate risks (heat, floods) with existing conflict-response systems.
Continuity of Learning	Brazil (flood-affected regions)	Remote/online learning platforms to maintain student performance during school closures.	Applicable where connectivity exists; hybrid approaches (offline/low-tech) needed for rural/conflict areas.
Continuity of Learning	Global / LMIC contexts	Community-based learning and parental engagement during crises.	Highly adaptable in Myanmar, especially where formal systems have collapsed; supports continuity in remote/conflict settings.
	Multiple contexts	Temporary learning spaces, additional classes and school merging.	Practical short-term solutions for displacement and disaster-affected communities.
Environmental Risk Mitigation	Thailand–Myanmar border (haze/pollution context)	Transboundary pollution management and reduction of agricultural burning.	Relevant for addressing seasonal haze and improving student health and learning conditions.
	Myanmar (Salween Peace Park – KNU/CSOs)	Community-led natural resource governance and reduced burning practices.	Strong locally grounded model; demonstrates how environmental protection can improve education outcomes even in conflict settings.

	South Sudan (flood mitigation)	River unclogging and waste management to reduce flooding.	Simple environmental management approaches (e.g. drainage clearing) could be replicated in Myanmar communities.
Climate-Resilient Infrastructure & School Design	Kenya (Green Economy Strategy)	Climate-responsive school construction (cooling, ventilation, resilience).	Can inform low-cost, climate-smart school construction using local materials and passive design.
	Burkina Faso (bioclimatic school design)	Naturally ventilated, climate-adapted school buildings.	Applicable for Myanmar in low-resource settings to reduce heat stress and improve comfort.
Climate-Resilient Infrastructure & School Design	Myanmar (Karenni IEC guidelines)	Community-led school construction using local materials, natural ventilation and energy-efficient design.	Highly relevant; combines local knowledge with external expertise; adaptable across regions with contextual modifications.
Capacity Building & Climate Literacy	Global / UNICEF-supported programmes	Training teachers and students in climate awareness, disaster risk reduction and adaptive practices.	Directly applicable; supports long-term resilience and behavioural adaptation in schools and communities.
	Myanmar (Karenni IEC curriculum reform)	Integration of environmental education into basic education systems.	Promising local model; can scale to include climate adaptation, risk awareness and local knowledge systems.

Recovery & System Resilience	Global disaster recovery models	Post-disaster recovery planning to ensure safe school reopening and learning continuity.	Critical for Myanmar to institutionalise recovery processes after climate and conflict shocks.

Objective 3: Develop guidance for integrating climate resilience into education programming		
3.1) What are the top three actionable approaches for incorporating climate considerations into education programmes to improve outcomes?		
Actionable Approach	**Description**	**Key Interventions / Practices**
1. Invest in climate-resilient, locally adapted infrastructure	Build context-appropriate, resilient and low-cost infrastructure to ensure safe, accessible and high-quality education in climate-affected areas. Local communities, CSOs, EESPs and authorities should lead design and implementation.	Context-appropriate and conflict-sensitive site selection and reinforcement
		Low-cost resilient materials (bamboo, hempcrete) and natural ventilation
		Climate-resilient WASH systems (rainwater harvesting, gender-responsive sanitation)
		Access-enabling infrastructure (roads, bridges) to maintain school access during shocks
2. Flexible and adaptive delivery models	Ensure continuity of learning during climate, disaster, and conflict-related disruptions through flexible, redundant and adaptive Education in Emergencies (EiE) approaches.	Flexible schedules, outdoor lessons, and community-based learning spaces
		Expanded remote learning with trained teachers and appropriate technology
		Remedial / catch-up instruction for learning losses
		Weather-adapted student support (rain gear, waterproof materials)
3. Anticipatory action, early warning systems, and	Shift from reactive to anticipatory, community-led adaptation by integrating early warning, disaster risk reduction (DRR)	Embed early warning and evacuation protocols in School Safety Plans
		Shift to anticipatory action; scenario and contingency planning

community-led adaptation	and protection systems. Engage stakeholders in planning, delivery and evaluation for sustainable outcomes.	Pre-position supplies (medicines, seeds, learning materials)
		Regular drills to reinforce preparedness
		Fast-access recovery funding for repairs and timely reopening
		Community engagement in risk management and environmental protection
3.2) How can these approaches be aligned with existing education policies and frameworks in Myanmar?		
Climate-Focused Approach	**Alignment with Myanmar Education Policies & Frameworks**	**Key Actions / Practices**
1. Invest in climate-resilient infrastructure	Aligns with Education Sector Strategic Plans and national/sub-national frameworks that guide school construction, maintenance and disaster preparedness.	Implement Climate-Safe Building Codes and risk-informed site selection
		Integrate climate adaptation in financing and planning
		Ensure infrastructure strengthens access, quality and system resilience
		Provide psychosocial support and trauma recovery in disaster-prone/conflict areas
2. Flexible and adaptive delivery models	Integrates with Education in Emergencies (EiE) frameworks, Education Cluster coordination and ESRG planning, ensuring continuity of learning during crises.	Embed disaster preparedness, early warning and anticipatory action into school management systems
		Support remote and flexible learning modalities
		Use remedial learning and weather-adapted student support
		Leverage whole-school approaches and community engagement

3. Anticipatory action & community-led adaptation	Aligns with decentralised governance, community-led initiatives and coordination frameworks such as JRF, ESRG and local education committees.	Support locally led policy and advocacy for school adaptation
		Foster multi-level coalitions linking communities, local authorities and international partners
		Strengthen capacity of marginalised schools (community, monastic, autonomous)
		Integrate early warning, scenario planning and pre-positioned resources into school systems
		Coordinate climate adaptation via Education Cluster, ESRG and CSOs
4. Integrate climate into curricula and awareness	Supports national curricula, teacher training colleges and CSO-led education initiatives, enabling climate education as part of mainstream learning.	Develop environmental and climate curricula with education authorities and CSOs
		Link school-based learning to community awareness (agriculture, energy, resource management)
		Promote green skilling and visible environmental improvements in schools
		Engage students and teachers as agents of change for climate action

3.3 What resources, tools, and funding sources are available to support practitioners in implementing these strategies?		
Category	**Examples / Sources**	**Purpose / Use**

Funding Sources & Financing Modalities	**Global funds**: Green Climate Fund (GCF), Global Environment Facility (GEF), Global Partnership for Education (GPE), Central Emergency Response Fund (CERF); **Regional partnerships**: Mekong–Australia Partnership (MAP); **Local/participatory grants**: FRIDA youth-led/community-driven grants; **Sector-specific/thematic funds**: Curriculum development, restoration projects, climate project grants; **Humanitarian/development actors**: WFP (school feeding & climate adaptation), DFAT, RISE network, Save the Children, UNICEF, World Bank	Support resilience-building, climate-adapted infrastructure, educational continuity and locally led interventions. Enables both emergency response and long-term adaptation in education.
Operational Guidelines & Programmatic Frameworks	**Sendai Framework for DRR 2015–2030• Words into Action (WiA)** guidelines; **Education in Emergencies (EiE)** approaches; **Safe School Approach / Comprehensive School Safety framework; SAFE package for adolescent protection• Inclusion frameworks**: IASC Guidelines, Humanitarian Inclusion Standards	Translate climate-education strategies into practice; guide school safety, risk reduction, anticipatory planning, and GEDSI integration.
Analytical & Planning Tools	**Risk assessment platforms**: Children's Climate Risk Index (CCRI), INFORM Risk; **Vulnerability assessment**: MODA, Vulnerability & Capacity Assessments (VCA); **Strategic planning tools**: Causality analysis, scenario-building, contingency planning, Theory of Change models; **Technical tools**: WASH-BAT, GIS for geospatial risk mapping	Support evidence-based, risk-informed programme design, planning, monitoring, and adaptation; identify local vulnerabilities and capacities.
Knowledge Platforms & Practitioner Networks	**PreventionWeb**: Repository for DRR publications, case studies, tools; **Online communities**: socialprotection.org; **Global alliances**: CADRI, GADRRRES; **Peer learning & regional exchange**: Study visits to Bangladesh, Thailand, Vietnam	Provide technical support, evidence, peer learning, coordination and opportunities to adapt best practices from similar contexts.

APPENDIX 3: CLIMATE ADAPTATION STRATEGIES RANKED BY COST-EFFECTIVENESS

Strategy	Indicative Cost	Rationale for Cost-Effectiveness	Comments
Very High Priority			
Adjusting academic calendars and schedules	Minimal financial cost	Immediate impact on exposure to heat/flooding	Children can still be exposed to the same hazards outside the safety of schools
Community engagement and PTA involvement	Minimal financial cost	Enables localisation, improves uptake and sustainability across all interventions	In many remote and conflict-affected areas, only local only communities and other local stakeholders have access.
Rainwater harvesting (basic systems)	Low cost	Strong impact on WASH access using simple, scalable solutions	Integrate with existing community development and adaptation projects.
Tree planting for shade	US$0.33/student	Very low cost with clear temperature and learning benefits	Needs to rely on locally available tree species placed in locations endorsed by communities
Disaster preparedness training	US$4.19/student	High impact on safety and continuity at relatively low cost	Integrate with existing community conflict adaptation strategies (emergency evacuation, airstrike shelters etc)
Flexible learning and temporary learning spaces	Low cost	Maintains continuity of learning during shocks	The spaces themselves (community space, emergency shelters, etc.) need to be resilient to climate shocks.
High			

Use of local / natural materials	Relatively low cost	Reduces construction costs while improving thermal comfort	Dependent on cooling needs or flood concerns. Not all natural materials are resilient against both.
Bioclimatic school design	Low cost (if integrated early)	Long-term benefits for comfort and energy use	Integrate with other school safety features, including airstrike shelters, etc
Sandbags for flood protection	Low cost	Effective short-term risk reduction in flood-prone areas	Not effective in flash floods
Environmental restoration (forests, riverbanks, mangroves, wetlands)	Low cost (per unit)	Cost-effective at scale, but slower and location-specific. Multi-benefit (flood control, livelihoods, microclimate)	Many areas (e.g. Kayah and Chin State) already have ongoing agroforestry or community forestry efforts. For example, Kawthoolei Climate Action Plan.
Climate and environmental education	Medium-to-low cost	Builds long-term adaptive capacity across communities	There are many ongoing grass-roots and EESPs efforts already underway to improve env. education
School feeding programmes	Medium–high cost	Strong benefits, but high recurring costs reduce cost-effectiveness	Strong results for child protection, in Myanmar and globally.
Medium			
Water storage systems	Medium cost	Critical for WASH, but requires upfront investment	Can sometimes utilize local materials or repurpose waste (eg. Water bottles for drainage).
WASH infrastructure improvements	Medium cost	High impact but resource-intensive	

Roofing improvements	Low–medium cost	Protects infrastructure but variable returns	Requires local input, as thatched may be most effective for cooling, while vulnerable to floods and fire.
Elevated / stilted classrooms	Medium cost	Effective in flood zones but location-specific	Requires upstream design and planning.
Catch-up and remedial programmes	Medium cost	Important for learning recovery but ongoing costs	Currently many teachers operate these programmes without compensation
Early warning systems (EWS)	Medium cost	High potential impact but depends on trust and system capacity	See Karen and Karenni example of this being operationalized at a local level
Medium–low			
Invest in alternative energies	High-cost	Essential but capital-intensive	Solutions (such as solar or micro-hydro) need to be locally relevant, with training.
Remote learning systems	Medium cost	Effective but dependent on connectivity and infrastructure	Distance learning requires specialized teacher training
Rainboots, waterprooof backpacks, umbrellas	Low cost	Niche intervention with limited system-wide impact	Proven effectiveness in improving student attendance during rainy season
Floating backpacks, / safety equipment	Low cost	Niche intervention with limited system-wide impact	
Low			

Retaining walls (landslide protection)	US$22/student	High-cost relative to targeted, location-specific benefit	
Emergency shelter integration	Medium–high cost	Important for protection but expensive and indirect for learning	
Solar-reflective (white) roof coatings	US$0.66/student	Strong evidence of temperature reduction at low cost	Potential increased risk of air-raids in conflict-affected areas and difficulty in transporting supplies.