Quality Education with the Planet in Mind: Towards a Climate-Responsive and Nature-Positive Framework for the Education System of Lower-Income Countries

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Acronyms

BANBEIS	Bangladesh Bureau of Educational Information and Statistics
CSSF	Comprehensive School Safety Framework
DRM	disaster risk management
DRR	disaster risk reduction
EiE	education in emergencies
EMIS	education management information system(s)
ESD	education for sustainable development
GCF	Green Climate Fund
GEF	Global Environmental Facility
GIS	geographical information system(s)
GPE	Global Partnership for Education
NAP	National Adaptation Plan
NDC	Nationally Determined Contribution
SDG	Sustainable Development Goal
SWApp	Student Watching Application (Philippines)
TVET	technical and vocational education and training
UNESCO	United Nations Educational, Cultural, and Scientific Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	United Nations Children's Fund
WASH	water, sanitation and hygiene

Executive Summary

This paper lays out a conceptual framework for a climate-responsive and nature-positive education system for the lower-income countries that the Global Partnership for Education (GPE) and its sectoral partners support. An overall thrust of the conceptual framework is to bring together diverse communities of practice working at the nexus of climate change, environmental conservation and protection, and education to delineate a more systemic and joined-up approach to maximize complementary between currently siloed approaches and initiatives.

The interlocking planetary crisis of climate change and environmental degradation is of an unprecedented scale. The challenges children, their teachers and education systems in lower-income countries face are compounded by climate change–induced events and shocks and a deteriorating natural environment, all exacerbated by unsustainable human activities. Education has a critical role to play in securing a sustainable future for all by addressing the root causes and key drivers of current crises and by helping the transition to a greener economy in a nature-positive world.

A climate-responsive and nature-positive education system seeks to maximize co-benefits between efforts to build climate resilience, restore environmental integrity and achieve quality, equitable and inclusive education for all. A climate-responsive and nature-positive education system framework consists of the three complementary spheres of climate action and justice, risk reduction and management and nature-based solutions, and is thoroughly infused and informed by the three cross-cutting themes of child rights and agency, gender equality and social inclusion, and cultural diversity.

Building upon the 2020–21 UNICEF South Asia–commissioned research on the impact of and response to climate change across education systems—the *Heat Is On!* series[1]—the framework encompasses seven education system dimensions that should be seen as interlocking. The quality standard for each dimension emerging from this paper can be summarized as follows:

- **Policy and planning**: Key national climate change, disaster risk reduction (DRR)/disaster risk management (DRM) and environmental strategies need to clearly incorporate the roles and contributions of the education sector. Key education sector planning, policy and strategy documents should incorporate

[1] The series includes eight country-specific reports as well as a regional synthesis report (Kagawa 2021, 2022a, 2022b, 2022c, 2022d, 2022e, 2022f, 2022g, 2022h).

climate change, DRR/DRM and environmental protection goals in a comprehensive and coherent manner.

- **Finance**: Both international and domestic finance from public and private sources should be mobilized to make the national education system more climate responsive and nature positive. Climate change–related budget allocation and utilization in the education sector needs to be well managed and monitored for greater efficiency and accountability of public finance. There should be equitable financing mechanisms directed toward the most sustainable ends through the targeting of marginalized children, schools and regions most affected by the climate and environmental crisis.

- **Physical infrastructure**: Both new and existing school infrastructure should integrate climate change mitigation and adaptation considerations into planning, design, construction and maintenance, thereby ensuring a protective, healthy and inclusive learning environment for all students while minimizing their environmental footprint. School and community-level stakeholders should play an active role in making and maintaining the school infrastructure to ensure it becomes safer and greener.

- **Curriculum, learning and teaching**: Through formal curriculum learning—delivered through the grade levels and across all subjects—students need to be empowered as change agents and advocates who can critically and constructively engage with the climate and environmental crisis. Teachers likewise need to be supported in their role as animators and catalysts for climate action from their school base, especially given their position in the community.

- **School and community linkages**: Schools should serve as community hubs in the enhancement of local safety and resilience by promoting environmentally sustainable practices, by proactively reaching out to communities and by drawing community members into the climate change, disaster risk and environmental protection and restoration mission and initiatives of the school. There should be school and community-based engagement platforms for children and young people that enable them to exercise and hone their change agency, advocacy and leadership capacities as they help take climate and environmental action forward.

- **Coordination and partnerships**: To strengthen education sector leadership in climate and environmental action, ministries of education should proactively participate on national climate change decision making and coordination platforms while enhancing their cross-sectoral collaboration and partnerships.

Existing education sector coordination mechanisms need to be harmonized, refined and enhanced to better address the needs and rights of crisis-affected children. Different stakeholders and initiatives at different levels should be connected in a synergic and purposeful way.

- **Data and evidence**: Data concerning climate and disaster risk and environmental degradation as they implicitly or explicitly relate to the education system should be gathered and systematically analyzed and reported. Data emerging should subsequently be made readily available for evidence-based decision making and policy deliberation in aid of resilience building and climate and environmental action across the education sector.

Achievements under one dimension are not sustainable in isolation, requiring simultaneous progress in other parts of the education system. It is vital to create synergies between these dimensions, weaving multiple projects, initiatives, people and places together in the fashioning of a thoroughly climate-responsive and nature-positive education system.

This paper features noteworthy examples primarily from lower-income countries that GPE supports, both in the main text and in appendix 1. An annotated list of selected tool kits and guidance documents forms appendix 2.

Section 1. Introduction

1.1. Planetary Crisis, Child Rights Erosions and Faltering Learning: The Unfulfilled Potential of Education Systems

Human-induced climate change has already made our planet 1.07°C hotter than the global surface temperature of preindustrial times (IPCC 2021). The current speed and scale of global heating are unprecedented. From 2010 to 2019, average annual greenhouse gas emissions were at their highest level in human history (IPCC 2022a). Climate change has already exacerbated the frequency, severity and duration of weather and climate extremes that bring in their wake widespread loss, damage and disruption that disproportionately afflict low-income countries and the most vulnerable members of society (IPCC 2022b).

Unsustainable human activities such as overexploitation of natural resources, rapid and unplanned urbanization, unrestrained industrial expansion and the consumption of the affluent have resulted in profound environmental damage. We now face the interconnected planetary crisis of climate change, biodiversity and habitat loss, desertification and pollution on an unprecedented scale. These environmental crises intersect with economic, development and security issues (UNEP 2021a; WWF 2022).

Children bear the greatest burden from adverse impacts of climate change and environmental degradation. A 2020 WHO-UNICEF-*Lancet* report highlights that every child worldwide now faces existential threats from climate disruption (Clark et al. 2020). According to UNICEF's first Children's Climate Risk Index, approximately 1 billion children—nearly half of the world's children—live in "extremely high risk" countries on account of climate and environmental shock and stress (UNICEF 2021a). The interlocking climate and environmental emergency threatens to reverse gains made in fulfilling the rights of the child as outlined in the UN Convention on the Rights of the Child, posing significant blockages to every child's ability to enjoy many, if not all, of their rights. The climate crisis, according to UNICEF, is fundamentally a child rights crisis (UNICEF 2021a).

Every child has the right to a quality education that fosters their full cognitive, social, emotional and physical development while equipping them with the capacities and skills for proactive engagement in the adult world. That right is now being seriously eroded by climate-induced sudden-onset events and a natural environment degraded by slow-onset events and erosions. The climate and environmental crisis adversely impacts education systems in myriad ways. For instance, weather-related extreme events such as floods, storms and cyclones cause direct and immediate damage and destruction to learning facilities.

Rehabilitation costs incurred after climate change–induced natural disasters drain national budgets, diverting scarce resources from the education sector. Slow-onset events such as ongoing aridification can erode education services and/or children's ability to attend school. Climate change–induced hazards and environmental degradation trigger both internal and external displacement and migration,[2] resulting in reduced access to education for displaced and migrant children. Teachers' ability to deliver quality learning is adversely affected because they and their families are also victims of disasters; they may also bear additional pressures because nonteaching work is often required of them in the aftermath of natural disasters, demands not backed with proper support. Some teachers and education sector staff are also displaced and forced to migrate (Godfrey and Tunhuma 2020; Kagawa 2022a; UNICEF EAPRO 2019).

Parents struggling with degradation and loss of livelihood and reduced income triggered by climate change–induced hazards and shocks expect their children, especially girls, to support the family by supplementing family income and taking on more household duties, thus forfeiting their education. Families in such situations may well feel constrained to resort to negative coping strategies such as child marriage, child labor and child trafficking, leading to school dropout. Student health and well-being is increasingly affected by climate-triggered extreme weather events and diseases, while lack of sufficient and nutritious food either at home and at school also debilitates student ability to attend school and learn (Godfrey and Tunhuma 2020; Kagawa 2022a; UNICEF EAPRO 2019). Children with disabilities and special needs are at greater risk during humanitarian emergencies, being more likely to experience discrimination. Girls with disabilities are particularly vulnerable to exploitation and have less access to essential services such as education and health than their peers without disabilities.[3]

The planetary crisis adds another layer to the existing crisis of learning poverty. In low- and middle-income countries, the proportion of children unable to learn basic skills rose from over 50 percent to an anticipated 70 percent following COVID-19–related school closures (World Bank, UNESCO, and UNICEF 2021). These countries were already highly vulnerable to climate change–induced hazards and shocks that affect school attendance and learning performance. Emerging research evidence suggests that increased childhood exposure to climate shocks such as

[2] It should be noted that the distinction between forced and voluntary migration is contested and ambiguous in the context of climate change as there are multiple and intersecting drivers and causal factors. See, for instance, Pye, Seeger, and Ndabananiye (2021) and Cundill et al. (2021).
[3] "The Impact of Climate Change on the Rights of Persons with Disabilities," OHCHR and Climate Change, OHCHR, 2020, https://www.ohchr.org/en/climate-change/impact-climate-change-rights-persons-disabilities; "Children with Disabilities in Emergencies," UNICEF, undated, https://www.unicef.org/disabilities/emergencies.

floods and droughts has long-lasting adverse impacts and intergenerational effects, including on learning outcomes, especially among those who are from the economically poorest households.[4] Should effective learning countermeasures not be put in place, climate breakdown is likely to further exacerbate existing learning shortfalls. All education gains made in achieving quality, equitable and inclusive education for all are likely to fall short or be reversed unless the ongoing and future climate crisis with its associated risks is addressed.

Key international agreements such as the United Nations Framework Convention on Climate Change (UNFCCC) and the Paris Agreement recognize the important role of education in accelerating climate action (UN 2015). UN member states are committed to achieving the Sustainable Development Goals (SDGs), which include ensuring inclusive and equitable quality education (SDG 4), taking urgent action to combat climate change and its impacts (SDG 13) and halting and reversing land degradation and biodiversity loss (SDG 15).[5] In particular, the SDG 4.7 target lays down that by 2030 "all learners [should] acquire the knowledge and skills needed to promote sustainable development, including among others, through education for sustainable development (ESD) and sustainable life styles" (UIS 2022). The Berlin Declaration adopted at the 2021 World Conference on Education for Sustainable Development (ESD) includes a specific commitment on climate education as a priority area of ESD (UNESCO 2022). The Glasgow Work Programme on Action for Climate Empowerment adopted at the 2021 UN Climate Change Conference (COP 26) underscores the role of education in fostering climate action and acknowledges young people as potential agents and advocates of change directed at mitigating the climate threat (UNFCCC 2021).

Despite these global commitments and the continuous high-level advocacy efforts of UN agencies, international nongovernmental organizations and civil society networks, the education sector's climate change provision for kindergarten to 12th grade (K-12) children has fallen short of what is needed. Different elements of provision tend to be siloed and hence lacking in coordination. There is a shortfall in implementing meaningful and urgent systemic changes that, together, add up to a fit-for-purpose and duly calibrated response to the climate crisis (Kwauk 2020). The role of education in response to the climate and environmental emergency in lower-income countries has been underexplored and therefore under-leveraged (Bangay 2021). Climate actions that focus on sectors and risks in isolation as well

[4] "The Young Lives Study," Department of International Development, Oxford University, 2022, https://www.younglives.org.uk.

[5] UN General Assembly, Resolution 70/1, Transforming Our World: The 2030 Agenda for Sustainable Development, A/RES/70/1, October 21, 2015, https://www.un.org/en/development/desa/population/migration/generalassembly/docs/globalcompact/A_RES_70_1_E.pdf.

as short-term benefits could increase risks of maladaptation, that is, adverse unintended consequences of actions (IPCC 2022a). Therefore, the education sector must work in cross- and intrasectoral strategic ways as it contributes to confronting the planetary crises across its sphere of activity.

The urgency of maintaining a livable planet has been advocated by an ever-increasing number of children and young people, all deeply concerned that their planetary inheritance is being jeopardized by our currently unsustainable trajectory. Anticipating the multiple cascading and mutually compounding risks arising from the deep and ubiquitous changes to the global climate that are already locked in from historical emissions, education systems need to become more resilient, equitable, effective and responsive than ever before.

1.2. Purposes and Scope of the Framework

The goal of GPE's Strategic Plan 2021–2025 is "to accelerate access, learning outcomes and gender equality through equitable, inclusive and resilient education systems fit for the 21st century" (GPE 2022). Strengthening resilience and mitigating the systemic impacts of crisis, including those resulting from the impacts of climate change, is a critical part of GPE's mission under the next five-year period. Many GPE partner countries have recently expressed the need for support in more systematically addressing the impacts of climate change in the education sector. Therefore, the GPE Secretariat commissioned this background paper to inform GPE engagement in wider efforts to assist partner countries through system-level approaches and initiatives.

The purposes of the conceptual framework are threefold:

- Predicated on diverse communities of practice working on the nexus between climate change, environment and education, delineate a more systemic and joined-up approach to maximize complementary between presently siloed approaches and initiatives.
- Highlight indicative entry and leverage points within national education systems, as well as identify where ongoing gaps in both evidence and practice exist, to address and remediate climate change impacts in and through education systems.
- Demonstrate the importance of forging interconnections and synergies between key education system components.

Achievements under one system component are not sustainable in isolation, requiring simultaneous progress within other parts of the education system. Gains made in one area are not sustainable if bereft of achievement in other areas.

The scope of the framework primarily covers primary to secondary levels of formal education and nonformal education for school-age children and young people (up to 18 years old) that fall under the auspices of national education systems.

It should be noted that consideration of the early childhood development (ECD) subsector is very much limited in this paper.

Tertiary education and technical and vocational education and training (TVET) are held to be outside the scope of the framework at this juncture. These education subsectors, however, merit detailed and serious consideration in the future. For instance, tertiary education's contribution to research and development in locally led and solution-focused climate change adaptation and mitigation innovations could be elaborated. Tertiary education and school education linkages should be developed along lines that enhance capacity development among young people. TVET's contribution to green skills development,[6] with specific focus on girls, is another area of research.

1.3. Target Readership

The principal target readership for this paper is initially the GPE Secretariat, with the aim of informing its approach to supporting partner countries as they address the impacts of climate change in and through education. Secondly, the paper is meant to inform ministry of education officials and officials in other relevant government ministries (e.g., ministries in charge of climate change, disaster management, environment and health) in GPE-supported countries.[7] And, finally, the paper is aimed at GPE sectoral partners, namely bilateral and multilateral partners, civil society organizations, the private sector and private foundations engaged in supporting government efforts to respond to and redress climate impacts in and through their national education system.

[6] For various definitions of *green skills* see, for instance, Kwauk and Casey (2021), Malala Fund (2021), UNEP and UNESCO (2016), and UNESCO-UNEVOC International Centre for TVET (2017).
[7] As of April 2023, GPE supports 88 lower-income countries around the world ("Where We Work," Global Partnership for Education, undated, https://www.globalpartnership.org/where-we-work/partner-countries).

Section 2. Towards a Climate-Responsive and Nature-Positive Education System Framework

Education has a critical role to play in securing a sustainable future for all. Addressing the root causes of the current interconnected climate and environmental crisis and swiftly transitioning to a greener economy and a nature-positive world calls for an integrated education system framework, a framework that maximizes co-benefits between efforts to build climate resilience, to restore environmental integrity and achieve quality, equitable and inclusive education for all.

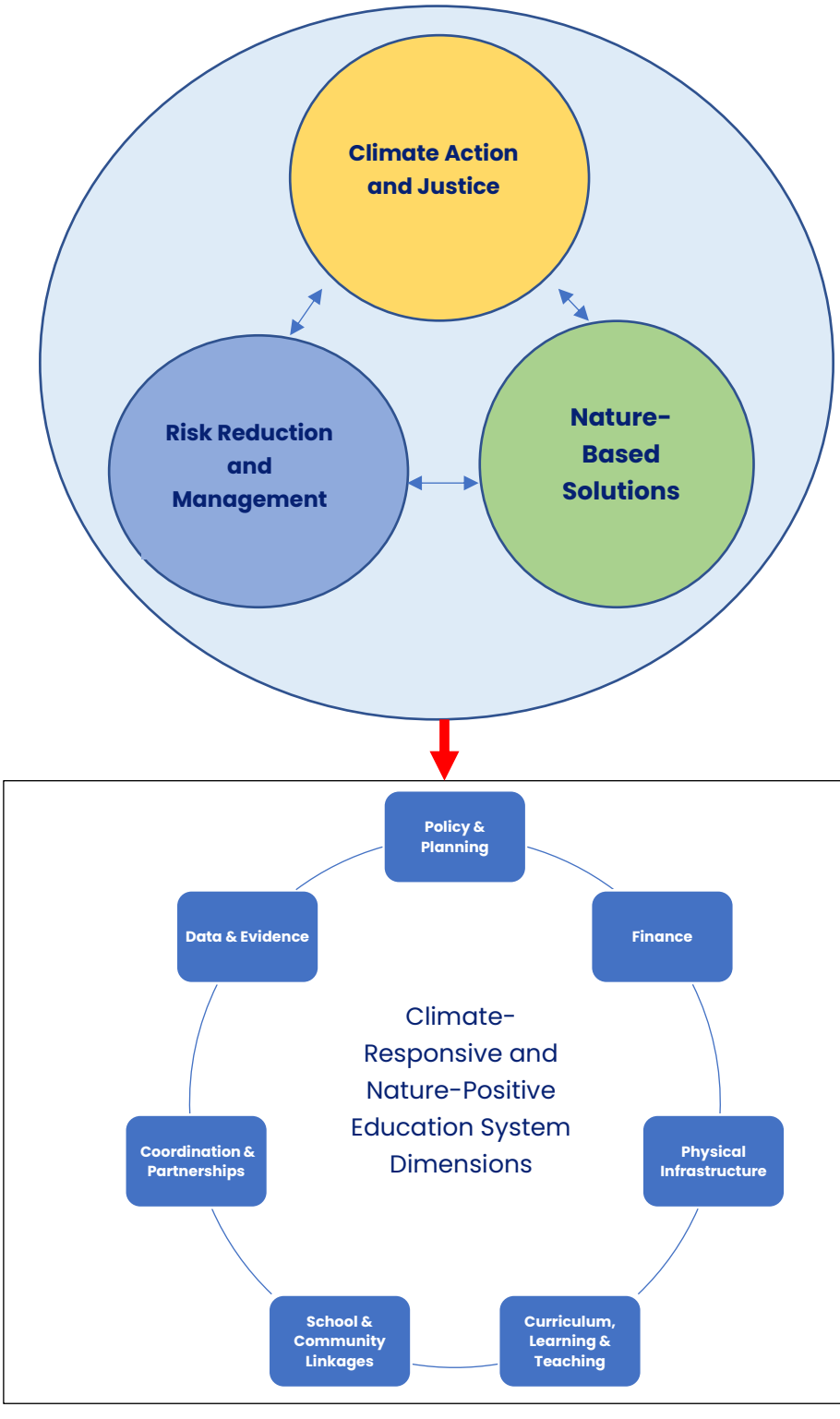
A climate-responsive and nature-positive education system framework recognizes that a stable climate and healthy natural environment is the foundation of all our lives, and that the health and well-being of human societies and the planet are deeply entangled.[8]

Figure 1 indicates three complementary spheres to be addressed by a climate-responsive and nature-positive education system. Taken as a whole, it seeks to achieve the following goals:

- Provide uninterrupted education for all children and protect their right to education at all times.
- Provide a safe and inclusive learning environment for all children to develop holistic learning outcomes.
- Empower and support children and other education stakeholders as they build a greener, safer and fairer society and protect the living planet.

[8] The authors have chosen to use the term *climate responsiveness* because, in their opinion, it captures both reactive and proactive elements—that is, the field must necessarily involve a reaction to the all-consuming threat posed by climate breakdown and its runaway and often unforeseen twists and turns, but any reaction must also necessarily involve proactive and anticipatory action for the well-being of people and planet. As such, climate responsiveness significantly overlaps with all that falls under the heading of *climate resilience*. *Nature positive* is the term increasingly used to address biodiversity loss by governments, civil society organizations and businesses. According to the World Economic Forum, it means "enhancing the resilience of our planet and societies to halt and reverse nature loss" (Holdorf et al., 2021).

Figure 1. Climate-responsive and nature-positive education system framework



2.1. Enabling and Promoting Climate Action and Greater Climate Justice

A climate-responsive and nature-positive education system should help accelerate climate action by critically reviewing and actively renewing social, ecological and economic systems in response to actual and anticipated impacts of human-made climate change (climate change adaptation). It also needs to contribute to curtailing greenhouse gas emissions and removing carbon from the atmosphere (climate change mitigation). Lower-income countries have limited responsibilities for historical and current greenhouse gas emissions. However, given that our planet is in danger of exceeding the climate threshold beyond which adaptation reaches its limit (IPCC 2022b), low-income countries have "common but differentiated responsibilities"[9] for contributing to global efforts to urgently curb greenhouse gas emissions and enhancing carbon sink capacities.

Impacts of climate change are borne disproportionately by populations and countries least responsible for historical and current greenhouse gas emissions. Climate justice proposes the safeguarding of the rights of the most disadvantaged and marginalized—on account of their gender, age, disability, poverty, displacement, ethnicity, caste, geographic location or other socioeconomic factors—as they face specific vulnerabilities arising from climate and environmental change, climate change–induced disasters and environmental degradation. These factors intersect and drive up vulnerabilities. It is critical to address the different needs and vulnerabilities of those who are most affected and to build their capacities while drawing upon their unique experience, knowledge, insights and perceptions and skills. Climate justice also proposes that the burdens and benefits of climate change be shared equitably and fairly and that decision making processes aimed at realizing justice be participatory, transparent and accountable (Girotto 2021; Mary Robinson Foundation – Climate Justice, n.d.; UN Women 2016).

In the education system, prioritizing the needs of the most marginalized children, their schools and communities and helping them build their capacity to withstand shock is one way to scale up climate action and enhance climate justice.

2.2. Enshrining Risk Reduction and Risk Management

Climate change is a threat multiplier. It not only drives up disaster and health risks but also increases insecurity and conflict risks because of intensifying competition

[9] A principle formulated at the 1992 UN Conference on Environment and Development in Rio de Janeiro that is pertinent to climate justice.

and conflict over shrinking natural resources and climate-induced displacements (African Union 2021). A climate-responsive and nature-positive education system needs to play a pivotal role in risk reduction and management, thus safeguarding the safety of children and other education stakeholders. It builds the capacity to withstand multi-hazard risk, often climate change induced, in its overarching mission to provide equitable and quality education for all.

Common measures used in risk reduction and management include risk assessment, prevention and mitigation, preparedness, response, "building back better" through recovery, rehabilitation and rebuilding by means of integrating DRR measures (UNDRR 2020a; IIEP-UNESCO et al. 2021).

In the education system, developing disaster management plans and strategies at all system levels is one way to institutionalize risk management and develop an institutional culture of safety and resilience.

2.3. Promoting and Implementing Nature-Based Solutions

Nature-based solutions enshrine activities that seek to protect and restore biodiversity to the benefit and well-being of both humans and nature. Degraded and destroyed natural environments are two key drivers of disaster and climate risk. A deteriorating natural environment makes those who depend on it for their livelihood and basic needs—food, water, shelter—more susceptible to climate change–induced hazard and shock. Degraded ecosystems fuel the rise of zoonotic pandemics, such as COVID-19, and drive up food and water insecurity. Conversely, healthy ecosystems characterized by richer biodiversity enable communities to better withstand, cope with and recover from disaster. Healthy and diverse ecosystems and biomes provide cost-effective natural buffers against hazardous events and are more resilient to extreme weather events (e.g., healthy mangroves against sea surges in coastal zones). Healthy natural environments such as oceans and forests also yield climate mitigation benefits as they absorb and store carbon (Sudmeier-Rieux et al. 2019; UNDRR 2020b; Selby and Kagawa 2020). However, it is important to highlight that the effectiveness of nature-based solutions significantly declines or even becomes ineffectual in some parts of the world as global heating intensifies, especially if the surface temperature exceeds 2°C of warming (IPCC 2022b).

The education system should provide students with multiple and continuous opportunities to learn about and participate in biodiversity protection and restoration efforts, working closely with local community members. Such pro-

environmental practices can be an integral part of school improvement plans and national education sector plans.

2.4. Cross-Cutting Themes

The above-mentioned spheres are infused and informed by the following cross-cutting themes:

- **Child rights and agency**: Duty bearers (including government at different levels) have the responsibility of ensuring every child fully enjoys their rights to survival, development, participation and protection. Children are a very diverse group with unique needs, capacities, perceptions and experiences reflecting their particular developmental stage and the various sociocultural characteristics with which they are imbued (see immediately below). While they have specific vulnerabilities in the face of climate and environmental change, they need to be empowered as agents and advocates of change who can contribute to realizing a greener, safer and fairer future. Current and future generations of children need to be supported in proactively facing the full consequences of the climate crisis and in becoming peer educators and advocates who inspire their cohorts and community members.

- **Gender equality and social inclusion**: It is vital that the education system and its processes ensure all children have access, opportunity and dignity regardless of gender, age, disability or any other socioeconomic characteristic. It is important for education to transform social structures and norms that have perpetuated gender inequalities and social exclusion. A gender-transformative and socially just and inclusive approach is vital in building an education system that attends to the call for climate responsiveness and nature positivity.

- **Cultural diversity**: Indigenous peoples have a deep understanding of human-nature interconnectedness and of how to live harmoniously with and within nature. Nomadic and tribal peoples also possess a deep storehouse of unique knowledge and skills for adapting to a changing climate and environment (WWF 2022). Teaching and learning as well as school-wide management should incorporate and be informed by diverse sources of cultural knowledge, values and practices associated with caring for natural environment.

Each of the above-mentioned spheres and cross-cutting themes has been addressed through different education frameworks and initiatives championed to

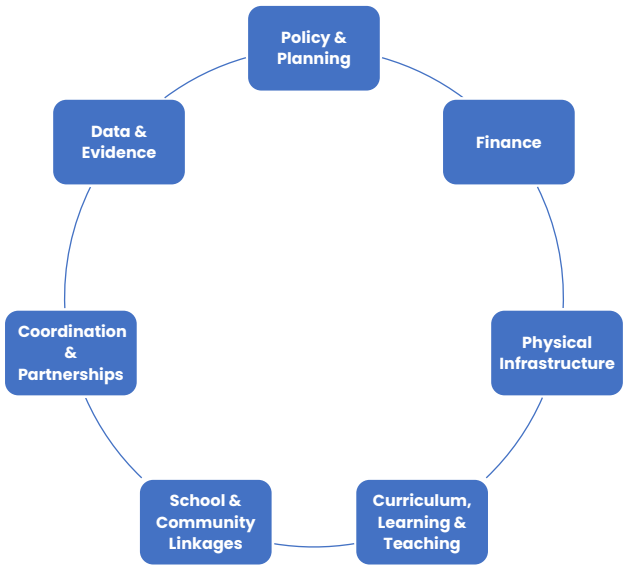
different degrees and in varying combinations by a range of different stakeholder groups, many with overlapping aims and remits. They include education for sustainable development, the Comprehensive School Safety Framework, disaster risk reduction education (DRRE), environmental education, climate change education, education in emergencies, crisis-sensitive education and girls' education, among others. A climate-responsive and nature-positive education system offers a holistic frame that aligns with and coalesces these diverse practices.

Section 3. Seven Dimensions of a Climate-Responsive and Nature-Positive Education System

This section covers the seven dimensions of a climate-responsive and nature-positive education system:

- Policy and planning
- Finance
- Physical infrastructure
- Curriculum, learning and teaching
- School and community linkages
- Coordination and partnerships
- Data and evidence

Figure 2. The seven dimensions



These dimensions build upon 2020–21 UNICEF South Asia research on the impact of and response to climate change across education systems.[10] The choice of dimensions was also informed by the June 2022 Wilton Park conference on climate change and education,[11] followed by consultation with the GPE Secretariat.

The dimensions should be seen as in an intersecting relationship; it is especially important that the policy and planning dimension reflects all other dimensions.

3.1. Policy and Planning

Key national climate change, disaster risk reduction (DRR)/disaster risk management (DRM) and environmental strategies need to clearly incorporate the roles and contributions of the education sector. Key education sector planning, policy and strategy documents should incorporate climate change,

[10] The seven key education system components covered are policies, plans and strategies; finance; curriculum, teaching and learning; teacher capacity development; communication, cooperation and partnership; school/community student participation platforms; and monitoring, evaluation and accountability. See the UNICEF South Asia *Heat Is On!* publication series for further details (Kagawa 2021, 2022a, 2022b, 2022c, 2022d, 2022e, 2022f, 2022g, 2022h).

[11] For further details on the Wilton Park Conference, see https://www.wiltonpark.org.uk/event/learning-climate-forging-shared-solutions-on-education-environment-and-climate-change/.

DRR/DRM and environmental protection goals in a comprehensive and coherent manner.

Education Entry Points in Key Climate Change, DRR/DRM and Environmental Policies and Strategies

National legal, administrative and procedural arrangements identify dedicated ministries responsible for climate change policy (UNFCCC 2019). The Nationally Determined Contributions (NDCs) represent country commitments to reducing greenhouse gas emissions and adapting to climate change, thus ensuring high-level commitment and implementation at all levels, local to national. In NDCs, each government specifies their contribution and priorities based on key contextual factors such as local climate risks and impacts, the country's livelihoods and economies, and its critical public infrastructure, laws and strategies. The role and contribution of the education sector largely remains unrecognized in the NDCs just as NDCs tend to disregard children (Kwauk 2022; Pegram and Colon 2019; UNICEF 2021b). Significant opportunities are thus unutilized to affirm and integrate the critical role the education sector can play in advancing climate action, as well as acknowledge and foster the contribution of children and young people in accelerating climate action. Cambodia's updated NDC document is a model of excellence; it clearly articulates education's contribution to climate action under the leadership of the Ministry of Education, Youth and Sports. Education-specific actions include climate change integration into primary school and nonformal education curricula, climate-resilient school infrastructure development, and mainstreaming climate change into the Education Strategic Plan 2019–2023 and the SDG 4 Roadmap for Education 2030. It also recognizes the active role of young people in climate action (General Secretariat of the NCSD/Ministry of Environment, Cambodia 2020).

National Adaptation Plans (NAPs) detail a country's strategies and programs to address country-specific medium- and long-term adaptation needs and to enhance adaptive capacity and resilience. Among the NAPs available online in August 2022,[12] it is noteworthy that there is no consistency in referencing education. For instance, while Burkina Faso and Ethiopia only very briefly touch upon their promotion of environmental education, Grenada elaborates how to support climate change teaching at all levels of the education system, but with no reference to early childhood development (Ministry of Environment and Fishery Resources, Burkina Faso 2015; Ethiopia 2019; Grenada 2018). The NAPs of St. Lucia and Suriname are exemplars: the former acknowledges education as one of the

[12] Among the 13 NAPs available (see "National Reports with Adaptation Information," NAP Central, UNFCCC, https://www4.unfccc.int/sites/NAPC/Pages/NationalReports1.aspx), 10 documents available in English were reviewed.

priority sectors and includes education sector–specific outcomes (St. Lucia 2018a); the latter regards education and health as "foundation sectors" (Suriname 2019), upon which other key sectors depend and which are critical for long-term resilience building (see example 1, appendix 1).

With regard to integration of education considerations into national disaster management plans, according to one recent global survey covering 68 high-risk counties, more than 70 percent of surveyed countries have a national disaster management policy that refers to the education sector. However, the reference is usually a passing one (Paci-Green et al. 2020). In terms of education sector considerations in national environmental policies, systematic research focusing on low-income countries has not been found.

Despite similarities, interconnections and overlapping concerns between climate change adaptation and DRR, policy alignment of these two fields is a common gap. This is due to differences arising from separate international and national institutional structures; parallel funding lines; and the different ways scientific, Indigenous and local knowledge and statistical data are collected, analyzed and communicated, among others (IFRC 2019). The ministry of education needs to engage with relevant ministries to better harmonize policies arising from overall national development goals. It should be noted that inter-ministerial policy dialogue has real-time costs, such as costs involved in dedicating staff time for regular communication, so cross-sectoral engagement must be properly planned, staffed and duly financed (see also section 3.6).

It is important that there are processes, platforms and mechanisms in place that enable children and young people to meaningfully participate in policy making and decision making processes concerning climate change–related challenges as they affect their lives. Children and young people have unique knowledge, their own experiences and fresh perspectives to bring to the table. It is particularly important to ensure girls' voices are heard in such policy making. Child and youth participation can take different forms depending on age, required types and scale of involvement (e.g., consultation, workshop, survey, collaborative partnership, online, in person) at different levels (local, national and global) (UNICEF 2021b). In Zimbabwe and Nigeria, youth were engaged in the NDC update process (see example 2, appendix 1).

Climate Change, DRR/DRM and Environmental Considerations in Education Policy and Planning

In some lower-income countries, national-level education policy making and planning processes to address climate-related threats have been informed by

global frameworks such as education for sustainable development (ESD) and the Comprehensive School Safety Framework (CSSF) to differing degrees.

ESD covers interlinked aspects of the climate crisis across three pillars of sustainable development: social, economic and environmental. ESD aims to empower "learners with knowledge, skills, values and attitudes to take informed decisions and make responsible actions for environmental integrity, economic viability and a just society empowering people of all genders, for present and future generations, while respecting cultural diversity" (UNESCO 2020). ESD for 2030, the global framework for implementing ESD from 2020 to 2030, highlights ESD's contribution to achieve all 17 SDGs, in particular SDG 4.7 (UNESCO 2020). At the country level, Namibia has developed a national policy to support environmental education and education for sustainable development in formal, nonformal and informal education processes across all sectors (Ministry of Environment, Forestry and Tourism, Namibia 2019). However, how and to what extent ESD has actually been integrated in the education sector plan and policies in lower-income countries is less evidenced. According to a 2021 UNESCO study, 92 percent of the education sector plans and national curriculum frameworks analyzed included at least one reference to environment-related key words (e.g., *environmental, ecosystem, biodiversity, climate change, sustainable development*) but the "depth of inclusion was very low on average" (UNESCO 2021a).[13]

Consideration of disasters—both climate change induced and otherwise—and DRR/DRM has become increasingly prominent in education policy and strategy documents of lower-income countries in recent years. An increasing number of countries have incorporated the CSSF, which takes a risk-informed approach. The goals of the CSSF are to "protect learners, educators and staff from death, injury, violence and harm in schools and other learning spaces; plan for education and protection continuity, and limit disruptions to learning in the face of shocks, stresses, hazards and threats of all kinds; promote knowledge and skills of learners and duty-bearers, to contribute to risk reduction, resilience building and sustainable development" (GADRRRES 2022). The CSSF has a cross-cutting foundational pillar on "enabling systems and policies" and three intersecting pillars: "Pillar 1: Safer Learning Facilities; Pillar 2: School Safety and Educational Continuity Management; Pillar 3: Risk Reduction and Resilience Education" (GADRRRES 2022). As an example of how the pillars may be translated into national efforts, Nepal has developed a set of comprehensive school safety policy, planning and implementation tools to build education sector resilience to multi-hazards. Despite the CSSF's emphasis on an "all hazards and all risks" approach, fast-onset hazards are prioritized in many countries. Detailed consideration of climate-induced slow-onset hazards and

[13] The study covered a geographically diverse group of 46 countries.

shocks (e.g., drought, salinization, sea level rise) and environmental degradation is yet to be fully integrated (Kagawa 2022a). According to the above-mentioned global survey covering 68 high-risk countries, nearly 60 percent of countries surveyed have either DRR or disaster response components in their education sector plan, but planning details tend to be very limited (Paci-Green et al. 2020).

In the context of the increasing humanitarian crises exacerbated by climate change, it is even more important that national and subnational education sector planning becomes crisis sensitive. Crisis-sensitive education planning involves rigorous risk analysis (conflict and disaster risk analysis) to better understand how different risks impact an education system directly and indirectly and considers crises and risks at every step of the regular education planning process, that is, education sector diagnosis, policy formulation, plan preparation, cost and financing, monitoring and evaluation framework development (IIEP-UNESCO 2017). (See also section 3.7.) In Guyana, after creating risk profiles and hazard maps for each of the 10 regions and the capital, the Ministry of Education analyzed risks comprehensively as well as existing capacities and developed the National Risk Management Policy for the Education Sector. The policy aims at building education sector resilience, saving lives and protecting rights to education. It involves several disaster management and protection measures, with specific attention given to the most vulnerable learners (Ministry of Education, Guyana 2021; Education4Resilience 2021). In Burkina Faso, after analyzing both conflict and disaster risk in the education sector, the Ministry of National Education and Literacy developed the National Education in Emergency strategy, including risk reduction measures as part of its 10-year Programme for the Strategic Development of Basic Education (MacEwen and Chimier 2016; IIEP-UNESCO 2017).

Overall, detailed references to climate change and environmental threats, their system-wide direct and indirect impacts on the education sector and the education sector's responses to climate and environmental challenges are limited in education sector plan, policy and strategy documents in lower-income countries. A promising example is Liberia's Education Sector Plan 2022/23–2026/27; it includes the "development of a policy framework on disaster risk reduction and climate change adaptation and mitigation" (Ministry of Education, Liberia 2022). Nepal's National Education Policy 2076 includes the "one student, one sapling" and "one school, one garden" programs to create environmentally friendly schools (Ministry of Education, Science and Technology, Nepal 2019). The Philippines has taken an innovative step by creating the so-called Graduation Legacy for the Environmental Act (see example 3, appendix 1). A climate change–focused curriculum policy is emerging through a UN CC:Learn partnership in 13 countries (Benin, Burkina Faso, Dominican Republic, Ethiopia, Ghana, Indonesia, Kenya, Kyrgyz Republic, Malawi,

Niger, Uganda, Zambia, Zimbabwe).[14] Each country has developed national education climate change learning strategies identifying strategic priorities and actions for improving climate-focused learning and developing skills for climate change.[15]

Examining the implementation of the above-mentioned education policy and strategy frameworks is beyond the scope of this research. Evidence concerning the effectiveness of specific education policy frameworks in relation to enhancing quality education provision, climate change resilience and environmental integrity merits detailed research to better understand enabling and inhibiting factors in specific country contexts.

One significant education policy gap is the overall failure to address climate change–driven migration and displacement. In 2020 alone, 9.8 million children were newly displaced due to climate-related hazardous weather events (UNICEF UK 2021). Without concerted climate and development action at national and global levels, the number of climate change–induced internally displaced persons is expected to reach more than 143 million in just three regions by 2050: 40 million in South Asia, 86 million in sub-Saharan Africa and 17 million in Latin America (Rigaud et al. 2018). Children on the move in the context of climate change are categorized by whether they move within their own country of origin or across country borders, whether they move temporarily or permanently, whether they move on their own or with their caregivers, and whether they move in a documented or undocumented manner. There are also children who can't move because they have been left behind by migrating parents (UNICEF Office of Global Insight and Policy 2022). Each of these different conditions is likely to come with particular implications for education policy making. Policy makers also need to consider supporting teachers and education support staff who are also on the move as well as schools that have lost teaching and support stuff. Although system-wide education responses are clearly required, lack of disaggregated and detailed data on children, teachers and education support staff on the move and the absence of education-specific modeling on climate change–induced displacement and migration pose a significant challenge for education policy making (see also section 3.7). Addressing the needs of children with disabilities and considering gendered impacts in the context of climate change–induced displacement are other current and significant gaps requiring substantial, in-depth attention (Pye, Seeger, and Ndabananiye 2021).

[14] Started in 2009, UN CC:Learn (formally, The One UN Climate Change Learning Partnership) is a collaborative initiative of UN agencies working to support countries to build capacities of learning to address climate change and related development challenges.

[15] "Country Projects," UN CC:Learn (One UN Climate Change Learning Partnership), undated, https://www.uncclearn.org/country-projects/.

Box 1. **Policy and planning: Action points**

- Make education a priority sector in climate change efforts and specify the role and contribution of the ministry of education and the education sector in key national climate change policy and strategy documents (e.g., NDCs, NAPs).
- Integrate climate action, DRR/DRM and environmental goals in education sector planning and key policy and strategy documents.
- Ensure capacity building opportunities for ministry of education personnel at central and subnational levels on crisis-sensitive education planning and management.
- Ensure that policy making and decision making processes give sustained voice to both girls and boys, women, Indigenous and minority communities and those with special needs, with special arenas for participation provided as necessary.
- Anticipate the scale, timing and movement of internal migration and plan for education sector responses that are well coordinated, fit for purpose and sustainable.
- Ensure a well-financed policy on education in emergencies and protracted crisis for climate change–induced displaced children to ensure education continuity and protect learning outcomes.

3.2. Finance

Both international and domestic finance from public and private sources should be mobilized to make the national education system more climate responsive and nature positive. Climate change–related budget allocation and utilization in the education sector need to be well managed and monitored for greater efficiency and accountability of public finance. There should be equitable financing mechanisms directed toward the most sustainable ends through the targeting of marginalized children, schools and regions most affected by the climate and environmental crisis.

Financial Resource Mobilization and Management

Investment in the national education system is one of the critical enablers for providing quality education for all. Yet in lower-income countries, the current level of government spending for education falls short of the level required to achieve existing education targets while providing for the COVID-19 pandemic, natural

disasters, the management and containment of violent conflict, and high population growth, all of which are putting a great strain on already squeezed resources (World Bank and UNESCO 2021, 2022; UN 2022). Thus, securing finance to make the education system more climate responsive and nature positive is a challenging task for education authorities operating at different levels. It becomes vital for the ministry of education working with their partners to strategically mobilize international and domestic finance from public and private sources to increase the volume of available funds and so support education sector efforts to respond effectively to climate change and environmental threats on the scale required.

There is the potential to unlock the large amount of international climate funding available to the education sector. Key multilateral public climate finance mechanisms aligned with the UNFCCC processes and its Kyoto Protocol are the Green Climate Fund (GCF), the Adaptation Fund and three funds administered by the Global Environmental Facility (GEF), the Least Developed Countries Fund (LDCF), the Special Climate Change Fund (SCCF) and the GEF Trust Fund. The GCF is the largest international climate fund covering both climate change mitigation and adaptation on a 50:50 basis. The Adaptation Fund finances initiatives that help vulnerable communities in developing countries adapt to climate change. Targeting least developed countries, the Least Developed Countries Fund finances immediate and urgent adaptation needs as outlined in National Adaptation Programmes of Action.[16] The Special Climate Change Fund targets all developing countries and includes support for low-carbon transition. The GEF Trust Fund finances environmental interventions (e.g., biodiversity conservation) that use ecosystem-based adaptation principles (Watson, Schalatek, and Evéquoz 2022). The calls on climate finance are immense and competition to tap into these financial mechanisms is fierce. The complex and highly detailed proposal formulation and stringent review process mean that it might take years from project idea formulation to approval and implementation. This may explain why education sector initiatives supported by these international climate finance mechanisms have been sparse and limited. Exceptions include a GCF-supported school infrastructure project in Bangladesh (see section 3.3) and a school facilities project in Haiti supported by the Adaptation Fund. Approved in early 2022, the Haitian project aims to improve national knowledge concerning the exposure and vulnerability of school facilities, retrofitting selected schools and enhancing capacities and levels of awareness of local populations and civil protection stakeholders on risk management, among other things (Adaptation Fund 2021). When the ministries responsible for the environment and climate change or other

[16] https://unfccc.int/topics/resilience/workstreams/national-adaptation-programmes-of-action/introduction.

non-educational ministries and their partners work on an international climate funding application, the ministry of education should be involved in the process so that the needs and contributions of the education sector are integrated into the application. Necessary preparatory and in-process support should be given to the ministry of education and relevant education sector stakeholders to develop their capacities for accessing these new and additional funding sources.

There is a growing interest in investing in climate action in the education sector across multilateral and bilateral donors, international financial institutions, the private sector, funding foundations, philanthropies and nongovernmental organizations (UNESCO and UNFCCC 2016; Kagawa 2022i). This presents an opportunity for cofinancing by education, climate, humanitarian and development funds to support national education system responses to climate change and environmental degradation. Existing multilateral finance mechanisms for education such as GPE and Education Cannot Wait (ECW), each prioritizing lower-income counties, are well placed to harmonize aid efforts to enhance climate resilience and nature positivity in the education sector in a coordinated manner according to national priorities. The UN Multi-Partner Trust Fund (MPTF), which addresses a broad range of humanitarian and development challenges, including those related to climate change and the environment, is not an education-specific fund, but its pooled and blended financial model can be an additional avenue for financing joint and cross-sectoral climate and environmental action involving the education sector.[17]

Displacement exacerbated by the climate and environmental crisis calls for greater collaboration and coordination between national governments and humanitarian, development and private funders to mobilize resources to meet the particular educational needs of displaced children, refugee children and children in host communities (UN 2018, 2022).

In low- and lower-middle-income countries, about two-thirds of resources for education are financed from domestic public sources.[18] This highlights the vital importance of galvanizing domestic finance in a sustainable manner in support of efforts to make the education system more climate change responsive and nature positive. Improving the tax base (e.g., levies on extractive industries such as oil and gas, closing tax loopholes) and reforming overall financial governance and public finance management are important ways forward that can unlock additional public funding for education. Framing the climate crisis as a national security crisis

[17] "Multi-Partner Trust Fund Office Gateway," United Nations, undated, https://mptf.undp.org.
[18] "Domestic Financing," Global Partnership for Education, updated 2022, https://www.globalpartnership.org/what-we-do/domestic-financing.

might open a new avenue to increase financial resources for the education sector. There should be coordinated efforts to raise awareness and build commitment across various ministries, not only those in charge of education and environment but also those involved with finance and planning. In devolved contexts, subnational governments are often in charge of multisectoral budgets, including those for the education sector, so awareness raising and capacity building among subnational-level government personnel is also critical.

Efficiently managing climate change public finance—or any public finance—in line with its goals requires institutional frameworks, processes and accountability mechanisms. To better monitor climate change–related public finance, demarcating a climate change budget is an important starting point. Developing tags or budget codes for climate change–relevant activities as well as determining a method for defining climate change relevance are helpful features of better financial management, identifying funding gaps, mobilizing additional resources and raising awareness among policy makers (IBP and UNDP 2018; UNDP 2019). For instance, the government of Bangladesh has established a national climate change financial framework, created a budget tracking system applicable to a wide range of ministries and departments, including those in charge of education, and made climate financial information publicly available for greater transparency (see example 4, appendix 1).

In each country and jurisdiction, there should be clear agreement on what falls under "climate action" financing in the education sector in line with government's climate change policy and strategy framework. Without clear definitions, it is difficult to estimate, allocate, monitor and track what proportion of financial resource allocations are climate change responsive and nature positive and to analyze how well the funds have been used for achieving stated objectives (Kagawa 2022a).

Green or sustainable procurement is an area with huge potential. In the education sector, public purchases of goods and services should be oriented in a way that achieves value for money and promotes positive outcomes for the environment. In this regard, the World Food Programme's Home Grown School Feeding initiative is an innovative example; it enables schools to procure food produced by local smallholder farmers for school meals (see example 5, appendix 1). There should also be contingency funds or climate insurance schemes put in place—both are scarce in lower-income counties and particularly so in the education sector—so that the education systems are equipped with the financial instruments to respond to climate change–induced disruptions in a timely manner to safeguard education continuity.

Cost-benefit analysis of climate change and education remains a significant gap. At the time of this research, the World Bank plans to conduct cost-benefit analyses of climate change across all sectors. Save the Children, GPE and the World Bank also plan to initiate a series of Annual Climate and Finance Watch papers (title pending) with a view to making the clear economic case for financing anticipatory climate action in education (Kagawa 2022i). Clearly, mechanisms need to be put in place for the initiation of cost-benefit analysis of both climate inaction and action in the education sector, as well as investigation of the assumption that investing in climate-responsive and nature-positive education may result in system efficiencies and diminishing inequities. This will enable governments to better appreciate the cost of inaction and the costs and gains of particular actions, so they can better make the case for investment.

Equitable Finance

Finance is one of the important ways in which the ministry of education can pursue equity in education. This is well recognized in SDG 4, with one of the thematic indicators including the "existence of funding mechanisms to reallocate education resources to disadvantaged populations" (UIS 2022). As climate change disproportionately impacts those who are most marginalized due to gender, disabilities, socioeconomic conditions and other types of vulnerabilities and is likely to exacerbate existing disparities when effective measures are not taken, equitable finance in education becomes even more salient in the face of the climate and environmental crisis (Kagawa 2022a).

It should be well noted that in lower-income countries direct financial contributions of households to education provides a large proportion of overall education spending. Even for compulsory education in government schools, families often need to meet costs such as school fees, textbooks, school materials and supplies, uniforms and school transport, among others. Declining household income due to climate change impacts becomes a disincentive for economically struggling families to send their children to school, especially girls (Chigwanda 2016; World Bank and UNESCO 2021, 2022). Approaches such as school fee exemptions, scholarships, in-kind transfers (e.g., textbooks, uniforms, school supplies, transport costs, assistance to children with special needs) targeting the most disadvantaged students and their families can make an important contribution toward ensuring quality education provision for all in the face of the multifaceted climate and environmental crisis. School feeding programs as well as conditional or unconditional cash transfers through social programs with an educational component are promising interventions for incentivizing and maintaining children's participation in schooling (Global Education Monitoring Report Team 2021). In Bhutan, the Ministry of Education provides free public education and fully

funds a school feeding program. In Bangladesh, as part of the government's social safety spending, an increasingly large share of the education development budget is allocated for school feeding, various types of stipend programs and free distribution of textbooks. These measures, not necessarily created in response to climate change imperatives, have contributed to an increasing enrollment rate and better school performance (Kagawa 2022b, 2022c). The World Food Programme's Home Grown School Feeding initiative provides win-win solutions for children, smallholder farmers and combating climate change (see example 5, appendix 1).

Current education sector policy thinking and practice in lower-income countries do not intentionally link equitable finance mechanisms in education and climate and environmental considerations. Leveraging this underrecognized linkage is of vital importance in the context of the climate and environmental crisis.

Box 2. **Finance: Action points**

- Mobilize international and domestic finance to accelerate and boost climate change mitigation and adaptation as well as environmental protection across the education sector.
- From the planning stage, strategically consider how to sustain the investment in a climate-responsive and nature-positive education system in the long run and how to maximize the impact of that investment (e.g., plan for replicating and scaling up successful models and experiences).
- Raise awareness among key government personnel at both national and subnational levels about the importance and benefits of financing climate change mitigation and adaptation activities in the education sector.
- Create a shared understanding of what constitutes "climate action" financing in a national education system and how to use the financing efficiently.
- Create a tracking and monitoring system for financial resource allocation and spending concerning climate action in the education sector, linking it to the wider government climate finance tracking system where such exists.
- Strengthen existing equity-based financing mechanisms (or create them if not currently available) for the education sector as part of the sector's response to climate and environmental threats.

3.3. Physical Infrastructure

Both new and existing school infrastructure should integrate climate change mitigation and adaptation considerations into planning, design, construction and maintenance, thereby ensuring a protective, healthy and inclusive learning environment for all students while minimizing their environmental footprint. School and community-level stakeholders should play an active role in making and maintaining the school infrastructure to ensure it becomes safer and greener.

Regulatory Framework, School Location, Design and Construction

Schools are normally built to last for several decades. It is imperative that new school buildings are planned, designed, constructed and maintained taking into consideration known hazards and future global heating trends. With respect to existing, still-in-use school buildings, it is important to take proactive measures to reduce vulnerability to hazards and adapt to the changing climate.

There should be an up-to-date regulatory framework including building codes, local building bylaws and other legally binding stipulations as well as minimum performance standards and guidance for public buildings, including schools, to ensure safe, healthy, inclusive and environmentally sustainable living and learning environments. The regulatory framework and guidance documents need to enshrine the latest understandings of hazard and risk and include monitoring and enforcement mechanisms (GADRRRES 2022; UNEP 2021b). A noteworthy example is the Decree of Resilience Building Standards of Schools launched by the government of Mozambique in 2022. Recognizing repeated and serious destructions wrought on school buildings by increasingly frequent and intense climatic events, the decree insists on compliance with climate resilience standards for all new and existing schools in the country. The decree is to be integrated into national frameworks on public social infrastructures with enforcement mechanisms (UN HABITAT 2022).

School location is one of the key factors in determining school safety. Any new school site needs to be chosen carefully so the site and access to the site (e.g., roads, pathways, waterways) are free from dangers that may cause harm to students, teachers and other educational personnel. The site also needs to be accessible to all students (GADRRRES 2022; INEE 2010; UNICEF 2009). Choosing a right school location is a complex matter and careful planning is required. In addition to climate and other risks, land availability, the distance from learners' homes to the school, construction costs and resource availability are some of the

key factors that should influence a site selection decision. Advances in technology such as geographical information systems (GIS) have improved selection of school locations by helping maximize equitable education access. GIS can be purposefully extended to climate-smart site selection to minimize climate risks (Kazemi et al. 2021). The use of technology for school site selection should be complemented by detailed on-site assessment involving students, teachers, community members/leaders and relevant government authorities. Worsening sea level rise, river and sea erosion and landslide threat will make well-planned school relocation a viable and necessary adaptation option in some contexts. In general, planned relocation projects are highly complex, often involving the movement of a whole community and affecting multiple groups of people in different ways on differing time scales (IFRC 2021). Detailed education policy thinking is largely absent in this regard. Lessons should be learned from countries where planned school relocation has been implemented. Relevant data on this point are currently in short supply and require further study.

In hazard-prone areas, new schools should be designed and built and existing schools retrofitted so they can be used as temporary community shelters in times of emergency and disaster. For example, in Bangladesh, through the Climate Resilient Infrastructure Mainstreaming Project supported by the Green Climate Fund (see section 3.2), 45 new cyclone shelters are under construction and 20 existing shelters are also being renovated in the country's most vulnerable coastal districts. These shelters are used as primary schools in normal times, offering 45 additional schools and supporting the education of 18,590 children.[19] Using schools as temporary shelters requires advance shelter management planning and strategy so that the roles and responsibilities of different stakeholders are clear, the school facilities are used responsibly and kept clean, and, hence, learning disruption is kept to a minimum (APCSS 2017).

The school-built environment should play an Important role in reducing the school's carbon footprint. The use of renewable and clean energy (e.g., solar) in tandem with energy efficiency and conservation are key climate change mitigation measures that schools can take. For instance, in Pakistan more than 12,000 government schools in Punjab and Khyber Pakhtunkhwa provinces now enjoy clean and reliable electricity thanks to rooftop solar panel installation with support from the Asian Development Bank's Access to Clean Energy Investment Program. The installation of solar facilities means that remote off-grid schools as well as schools connected to the grid but suffering from regular power outages enjoy a stable and clean energy supply that provides access to proper lighting,

[19] "FP004: Climate Resilient Infrastructure Mainstreaming (CRIM)," Green Climate Fund, undated, https://www.greenclimate.fund/project/fp004#overview.

ventilation and drinking water in the classroom. The improved learning environment has led to increased school enrollment as well as a significant savings on utility bills (ADB 2022). In Vietnam, as a step toward scaling up the rooftop solar system in public schools across the country, UNICEF and GGGI developed an analysis report including a market assessment and recommendations (UNICEF Viet Nam and GGGI 2022). In St. Lucia, the Nationally Appropriate Mitigation Action for Schools (Green Schools NAMA) lays out three interventions—energy efficiency (e.g., replacing lamps with energy-efficient LED tubes), installation of solar PV units in primary and secondary schools, and a training and capacity building program comprising the development of energy accounting systems for all primary and secondary schools as well as a curriculum on environmental management and sustainable development (St. Lucia 2018b). Many schools in sub-Saharan Africa and southern Asia rely on firewood and charcoal for cooking school meals. This practice contributes to deforestation, greenhouse gas emissions and air pollution. Modern and clean cooking solutions include using solar-powered electric cookers. The World Food Programme is piloting the introduction of institutional electric pressure cookers to a small number of schools in urban Lesotho as an alternative to biomass-based cooking (WFP 2021).

With proper solid waste management schools can also reduce their carbon footprint as well as their pollution. Schools should set up waste segregation processes to promote recycling and reusing so they can reduce the overall volume for disposal. Bins should be placed in key locations according to waste types, each covered to avoid rainwater infiltration and rodents. Organic food waste can be composted, as can green waste, for subsequent use in the school garden. It is also important to minimize the use of disposable materials (e.g., single-use plastic) (CDEMA 2014).

In terms of school construction materials, sourcing them locally has several advantages, including reduction in transportation energy and costs and easier access to the materials for necessary repairs and maintenance after construction. Priorities should be given to sustainably produced or sourced materials, ensuring that the extraction of locally sourced materials does not contribute to the deterioration of local ecosystems (UNEP 2021b). In Côte d'Ivoire, more than 260 new classrooms have been built using plastic bricks made of plastic waste materials collected by local women, an innovative initiative tackling educational, environmental and social challenges simultaneously (see example 6, appendix 1).

To reduce teacher and student vulnerability to excessive heat while at school, measures to cool the school buildings can include painting building facades in white or light colors, installing green roofs, providing adequate ventilation (natural ventilation, ceiling fans) and planting shade trees. To mitigate flood impacts,

school building design can employ raised classrooms, water tanks and latrines above flooding levels, ensuring accessibility for all students. To cope with a declining supply of clean water, an experience worsening with a changing climate, schools can use rainwater harvesting and solar-powered water systems (for water pumping and wastewater treatment), among other measures (UNEP 2021b; UNICEF 2019, 2021c). For instance, in rural Malawi, with support from UNICEF, solar-powered water systems have been introduced to ensure sustainable access to safe water for schools, health care facilities and communities, resulting in education, health and climate change mitigation benefits. Solar-based water systems were also successfully integrated into the Cyclone Idai emergency response (see example 7, appendix 1). Lack of regular water supply and poor hygiene at school are major factors causing student absenteeism, especially among adolescent female students when they are menstruating. Schools might make a signal contribution to resolving both student absenteeism and climate change impacts by ensuring functional water supply systems based on sustainable energy sources such as solar power (Chigwanda 2016). Another issue, often overlooked, is the effect of salination. School buildings in highly saline coastal areas deteriorate faster and therefore call for higher building specifications, special care and quality control to extend the durability of the built environment (Das 2010).

School infrastructure design and development should enhance the digital learning infrastructure in an environmentally sustainable manner (e.g., ensuring green and sustainable procurement, using clean renewable energy), applying lessons learned during the COVID-19 school closures.

While features of sustainable and resilient schools have been well identified by multiple organizations, there are significant implementation challenges, primarily due to paucity of finance and lack of technical know-how (Fitzpatrick 2022).

School/Community Stakeholder Engagement

It is important to engage local communities in the different stages and aspects of school infrastructure development. Their engagement is essential to promote a sense of community ownership of the school and a sense of the school belonging to the community it serves. Community engagement also provides opportunities for capacity building and awareness raising for safety, disaster risk reduction and ecological sustainability.

As an added benefit, community members bring a range of craft and technical skills to the school building development process. Local community members are best placed to provide contextual knowledge, know-how and experience with respect to local needs, local hazards and risks, building materials and techniques

that are locally available and culturally appropriate, local labor conditions and local ecosystem health, among other things. Active and inclusive community engagement, especially in the early design and construction processes, not only helps develop ownership and trust but also familiarizes members of the community with the construction materials, methods and techniques being used. Newly gained knowledge and skills can, in turn, be applied to school building maintenance and repair, to their own dwellings and to community buildings (World Bank, GFDRR, and ARUP 2017; UNEP 2021b).

It should be noted that the level of community engagement in school infrastructure differs depending on whether the school building development is planned and managed centrally or locally. In centrally managed contractor-built processes where designs, labor and materials are imported, community members can feel excluded from the processes, resulting in lack of ownership and disengagement from involvement in future maintenance. In community-built (or self-built) schools, community labor is used in school construction projects. It is a most effective way of generating a sense of ownership within the community, leading to greater community involvement in maintenance. In applying vernacular methodologies to school buildings, appropriate measures should be taken to ensure that the design and construction are sound (World Bank, GFDRR, and ARUP 2017). Local builders need to be given necessary training and guidance concerning compliance with building codes and safe construction to avoid any harm (GADRRRES 2022).

The school-built environment offers student action learning opportunities (see also section 3.5). For instance, through engaging with school gardens students can learn and practice environmental conservation and sustainable agriculture techniques. School gardens can also provide nutritious food for the children. The 10,000 Gardens in Africa project under the auspices of Slow Food, involving many schools, is particularly noteworthy due to its strong emphasis on protection and regeneration of biodiversity and food security by cultivating local indigenous plant species and varieties while giving value to cultural heritage and traditional knowledge (see example 8, appendix 1).

Box 3. Physical infrastructure: Action points

- Establish an up-to-date regulatory framework for school infrastructure together with dissemination, training and enforcement mechanisms to ensure sound implementation.
- Choose new school locations that are safe from climate and other risks and accessible for all.

- Ensure that schools used as temporary shelters have shelter management plans and strategies in place and are equipped with necessary facilities and resources.
- Integrate climate change mitigation and adaptation considerations into all stages and aspects of school building development to arrive at carbon neutrality, nature positivity and disaster resilience, ensuring optimum community involvement at every stage.
- Ensure school and community stakeholder participation in the different stages and aspects of school infrastructure development and also ensure the availability of student action learning opportunities that use the school-built environment.

3.4. Curriculum, Learning and Teaching

Through formal curriculum learning—delivered through the grade levels and across all subjects—students need to be empowered as change agents and advocates who can critically and constructively engage with the climate and environmental crisis. Teachers likewise need to be supported in their role as animators and catalysts for climate action from their school base, especially given their position in the community.

Curriculum Content and Learning Outcomes

Facing the deepening planetary crisis calls for learning that addresses the multifaceted and dynamic nature of climate and environmental change, that covers its social, political, economic, environmental, cultural and moral dimensions. It is now widely appreciated that scientific knowledge alone does not bring about necessary attitudinal and behavioral change and resultant readiness for collective action (Kagawa and Selby 2010; Rousell and Cutter-Mackenzie-Knowles 2019). Historically, student exposure to issues of climate change and disaster risk reduction has tended to be in science and geography curricula mainly at the secondary school level. Overall, curriculum integration of climate change, disaster risk reduction and environmental concerns remains limited.[20] There is a growing realization that climate change, disaster risk reduction and environment curriculum integration needs to go beyond the natural sciences and physical geography and be reinforced in an interdisciplinary manner. All subjects have a contribution to make in developing critical understanding of the causes, effects

[20] A recent UNESCO study revealed that nearly half (47 percent) of the national curriculum frameworks reviewed made no reference to climate change (UNESCO 2021a).

and solutions of the interconnected climate and environmental emergency and in fostering proactive student engagement that seeks to address both causes and impacts in their own lives, in their schools and in their immediate and wider communities (Selby and Kagawa 2012; UNESCO 2021a; UNESCO and UNEP 2011).

More specifically, at age-appropriate points the school curriculum should address topics and issues such as the following:

- Anthropogenic causes of climate change and environmental issues such as pollution, biodiversity and habitat loss, deforestation, land degradation, aridification, desertification
- Effects and impacts of climate change, environmental degradation and natural disasters (e.g., social, economic and environmental effects; differentiated impacts in terms of gender, ethnicity, disability and other sociocultural and socioeconomic characteristics; locally specific impacts; mental and physical health effects)
- Solutions and actions (e.g., climate change adaptation and mitigation; sustainable natural resource management; biodiversity protection and restoration; green and low-carbon economy; clean and renewable energy; disaster risk reduction and management; sustainable production and consumption; good practice examples and pro-environmental actions involving children, young people and communities).

Curriculum content should also integrate understanding of the mutually exacerbating interface between climate change, disaster risk and environmental degradation. It also needs underlining that climate-responsive and nature-positive curriculum content should embrace local place-based, bioregional as well as global focuses, and consider the interfaces between scientific, Indigenous and local knowledge and wisdom (Selby and Kagawa 2010; Oxfam, n.d.; Selby and Kagawa 2012, 2013; UNESCO 2017).

A ministry of education curriculum specialist team should lead and coordinate the review and renewal process for climate change and environment curriculum integration supported by relevant experts from other government ministries/departments/agencies (that is, those with responsibility for the natural environment, climate change and disaster management coordination), development partners and university academics. Teacher educators and teachers should also be part of such a review. Existing curriculum should be examined through the lenses of climate change, disaster risk reduction, understanding of natural systems, gender equality and social inclusivity to determine what themes and topics need to be embedded in which subjects and at which grade levels. In each grade level, suitable carrier subjects should be identified to anchor climate change–related learning. In the curriculum development process, it is important to

ensure curriculum contextualization by working closely with relevant subnational-level stakeholders, especially teachers, to better integrate a sufficient range of locally relevant issues, risks, needs and actions to address climate change–induced and environmental challenges.

In Ethiopia, further to the development of the Climate Change Education Strategy of Ethiopia, the Ministry of Education, the Ministry of Environment, Forests and Climate Change, and UN CC:Learn have collaborated to identify climate change learning opportunities in the existing national curriculum and to develop a curriculum guideline including a content flowchart as a prelude to systematic climate change curriculum integration, calibrating appropriate depth and coverage according to learner level of maturity (Environment, Forest and Climate Change Commission, Ethiopia 2019; Ministry of Environment, Forests and Climate Change and Ministry of Education, Ethiopia 2017).

Systematically linking climate change mitigation and adaptation education, DRR education and environmental and biodiversity protection education is the approach employed for the new lower secondary national curriculum in St. Vincent and the Grenadines (see example 9, appendix 1). In Bhutan, environmental science, a secondary-level optional subject, takes an interdisciplinary approach to develop a holistic understanding of environmental systems and help students understand the multifaceted human causes of climate change as well as identify the potential for human agency at the individual and collective levels in tackling the climate crisis and protecting the natural environment (Kagawa 2022c).

For students to broaden and deepen their learning cumulatively, it is important to develop knowledge, skills and dispositional learning outcomes for climate change, disaster risk reduction and management and environmental protection systematically and coherently to inform and steer delivery of the national curriculum. Reinforcement of learning through the grade levels from the early years is critical, not least because of significant dropout during the secondary years in many lower-income countries. In earlier grades, learners achieve simpler learning outcomes suitable for a particular development stage as a foreshadowing of more complex learning outcomes earmarked for later stages of learning.

Existing taxonomies of climate change curriculum learning outcomes are heavily knowledge oriented. Since the climate and environmental crisis infringes on many child rights, it is vital to integrate a broad range of life skills to address mutually reinforcing issues related to child protection (including child marriage); water, sanitation and hygiene (WASH); health; nutrition and safety from risk, treating them comprehensively and with vertical and cross-curricular reinforcement. They include cognitive and metacognitive skills (e.g., critical and creative thinking),

socio-emotional skills (e.g., coping, self-management, collaboration) and communication and leadership skills (e.g., active listening, negotiation, advocacy). Skills learning applicable to transitioning toward a green and low-carbon economy, community resilience and sustainable lives and livelihoods as well as skills for living within the earth's ecological capacity are also important and need to be unpacked and applied. These include skills for contributing to environmental protection and conservation and skills for taking forward sustainable production and consumption, among others (Kagawa 2022a; Kwauk and Casey 2021; Selby and Kagawa 2012).

Considering the gendered impacts of climate change and disaster, developing resilience and leadership skills for girls is particularly important. Supporting girls to study science, technology, engineering and mathematics (STEM) on equal terms with boys is also critical preparation for their active participation in protecting the environment and contributing to a low-carbon economy using green and clean technology. There is also a need to ensure the revival of traditional green sector craft skills through skills training, thus creating entrepreneurial opportunities for women's collectives (Malala Fund 2021; UNICEF and ITU 2020).

Curriculum delivery of knowledge and skills also needs to be informed and mediated by values and dispositions such as affinity with, care and respect for nature; commitment to fairness, justice and solidarity in forging a sustainable future; respect for natural and cultural diversity; intrinsic valuing of "other"; and appreciation of the interdependence and interrelatedness of all sentient beings. Sustainability-aligned and nature-affirming values, including those informing Indigenous people and local communities, should be an integral part of the curriculum.

Pedagogies and Learning Assessment

The complexity and uncertainty of climate change require learning and teaching processes that empower learners as agents and advocates of change. For this to happen, considerable weighting should be placed on active, action-oriented and activist pedagogies that encourage learners to practice active citizenship skills within and outside of the school and within the local community and biome. Research evidence suggests that active forms of pedagogy that are cooperative, participatory and place based have significantly positive impacts on attitudes and actions of children and young people in relation to climate change (Rousell and Cutter-Mackenzie-Knowles 2019). However, top-down and heavily didactic pedagogies remain common practice in many classrooms in lower-income countries. Action learning outside the classroom is important for applying and practicing new knowledge and skills while also testing and confirming dispositional orientations within real-life situations—in their own lives, at school and in local

communities. Children should have safe and meaningful participatory opportunities of an age-appropriate and contextually appropriate nature (see section 3.5 for further details).

Pedagogical approaches for younger children should help them nurture care and love for the natural environment as a means of foreshadowing and preparing for later learning. Environmental consciousness starts to form and develop in early childhood and positive childhood experience in nature lays the foundation for pro-environmental attitudes and behaviors in adult life. Play-based and nature-rich (that is, nature immersion or bringing natural materials into classroom) pedagogies that incorporate physical movement and social interaction are promising approaches in developing young children's awareness of the natural environment and their relationship and affinity with other living beings (Ardoin and Bowers 2020). The importance of nurturing positive attitude toward nature features in the pre-primary curriculum framework documents of some countries. For instance, the Pre-primary Year Curriculum Framework of the Solomon Islands highlights the importance of play-based pedagogies and caring for the environment (MEHRD 2018) (see example 10, appendix 1). In Nicaragua, environmental education that cultivates love and respect for Mother Earth and promotes environmentally friendly practice is offered from the first stages of school life. In the class called "Growing in Values," preschool and primary school students carry out activities that promote care and love for Mother Earth.[21] A nature immersion approach is relevant to all levels of education. In the Maldives, a Ministry of Education–led nation-wide ocean exploration program—Farukoe (which means "child of the reef" in the Dhivehi language)—exemplified how nature immersive experiential learning can become a springboard for deeper understanding of the local environment and taking pro-environmental action (see example 11, appendix 1).

Not only age-appropriate play but also creative art-based activities using drawing, music and song, drama, stories, poems and fables provide engaging learning opportunities for children and help them develop creative and empathetic thinking as well as effective communication skills associated with disaster risk reduction. Digital technologies also provide engaging ways for students to learn about climate change and natural hazards (e.g., making photos and videos that tell their own climate change and nature stories as they advocate for change) (UNDRR 2020a).

To foster personal resilience in the face of adverse and traumatic impacts of climate change, teachers need to help students maintain their emotional well-

[21] Ministry of Education, Nicaragua, email message to authors, June 17, 2022.

being and develop emotional fortitude. The teachers' role is not to conduct therapy, which requires specialist training and skills. What teachers can do is provide psychosocial support to disaster-affected students by, for instance, establishing a safe and welcoming learning environment for all students, establishing a sense of normalcy by reestablishing daily routines, and creating structured opportunities for students to express emotions and experiences (IASC 2007). Social and emotional learning (SEL), overlapping with psychosocial support to some degree, aims to help students identify and manage their own emotions, establish caring and empathetic relations with others and effectively handle challenging situations (INEE 2016). Learning about climate change and living through the deepening climate and environmental crisis tends to trigger strong emotions among children and young people as climate change at its core poses perhaps the greatest existential threat to humanity and the whole planet. Emerging research evidence indicates that a large number of young people around the world suffer eco-anxiety—that is, distress, fear and anguish associated with the climate change and ecological crises.[22] It is important to note that climate anxiety is not fomented by ecological disaster alone but is deepened when those in power (e.g., government) are seen to repeatedly fail to act upon the threat (Hickman et al. 2021). Pedagogical approaches should enhance students' abilities to demand accountability of those in power and participate in collective action to facilitate systemic changes in age-appropriate ways. There should be in-school and out-of-school platforms where the voices of children and youth are heard and what they have to say is acknowledged and responded to. Classroom opportunities should be provided for students to articulate and share their anxieties and fears as a prelude to cultivating a sense of grounded hopefulness (Selby and Kagawa 2018a; Selby, forthcoming).

A climate change pedagogy also needs to zero in on the future. It is ironic that a key raison d'être of schooling is to prepare for the future but when it comes to curriculum, learning and teaching, the future is rarely a specific topic of study and deliberation. Students, age appropriately, need learning space for considering probable, possible and preferred futures and what needs to be done individually and collectively to preempt undesirable futures and bring on desired futures at all levels, personal and local through to national and global (Kagawa and Selby 2010; Selby and Kagawa 2013).

Student assessment is a further fallow area of climate change curriculum, learning and teaching. Teachers and students themselves know that what is not assessed is not taken very seriously. It is important to take on broad, fit-for-purpose ways of

[22] For instance, see the 2020 UNICEF surveys of the 8 countries of South Asia involving more than 25,000 individuals (Lopez Rello and Ackers 2020) and a 2021 global survey in 10 countries involving 10,000 individuals (Hickman et al. 2021).

formally and systematically assessing student proficiency and performance. Student assessment concerning action-oriented climate change learning should not be limited to knowledge acquisition; it should include monitoring and assessment of practical skills development and behavioral and attitudinal shifts. An age-appropriate and diverse set of assessment tools should include both formative and summative modalities. Overall, student assessment needs to be *authentic*—that is, the assessment needs to be consistent with, aligned with and informed by the specific knowledge, skills and dispositional learning outcomes laid out in the climate change and environmental curriculum; the assessment tools and processes need to be enabling and empowering so that students are partners in rather than objects of the assessment process; the assessment processes need to be meaningful, that is, received as relevant and meaningful through the student lens, and seen to inform corrective shifts in the learning process.

Teacher Capacity Building

While there are highly enthusiastic and committed teachers who are already doing their best to raise student ecological and climate change awareness and to motivate students to engage in pro-environmental actions through their subject teaching and co-curricular learning provision, such efforts need to be supported and systematized. Complex climate change and environmental challenges can't be meaningfully and sustainably addressed by individual teachers. Their efforts must be linked, coordinated and scaled up (Kagawa 2022a).

There should be systemic and adequately reinforced capacity building opportunities for pre- and in-service teachers. Such programs should be free and accessible and should meet the real needs of teachers. Teacher capacity building programs should focus not only on environmental and climate change–related curriculum content but also practical knowledge and skills building for effectively facilitating and managing interactive, experiential and participatory pedagogies that are also gender responsive and inclusive. Teachers need to be empowered to use a range of action-oriented pedagogies in support of school- and community-based student action learning. They can work in partnership with stakeholders in climate change, environmental and disaster management by bringing them to the classroom to share their knowledge or have students implement small projects with them. Teachers should also be supported as they take on the role of change agents who can bring about positive change at school, in their local communities and beyond (Oxfam, n.d.; Education International Asia-Pacific Regional Office 2021).

How to enhance student health and well-being in situations of a changing climate and environmental degradation is yet another area in which teachers need capacity development support. There should also be support measures for

teachers who are affected by disasters and struggle to meet basic needs. It is vital to support their safety, health, well-being and livelihood in a gender-sensitive manner. More broadly, ensuring decent work conditions (e.g., decent salary, payment on time) and teacher autonomy are important enablers for teachers to better contribute to climate-responsive and nature-positive education.

In addition, teachers need teaching and learning resources and tools that are up-to-date, gender responsive, contextually and culturally appropriate, sensitive to the needs of both teachers and students, and in their local languages (Education International 2021; Education International Asia-Pacific Regional Office 2021). Vanuatu and the Solomon Islands present noteworthy examples of teaching resources incorporating Indigenous and local environmental and vernacular knowledge into school curricula. In each country, the initiative formed part of the UNESCO LINKS (Local and Indigenous Knowledge Systems) program (see example 12, appendix 1). Teachers can also draw from online materials and resources, but it is important to ensure the accessibility and contextual relevance of such materials.

To support and connect teachers, in-person or virtual engagement and collaboration platforms and forums should be put in place. Such platforms may take the form of study groups, peer mentoring, site visits or "teacher circles" where teachers become a mutually supporting group and community of practice.

Box 4. Curriculum, learning and teaching: Action points

- Across the subjects and through the grades, systematically integrate a wide range of curriculum topics and associated learning outcomes with respect to climate change, DRR and environmental conservation.
- Bring relevant ministry of education partners into the curriculum development process as appropriate, including, very importantly, teachers.
- Ensure a wide variety of active and experiential forms of pedagogy that empower students as agents and advocates of environmental conservation and restoration and climate change adaptation and mitigation.
- Employ nature-oriented, age-appropriate pedagogical approaches, including fieldwork to nurture care and love for nature.
- Provide psychosocial support and social and emotional learning to take care of student emotional well-being in the face of natural disasters, environmental loss and the climate crisis.

- Create learning space for regular student reflection on probable, possible and preferred futures, especially climate-changed futures, and link that reflection to local action-oriented learning.
- Employ a range of authentic and fit-for-purpose student assessment modalities that assess not only knowledge acquisition but also skills and attitudinal and behavioral shifts.
- Ensure systemic and systematic capacity building opportunities and resources for pre- and in-service teachers in support of the delivery of climate change education, DRR education and environmental education.
- Establish in-person and virtual platforms and forums for teachers to enable mutual support and exchange.

3.5. School and Community Linkages

Schools should serve as community hubs in the enhancement of local safety and resilience, by promoting environmentally sustainable practices, by proactively reaching out to communities and by drawing community members into the climate change, disaster risk and environmental protection and restoration mission and initiatives of the school. There should be school- and community-based engagement platforms for children and young people that enable them to exercise and hone their change agency, advocacy and leadership capacities as they help take climate and environmental action forward.

Linking Learning in Classroom, School and Community

Schools are an integral part of a community and a strong school–community link is a defining factor in quality education provision. Linking schools and communities has a clear pedagogical dimension. For instance, schools can invite parents, community adults and elders to the classroom to share their knowledge, lived experiences and practical coping strategies in relation to past hazards and the changing climate. Indigenous elders, in particular, can share their wisdom and reflections on living in harmony with nature. While students can take newly obtained knowledge and practices back home and share them with family and community members, they can also bring ideas and practices from home and share and discuss them at school (UNICEF 2009; n.d. a). Pedagogical linkages between schools and communities are strengthened when student learning happens in a variety of contexts and circumstances within children's wider environment and through partnerships between schools and other local agencies and stakeholders (UNICEF 2009).

A whole school (or whole institution) approach to education for sustainable development (ESD) and environmental education has become popular among

policy makers and practitioners around the world. Aiming to make schools safe, environmentally sustainable and climate compatible, a whole school approach encourages schools to rethink all aspects of school and integrate sustainability considerations into each of those aspects, including curriculum, learning and teaching; school governance and policy; infrastructural operations and management; community engagement; and school ethos. A whole school approach provides students with meaningful and hands-on action learning opportunities (UNESCO 2016, 2018; Global Education Monitoring Report Team 2016). Eco-Schools Indian Ocean, an initiative linked to the global Eco-Schools Program,[23] is an exemplar of a whole school approach with participating schools extending environmental learning out the classroom across the workings of the school and into the community (see example 13, appendix 1).

School Risk Assessment and Disaster Management

Schools should establish clear procedures and mechanisms for effectively anticipating and managing any emergency and disaster situation in line with those in place at national and subnational levels. School safety needs to employ an all-hazards approach that encompasses natural, technological, biological and health-related hazards as well as human-originating hazards such as conflict, violence and everyday dangers such as road traffic accidents and behaviors arising from alcohol and substance abuse. It is critical to understand and address the multiplicity of risks comprehensively (GADRRRES 2022).

To facilitate school disaster management (or "school safety and education continuity management" [GADRRRES 2022]), each school needs to form a core team that exercises a leadership and coordination role. Such a group, often called a "school disaster management committee," is composed of school officials, staff members, student leaders and parental/community representatives. In some contexts, the existing school management committee or other body such as the WASH committee or parent-teacher association may take on additional school disaster management roles and responsibilities with membership extended to include students, and with the remit to drive forward school disaster management. An option for smaller schools in rural areas might include school disaster management aspects overseen by the village or community disaster management committee in the school catchment area where such exists. Whichever structure schools take on, a close working relationship with the village or community management committee is vital. As part of that relationship, it is important to include specific women's and girls' groups, each with a remit to discuss gender-specific considerations on climate- and disaster-related impacts

[23] Eco-Schools: https://www.eco-schools.org.uk.

and issues and the specific contribution females can make. Conduits for the sharing of outcomes from such gatherings should be established within both community and school.

One of the key tasks of school disaster management is to conduct a school risk assessment with the aim of identifying and collecting information on hazards, vulnerabilities and capacities that exist in and around the school. School risk assessment is a consultative and participatory process; therefore, the participation of diverse school stakeholder groups, including student groups, is vital—not least for the process of systematic data collection and analysis. By including multiple stakeholder groups, schools are more likely to gather diverse views and perspectives. Risk mapping, seasonal risk calendars, historical timelines/profiles, school structural and nonstructural vulnerability assessments and school/community transect walks are some common school risk assessment activities (Plan International 2018; UNESCO Office in Hanoi and Vietnam Ministry of Education and Training 2016).

The results of the assessment then inform the development of a school disaster management plan (or something similar but differently named). This plan typically pinpoints actions and responsibilities of different stakeholder groups for disaster mitigation, preparedness, response and recovery. It commonly includes the following components: a school profile; a school map; a summary of the school risk assessment; an emergency response plan (including emergency contact list, standard operating procedures for emergencies at school); an education continuity plan allowing for limited use of the school as a temporary evacuation center and including details of emergency evacuation procedures, identification of temporary learning spaces, an alternative and flexible calendar, details of WASH, child protection and psychosocial support, coverage of post-disaster damage assessment and data collection, regular emergency drills and simulation exercises, and a calendar and schedule, among others (UNESCO Office in Hanoi and Vietnam Ministry of Education and Training 2016; GADRRRES 2022). Similar to national-level planning (see section 3.1), putting education continuity plans in place for a likely future scenario of large-scale migration and displacement triggered by climate-related hazards and shocks remains a gap in school disaster management planning.

When necessary training and support are provided in an age-appropriate and contextually appropriate manner, school-age children are capable of conducting risk assessments in their locality, coming up with actions that contribute to reduced disaster risk and increased resilience in school and community. For instance, the UNICEF-supported Child-Centred Disaster Risk Reduction Programme in Nepal enables participating children to conduct risk analyses in their localities,

communicate identified risks requiring action and engage with the community disaster management committee and/or the school disaster management committee, thereby influencing their decision making processes on matters related to DRR and children. Child clubs in the community and school safety clubs are enabling vehicles where children can both hone and demonstrate their leadership skills (see example 14, appendix 1).

School and Community Participation Platforms

Outside of the classroom, platforms through which students engage with climate change–related issues often include school clubs or other extracurricular and nonformal education activities organized by enthusiastic teachers and schools. Common activities include tree planting, school gardening, cleanup of local environment, and projects, campaigns and exhibitions on climate and environmental themes. The varying range of resource capacities across different schools and the voluntary nature of these platforms mean that not all students have opportunities for engaging with climate change–related activities outside of the classroom. When national and subnational education systems have established student and youth participation platforms and programs (e.g., school cabinet/council/parliament, scouting activities, school health programs), climate change components can be integrated as part of their remit (Kagawa 2022a).

Around the world, children and young people have created and participated in child- and youth-led networks and advocacy groups to make their voices heard and to bring about positive changes at different levels. For instance, the India Youth Climate Network (IYCN), founded in 2008, is India's largest coalition of young people and youth-oriented organizations; the network aims to empower youth to take effective action against climate change at local, state, national and international levels.[24] The Caribbean Youth Environment Network (CYEN), established in 1993, is a community of young people working collaboratively to safeguard the environment and achieve sustainable development; the network calls on Caribbean governments to establish an enabling governance structure that facilitates youth involvement and engagement in climate change–related dialogue and action.[25] Fridays for Future is a global movement started in 2018. It raises awareness of the climate crisis and seeks to "keep the global temperature rise below 1.5°C compared to pre-industrial levels; ensure climate justice and equity; [and] listen to the best united science currently available."[26]

[24] India Youth Climate Network: https://iycn.in.
[25] Caribbean Youth Environment Network: https://cyen.org.
[26] "Our Demands," Fridays for Future, 2022, https://fridaysforfuture.org/what-we-do/our-demands/.

For raising ecological consciousness and safety awareness and building resilience in the community, a peer-to-peer approach has proven effective. In Zambia, for instance, more than 1,000 children trained to become "climate ambassadors" through the nationwide program Unite 4 Children have since reached out and influenced more than 1 million children, youth and community members through their outreach educational efforts (see example 15, appendix 1). In India's Bihar state, the state-wide Safe Saturday program employs a peer-to-peer method to transfer new knowledge and skills and has proved effective in empowering children, who in turn empower community members (see example 16, appendix 1).

Box 5. School and community linkages: Action points

- Establish a process that links climate change, disaster risk and environmental action learning across classroom, school and community on a regular basis.
- Work closely with members of the local community—including Indigenous and religious leaders—to promote resilience building and pro-environmental learning and action in school and community.
- Ensure the engagement of a wide range of stakeholder groups—including students—in all-hazard risk assessment and disaster management activities at school.
- Develop a school disaster management plan based on risk assessment and wider consultations with relevant school and community members.
- Create and support a range of school- and community-based platforms for student climate change, disaster risk and environmental action and learning, employing the peer-to-peer approach and allocating necessary resources.
- Similarly, create and support mechanisms for school and community deliberation on climate change issues and impacts, mechanisms that should include female-only groups, so ensuring that gender-specific concerns and proposals are fully expressed and considered in school and community decision making.

3.6. Coordination and Partnerships

To strengthen education sector leadership in climate and environmental action, ministries of education should proactively participate in national climate change decision making and on coordination platforms while enhancing their cross-sectoral collaboration and partnerships. Existing education sector coordination

mechanisms need to be harmonized, refined and enhanced to better address the needs and rights of crisis-affected children. Different stakeholders and initiatives at different levels should be connected in a synergic and purposeful way.

Interministerial and Cross-sectoral Coordination and Collaboration

Several countries have established interministerial commissions and/or inter-institutional coordination mechanisms on climate action at a high level (UNFCCC 2019). Many countries have also established national disaster management coordination mechanisms. It is important that the ministry of education be represented in such national decision making and coordination platforms so that education sector needs, priorities and contributions are represented and shared and that sector views inform overall national plans and actions on climate change and disaster management. Such engagement would, in turn, alert the ministry of education to the latest national contexts and developments concerning climate change and disaster management.

There should be enhanced inter-ministerial collaboration and coordination involving the education ministry and the ministries responsible for climate change, the environment and disaster management together with other relevant ministries (e.g., health, social protection, agriculture, water, energy) for better planning, implementation and data management across the education sector in response to the interconnected climate and environmental impacts. For instance, in the Dominican Republic, the Ministry of Education and the Ministry of Agriculture collaborated on a school garden program, with the latter providing schools with the resources, materials and technical guidance to improve the gardens (UNESCO 2021a). The World Food Programme's Home Grown School Feeding program (see example 5, appendix 1) typically involves the ministries in charge of education, health and agriculture. The countries that developed national education climate change learning strategies (see section 3.1) commonly involved both the ministry in charge of climate change and the one in charge of education. For instance, in Ethiopia, its Climate Change Education Strategy was developed under the joint leadership of the Ministry of Environment, Forest and Climate Change and the Ministry of Education (Ethiopia 2019).

Education Sector Coordination and Collaboration

There are well-established education sector humanitarian and development coordination mechanisms: the education cluster, which focuses on humanitarian responses, except for education for refugee children; the refugee education working group, which coordinates the education of refugee children and youth; and

the local education group,[27] which focuses on development. Harmonized humanitarian and development coordination in the education sector helps strengthen the quality of education in emergencies (EiE) response and makes the national education system more crisis sensitive by integrating considerations of crisis-affected children and youth in national education planning processes. With increasingly complex emergency situations—where climate change is one of the key drivers—a more coherent, coordinated approach between these three systems is critical for ensuring support for crisis-affected children and youth delivered in an equitable and sustainable manner (Global Education Cluster, INEE, and UNHCR 2020; Nicolai et al. 2020).

Within the ministry of education, a dedicated unit could be created to increase greater coordination horizontally and vertically to address overlapping issues of climate change, disaster risk, EiE and environmental degradation. For instance, the UNICEF-supported School Safety Cell (SSC), established within the Directorate of Elementary and Secondary Education Khyber Pakhtunkhwa Province, is the first of its kind in Pakistan. The School Safety Cell plays a pivotal role in coordinating, facilitating and strengthening school safety, DRR and resilience building across the province and took a key role in COVID-19 responses (Kagawa 2022g). In the Philippines, as per the Philippine Disaster Risk Reduction Act of 2010, the Disaster Risk Reduction and Management Service (DRRMS) was created within the Department of Education in 2011; it is a focal coordinating unit for disaster risk reduction and management, climate change mitigation and education in emergencies.[28]

Peer Learning and Partnership

In the context of climate change, it is important to facilitate South-South peer learning and cooperation. This is because northern solutions can often appear abstract and lacking in contextual relevance in southern contexts. South-South peer learning emphasizes learning together by exchanging "tacit" knowledge ("the kind of experiential knowledge that is not generally documented"), addressing common challenges that learners can apply to their own context. The peer-learning process is likely to inspire participants to act by boosting their confidence and increasing their sense of agency (GIZ 2022). The Caribbean Safe School Initiative and the Caribbean Ministerial Forum on School Safety is a type of peer-learning platform that facilitates knowledge sharing, enhances capacity and

[27] Alternative names are also used, for instance, education sector development committee, joint education sector working group, education technical working group and education sector plan consortium.

[28] "About DepEd DRRMS," Department of Education, Philippines, undated, https://www.deped.gov.ph/about-deped-drrms.

supports regional collaboration (see example 17, appendix 1). At the 2022 UN Secretary General's Transforming Education Summit, the Greening Education Partnership was launched to "deliver strong, coordinated and comprehensive action that will prepare every learner to acquire the knowledge, skills, values, and attitudes to tackles climate change and to promote sustainable development."[29] This emerging global platform is promising in its potential support for mutual learning among countries by exchanging experiences and showcasing good practice.

Box 6. Coordination and partnerships: Action points

- Ensure that the ministry of education actively engages in high-level multisectoral platforms on climate, disaster risk and environmental conservation action.
- Develop clear and functional communication and coordination mechanisms between education authorities, authorities responsible for climate change, environmental and disaster management, as well as other relevant ministries and agencies, specifying the roles and responsibilities of all involved.
- Ensure harmonization of national and international education sector humanitarian and development coordination mechanisms.
- Create South-South learning opportunities to stimulate and exchange innovative policy and practice ideas and provide mutual support.
- Involve teachers and teachers unions as key partners in transforming education systems toward climate responsiveness and nature positivity.

3.7. Data and Evidence

Data concerning climate and disaster risk and environmental degradation as they implicitly or explicitly relate to the education system should be gathered and systematically analyzed and reported. The emerging data should subsequently be made readily available for evidence-based decision making and policy deliberation in aid of resilience building and climate and environmental action across the education sector.

[29] "Greening Education Partnership," UNESCO, last updated March 14, 2023, https://www.unesco.org/en/education-sustainable-development/greening-future.

Data Collection

As section 3.1 highlights, education planning needs to be risk-informed. Data arising from education sector risk analysis should inform policy makers and planners of the following:

- The main risks that the country and specifically the education sector face
- Their significance and implications
- Historical and potential future risk locations
- Potential impacts of risks on education supply, demand, access, equity, quality and sector financing
- Existing school capacity levels for protecting students and teachers from the effects of hazards
- Existing education policies, infrastructure and practices
- Assessed overall system ability to respond to crises (IIEP-UNESCO et al. 2021).

Child vulnerability data should be disaggregated according to age, sex, disabilities, urban/rural weighting and other relevant demographic and socioeconomic characteristics, thus enabling targeted interventions that better address specific needs (Pegram and Knaute 2019; IIEP-UNESCO et al. 2021; UNICEF EAPRO 2019).

It is important that a ministry of education working with partners sets clear frameworks and parameters on what data are required in support of system-wide risk reduction and resilience building in light of climate and environmental change. Deciding on the shape and scope of data garnered depends on several factors, such as the purposes, potential uses, needs of different end users, goals and priorities as set down in the education sector plans and policies, human and financial resources and time allotment available, and the type and quality of relevant preexisting data (UNICEF 2019).

Bangladesh has taken concrete steps to address critical knowledge gaps in climate change–driven impacts on the education institutions. A pilot study, Climate Change Education for Sustainable Development, was implemented in 2015 by the Bangladesh Bureau of Educational Information and Statistics (BANBEIS) of the Ministry of Education with support from UNESCO. The study systematically gathered and analyzed disaster-related data from 1,800 education institutions covering 12 areas, each representing a distinctive disaster risk (Islam 2015). Following on from this path-finding pilot study, BANBEIS continues to gather climate change and disaster data using secondary data from education subsectors. A chapter on climate change and disaster impacts on education institutions has, since 2017, become part of the annual *Bangladesh Education Statistics* report (see example 18, appendix 1) (Kagawa 2022b).

It is important to examine what information is currently gathered and available in the national (and subnational) education management information systems (EMIS). In general, EMIS are not designed to capture climate change impacts and disaster risk data, nor emergency-related information (Kagawa 2022a; UNESCO 2021b). Embedding new risk-related variables in the EMIS is one possible way forward. For instance, in Chad the 2018–19 EMIS questionnaire included indicators concerning enrollment of refugees, internally displaced persons, returnees, orphans and vulnerable children, with the disaggregated data on these groups integrated into the 2018–19 *EMIS Annual Report* for the first time (UNESCO 2021b). India's robust education online data collection system, the Unified District Information System for Education Plus (UDISE+), includes indicators that could be used as proxy indicators for monitoring climate change impacts as well as education sector responses to climate change (Kagawa 2022d) (see example 19, appendix 1). More generally, the extent to which EMIS can play a role in climate change– and disaster-related data production depends on their functioning and suppleness. Hence, strengthening and fully equipping EMIS would be a prerequisite. In many lower-income countries, EMIS operation capacity remains limited.

It is neither practical nor realistic to include all new data collection processes required by the education sector in EMIS. EMIS can't be the one-stop shop for all the data required by everyone. Instead, linkages should be forged between EMIS and other existing data sets. This is a matter of improving data interoperability, that is, in essence the ability to "join up" data from different sources in support of creating more holistic and contextualized information for better decision making and accountability purposes (van Wyk and Crouch 2020; UNESCO 2021b). To have a comprehensive understanding of direct and indirect climate change and environmental impacts on children and schools and to inform policy decision making, education databases need to be linked with existing databases on disasters, climate change and the environment as well as child-related data on health, nutrition and child protection as managed by relevant line ministries and different departments and agencies (UNICEF EAPRO 2019). Some lower-income countries may have already developed a GIS database that contains locations of existing schools, natural hazard data and structural and nonstructural characteristics of schools. Overall, combining GIS school location data with climate data (e.g., climate change projections, climate vulnerabilities) is an underresearched and underdeveloped area that requires further investigation.

In some countries, climate risk data are limited and fragmented. This is partly because the data collection has been done in an ad hoc manner by different institutions and government agencies at different levels. To complement the available country-level climate risk information, education sector planners and

policy makers can draw from existing global databases such as the World Bank Climate Change Knowledge Portal (CCKP). The Climate Change Knowledge Portal contains country-specific climate data and analysis (e.g., historical and projected climate data, climate data by sector, impacts, key vulnerabilities, adaptation measures), and all the data are freely available to download.[30]

EiE data gathered in the humanitarian context tend to exist in parallel to EMIS data. Linking EMIS and EiE data is important for achieving consolidated outcomes and achieving multi-year planning for better humanitarian and development coherence. To increase better interoperability and compatibility of data sets, it is vital to develop standardized definitions, indicators and methods for calculating them across different ministries and partners (UNESCO 2021b).

Data on displaced children in the context of climate change and environmental degradation—in particular, disaggregated data—remain largely insufficient. The current data gap impedes the development of adequate measures to safeguard the rights of children. There is an urgent need for better data generation concerning children on the move (UNICEF et al. 2022). It should be noted that in crisis-affected situations, some data are highly political and highly sensitive, potentially carrying risks for education beneficiaries and providers; such data include those on displacement, psychosocial and other learning needs, and gender-based violence. In each context, the optimal degree of interoperability should be weighed and the data should be carefully and safely handled according to pre-agreed data-sharing protocols and privacy measures (UNESCO 2021b).

The education ministries in the Maldives, Pakistan and Sri Lanka have developed comprehensive school-level monitoring guides and tools aimed at ensuring quality education provision: *School Improvement, Quality Assurance & Accountability Framework* and *Baraabaru School Indicators* (the Maldives), the *Minimum Standards for Quality Education in Pakistan* (Pakistan) and *Process of Evaluation for Assuring the Quality in Education* (Sri Lanka). Well-established school-level monitoring tools such as these can offer unique but so far neglected entry points for gathering climate change–related data in relation to quality education provision (Kagawa 2021, 2022e, 2022g).

Technology plays an important role in gathering data rapidly and efficiently. An innovative example is the Philippines' Disaster Risk Reduction and Management Information System (DRRMIS), which is a comprehensive information management and communication system launched by the Department of Education in

[30] Climate Change Knowledge Portal, World Bank Group: https://climateknowledgeportal.worldbank.org.

partnership with Save the Children Philippines and the Prudence Foundation. The information system consists of three digital tools: (1) the Rapid Assessment of Damages Report (RADaR) application, which allows for timely and accurate data gathering, reporting and decision making after a disaster, thus opening the way for timely interventions by the Department of Education to ensure learning continuity; (2) the School Watching Application (SWApp), a student-led school hazard-mapping checklist; and (3) the Comprehensive School Safety Monitoring Tool, which allows schools to evaluate their compliance with the Comprehensive School Safety Framework for implementing safety programs (see example 20, appendix 1).

As the SWApp experience and the discussion in section 3.5 indicate, students are capable of conducting school/community-level risk analysis when the necessary support is provided. Students can conduct school environmental (e.g., waste, energy, water) audits that measure a school's progress in becoming more environmentally sustainable. They may also conduct biodiversity counts/mapping (UNESCO 2016). Bhutan's Himalayan Environmental Rhythms Observation and Evaluation Systems (HEROES) Project is an innovative school and community-based citizen science initiative. Students in participating schools gather phenological data on the seasonal appearance and life cycle of chosen plants and wildlife in their school vicinity over 10 months, with the gathered data feeding into the national climate data repository system (Kagawa 2022c). Meaningful age-appropriate and contextually appropriate child participation in data generation of this kind should be actively promoted in line with the participatory ethos of climate change and citizen science learning.

To further strengthen the environmental dimension, and to encourage community and whole school participation in data collection and analysis, it is also recommended that schools conduct an annual environmental audit of the school, the school grounds and the immediate locality, covering topics such as air purity, waste management, cleanliness of local water sources, biodiversity health and state of the local ecosystem. The findings should be made available and made the subject of a community reporting and discussion event, becoming a possible springboard for pro-environmental action across school and community.

To assess and monitor progress toward climate resilience across the education system, criteria-based progress assessment tools and mechanisms should be developed in a contextually appropriate manner. Such a tool and mechanism has been developed out of the recent UNICEF South Asia climate change and education study across eight countries. The tool, including system-wide standards and progress indicators for climate-resilient education systems covering seven key

education system components,[31] is designed to help education ministries and their partners assess whether the education system is moving toward an increased climate change responsiveness (Kagawa 2022h).

Data Management and Use

There should be quality assurance measures to check accuracy, validity and usability of all data collected (Abdul-Hamid 2014). Data should be analyzed and consolidated to highlight trends and gaps and thus assist strategic decision making. To enable this to happen, the ministry of education and its partners should provide necessary support and resources and capacity building training for those involved in the different stages of data production at different spatial levels. National education unions should be key partners in data management efforts as they have a wide reach to teachers across the country.

Data should be presented and disseminated in an accessible and usable form, with users well informed as to what data are available and where to find them (van Wyk and Crouch 2020; UNESCO 2021b). It is important that data collection mechanisms be reviewed periodically for further refinement and improvement as necessary.

Box 7. Data and evidence: Action points

- Establish clear frameworks and set clear parameters for the gathering of climate change–related data within the education sector and agree upon country-specific indicators to be integrated into existing data collection mechanisms/tools (e.g., EMIS, school-level data collection tools) and/or through supplementary mechanisms/tools.
- Ensure collaboration and partnership between the ministry of education, relevant line ministries and their humanitarian and development partners for the gathering, sharing, analysis and dissemination of climate change, environmental and disaster-related data concerning children and schools.
- Analyze the data and disseminate them in a user-friendly and accessible manner to inform education policy making and planning and generate wider public awareness and interest.
- Provide necessary support and capacity development training for those involved in data collection, analysis, validation and dissemination.

[31] See footnote 10.

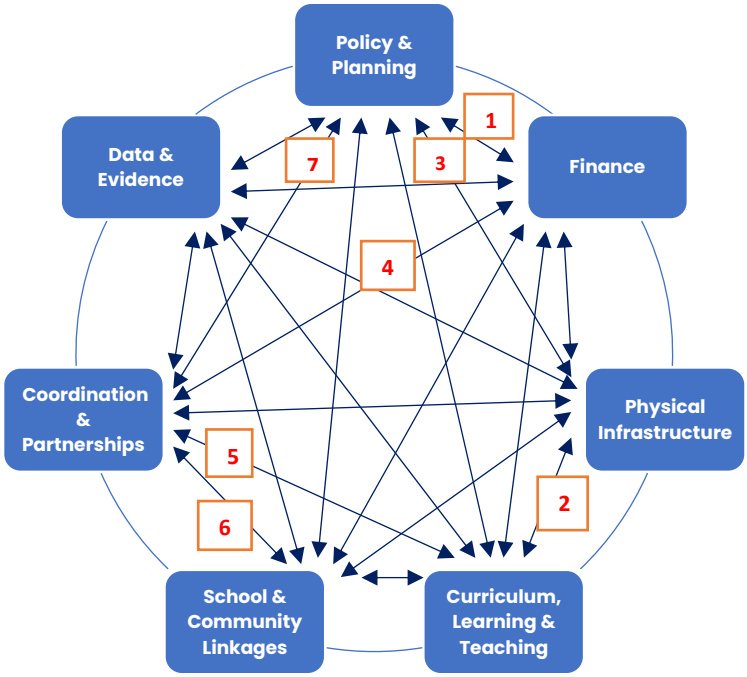
- Provide capacity building to relevant stakeholders focusing on *using* the generated data to analyze the effects of climate and environmental change on the education system and to better inform policy development, planning and implementation.

Section 4. The Seven Dimensions: Samples of Interlinkages

In the final analysis, each of the seven dimensions covered in the last section interlinks with and impacts on each of the other dimensions. Interventions and changes in one dimension are likely to have multiple direct and indirect implications for other dimensions, albeit on a differing time scale. In moving toward an education system that is climate responsive and nature positive, it is vital for the ministry of education and their partners working on the different system dimensions to actively seek to create synergies between them. There should be an enabling environment that encourages wide participation, horizontal as well as vertical innovation and leadership, and continuous capacity building across the seven dimensions.

Figure 3 illustrates the two-way flow between each of the dimensions. The figure seeks to flag the availability of multiple action entry points and collaboration opportunities for those working at the interface between education, climate change and environment. Whether and to what degree linkages currently exist between certain dimensions may very well differ within different national and subnational arenas and contexts. Reflecting on a country's unique context and needs, it is vital to determine which linkages should be prioritized and in which order. That said, the ultimate interweaving of multiple projects, initiatives, people and places is vital in creating a thoroughly climate-responsive and nature-positive education system.

Figure 3. Climate-responsive and nature-positive education system interlinkages



Sample of linkages

Link 1: Ensure education policy implementation is aligned with sustainable resource allocation by mobilizing domestic and international funding from both public and private sources. [Policy & Planning <> Finance]

Link 2: Ensure that the curriculum in appropriate areas such as science and technology integrates consideration of school building and surrounds in terms of structural safety in readiness for times of hazard. [Physical Infrastructure <> Curriculum, Learning & Teaching]

Link 3: Concretize how climate-resilient school infrastructure and facilities in different climatic, geographical, topographical regions in the country should look like in the short, mid and long terms set against a projected range of climate change scenarios. [Policy & Planning <> Physical Infrastructure]

Link 4: Allocate resources to support more coherent coordination that fills in current gaps. [Finance <> Coordination & Partnerships]

Link 5: Collaborate with ministries responsible for climate change, environment and disaster management and health (and other relevant sectors) as well as the ministry of education's implementation partners to develop and furnish learning resources in support of contextualized curriculum for climate change

and environmental/biodiversity education. [Curriculum, Learning & Teaching <> Coordination & Partnerships]

Link 6: Reflect on the existing school and community coordination mechanisms and integrate climate change considerations into existing, amended or new coordination mechanism as appropriate. [School & Community Linkages <> Coordination & Partnerships]

Link 7: Ensure that key national education sector plan and policy documents specify cross-sectoral as well as vertical coordination mechanisms for climate change learning and action. [Policy & Planning <> Coordination & Partnerships]

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Appendix 1. Noteworthy Examples

Policy and Planning

Example 1. National adaptation plans [St. Lucia and Suriname]

St. Lucia's National Adaptation Plan 2018–2028 identifies education as one of the priority sectors. The plan explains climate change adaptation in the education sector as "taking necessary steps to safeguard the education community; retrofitting and building climate resilient into education facilities; continuously updating the knowledge transferred; and ensuring that all members of society receive, in a systematic manner, the information they need to make informed decisions."

Among the four education-specific outcomes laid out, two are particularly relevant to school-level education. Outcome 2 on "improved and expanded climate change education as the basis for effective adaptation" includes indicative measures such as developing climate change materials tailored for specific group needs (e.g., vulnerable groups and young children) and teacher training. Outcome 4 on "strengthened preparedness to climate variability and extremes" includes planning for and implementing climate proofing of education infrastructure.

Suriname's National Adaptation Plan 2019–2029 refers to education and health as "foundational" sectors that are considered crucial for resilience building in other sectors. Proposed adaptation measures for the education sector include incorporating climate change into primary, secondary, tertiary and vocational education curricula and making school infrastructure climate resilient by addressing climate change impacts such as flooding, drought and extreme weather events.

Sources: St. Lucia 2018a; Suriname 2019.

Example 2. Youth participation in NDC policy dialogue [Zimbabwe and Nigeria]

Zimbabwe has organized policy dialogues on Nationally Determined Contribution (NDC) enhancement that include youth, which has provided a space for mobilizing action and sharing ideas on climate solutions. Zimbabwean youth have developed a policy paper that was considered in the NDC revision process and informs the various actions and commitments they are ready to support in the NDC implementation phrase.

For the NDC update process in Nigeria, the funding organization Friedrich-Ebert-Stiftung Nigeria supported and coordinated a youth consultation between the Federal Ministry of Environment and the International Climate Change Development initiative, a youth-led organization. The consultation had the support of the environment minister, who was eager to receive youth inputs for the NDC. A 90-minute virtual kickoff event was held, with the minister and UNDP and youth speakers making presentations to initiate the consultation, which was structured around the eight priority sectors of the NDC. An editable document of recommendations was placed on Google Drive and remained open for input from participants for three weeks after the event, after which the recommendations were officially submitted to the environment ministry. Another immediate outcome of the consultation was the ministry's proposal to establish a youth working group that will continue to interface with the ministry on the implementation of the NDC and beyond. The process of establishing the working group and defining engagement modalities is underway and, at the request of the ministry, is being led by the youth who facilitated the consultation.

Source: UNDP 2022.

Example 3. The Graduation Legacy for the Environment Act [The Philippines]

The Philippines' so-called Graduation Legacy for the Environment Act went into effect in May 2019. All graduating elementary, high school and college students must plant at least 10 trees each to graduate. The new legislation is to ensure a healthy ecosystem and cultivate socially responsible and conscious citizenship among young people. It is estimated that at least 175 million new trees are planted annually in suitable sites, including forested areas, mangroves, nature reserves, urban areas, abandoned mining sites and Indigenous territories, among others. The Ministry of Education is responsible for implementing this new measure, working closely with other ministries such as the Department of Environment and Natural Resources.

Source: House of Representatives, Philippines 2019.

Finance

Example 4. Climate fiscal management [Bangladesh]

Following the 2009 establishment of a comprehensive national climate change mitigation and adaptation strategy—the Bangladesh Climate Change Strategy and Action Plan (BCCSAP)—the government of Bangladesh created the Climate Change Trust Fund sourced by its own revenues to finance programs falling

within the scope of the BCCSAP. The Climate Fiscal Framework, adopted in 2014 and updated in 2020, helps embed climate change considerations in the country's fiscal management systems and proposes a climate-expenditure tracing framework. Climate expenditures are tagged according to the six thematic areas of the BCCSAP:

- Food security, social protection and health
- Comprehensive disaster management
- Infrastructure
- Research and knowledge management
- Mitigation and low carbon development
- Capacity building and institutional strengthening.

Supported by the UNDP's Inclusive Budgeting and Financing for Climate Resilience Project, the Ministry of Finance has so far published five annual climate change budget reports, the last three reports covering analysis of the financial resource allocations and expenditures of 25 ministries and divisions, including the Ministry of Primary and Mass Education and the Secondary and Higher Education Division. A reader-friendly version of the climate budget report, *Citizen's Budget Report*, is also available using the data and information derived from the climate budget report. This is to broaden understanding among wider stakeholders regarding government responses to climate change.

Sources: Kagawa 2022b; Ministry of Environment and Forests, Bangladesh 2009; Ministry of Finance, Bangladesh 2021; "Inclusive Budgeting and Financing for Climate Resilience (IBFCR)," UNDP Bangladesh, 2022, https://www.undp.org/bangladesh/projects/inclusive-budgeting-and-financing-climate-resilience-ibfcr.

Example 5. Home Grown School Feeding [46 countries, predominantly in Africa]

The World Food Programme's Home Grown School Feeding initiative provides school meals using safe, nutritious, fresh and culturally appropriate food that is locally grown and procured from smallholder farmers. The initiative supports millions of school children in 46 countries, predominantly in Africa.

The initiative has multiple benefits. School-going children enjoy healthy and diversified food, which provides nutrition and health benefits. School meals incentivize children, especially girls, to stay in school while enhancing their ability to learn. By connecting schools and local food production sources, the initiative supports sustainable local food production, distribution and consumption; it also

boosts the local economy because it provides smallholder farmers, especially women, with a secure outlet for their products. This ultimately creates jobs for youth and women. By shortening food chains and minimizing food wastes—preventable causes of greenhouse gas emissions—the initiative also contributes to climate change mitigation.

Sources: Ahmed and Crosdale 2021; "Home Grown School Feeding," World Food Programme, 2022, https://www.wfp.org/home-grown-school-feeding.

Physical Infrastructure

Example 6. Turning plastic waste into materials for building classrooms [Côte d'Ivoire]

In Côte d'Ivoire, 1.6 million children are out of school. Insufficient and overcrowded classrooms are significant obstacles in ensuring quality learning opportunities for all children. It is estimated that 15,000 classrooms are required to provide out-of-school children with a place to learn. The country also experiences significant plastic pollution. More than 280 tons of plastic waste are produced daily just in the capital, Abidjan, with the majority ending up in landfills located in low-income communities. Inappropriate waste management contributes to diseases such as malaria, pneumonia and diarrhea, impacting children's health.

UNICEF Côte d'Ivoire in partnership with Plásticos, a Colombian social enterprise, has devised an innovative, cost-effective and scalable solution to tackle the "classroom crisis," plastic pollution and poverty simultaneously by building new, clean classrooms using bricks made of recycled plastic waste collected from highly polluted areas in and around Abidjan by vulnerable local women, providing them with a job.

The plastic bricks, produced in Abidjan at the first brick factory of its kind in Africa, built in 2019, are made from collected plastic waste. The bricks are low-cost, durable, nontoxic and easy to assemble. Using these bricks, it takes only a few weeks to construct a classroom. So far, 262 classrooms have been built, benefiting 13,100 students, and 1,441 tons of plastics have been recycled. Compared with a classroom built with conventional building materials, the plastic brick–built classroom is a few degrees lower in temperature. It provides a comfortable learning environment as it is designed to ensure natural air flow.

Sources: "A Future for Every Child by Beating Plastic Pollution: The Côte d'Ivoire Project; Turning Plastic Waste into Materials for Building Classrooms," UNICEF

Côte d'Ivoire, undated, https://www.unicef.org/cotedivoire/en/future-every-child-beating-plastic-pollution; UN 2019.

Example 7. Climate-resilient sustainable solar-powered water systems for schools, health care facilities and communities [Malawi]

Limited access to safe water presents many challenges in rural Malawi, the situation worsening as the climate changes. Since 2017, UNICEF, working closely with the government of Malawi, has constructed or rehabilitated 64 solar-powered water systems to provide safe and sustainable piped water for 40 schools, 24 health care facilities and 64 communities in 11 districts. Each system serves a community and either a school or a health care facility or both. The design of the solar-powered water systems factored in climate and disaster risk (e.g., choosing sites with minimal flood risk, protecting the water source from being flooded). The initiative ensures long-term sustainability of the installed systems, promotes community participation, builds community capacity and instills a sense of ownership as integral to the initiative.

The water systems have significantly increased the availability and reliability of the water supply, improved hygienic conditions both at home and at school, and increased the school attendance of students, especially of girls. Compared with diesel-powered systems, each solar-powered system is more cost effective over the estimated life cycle of 25 years—and it eliminates carbon emissions.

As part of the 2019 Cyclone Idai response, solar-powered water systems were introduced in 13 internally displaced person camps in schools, health care facilities and adjacent communities to meet high water demand. The water systems remained functional after the emergency.

Sources: UNICEF 2020, 2021c.

Example 8. Slow Food gardens in Africa

In 2011, Slow Food launched 10,000 Gardens in Africa—an international project that aims to create "good, clean and fair" food gardens in schools, villages and urban areas to save Africa's extraordinary biodiversity and to ensure community access to healthy and fresh food.

Slow Food gardens are designed, created and run by the local communities. They offer "open-air classrooms" where children can learn about traditional varieties of plant species, sustainable soil management, judicious use of water resources, and seed saving while having lots of fun. Slow Food gardens are networked

together. Gardens near each other share seeds, while those at a distance exchange ideas and information. Students are encouraged to teach their parents about what they have learned in school gardens and many parents replicate what they learn from their children in their home patch. Hence, students spread sustainable cultivation techniques to the community. The harvest from school gardens is used to supplement school meals and is sometimes sold, the income helping schools to buy school materials or garden equipment.

As of September 2022, more than 3,500 Slow Food gardens are active across Africa.

Source: "Slow Food Gardens in Africa," What We Do, Slow Food Foundation for Biodiversity, undated, https://www.fondazioneslowfood.com/en/what-we-do/10-000-gardens-in-africa-2/.

Curriculum, Learning and Teaching

Example 9. Climate change mitigation and adaptation and disaster risk reduction lower secondary curriculum [St. Vincent and the Grenadines]

In 2019–20, the Ministry of Education in St. Vincent and the Grenadines developed a systematic and integrated climate change mitigation and adaptation and disaster risk reduction (CCMA/DRR) curriculum for the lower secondary level (forms 1 to 3). The CCMA/DRR curriculum development was part of the Regional Disaster Vulnerability Reduction Project (RDVRP) aimed at reducing vulnerabilities to natural hazards and climate change in Dominica, Grenada, St. Lucia, and St. Vincent and the Grenadines.

The curriculum was developed through close collaboration between the Ministry of Education, key stakeholders and the United Kingdom–based organization Sustainability Frontiers. The curriculum development process involved curriculum analysis through a CCMA/DRR lens, key stakeholder consultations, country-specific data gathering, drafting of the new curriculum materials, pilot testing and finalization by incorporating stakeholder feedback. The new CCMA/DRR curriculum comprises three modules, one for each of the three lower secondary grades. The same 10 strands frame each module: hazards and disasters; climate change; climatological hazards; geological hazards; human-made hazards and epidemics; planning for disasters; marine environment; land environment; ecosystem and biodiversity threats; water and solid waste. Each unit dovetails with existing subject and syllabus content. The curriculum employs a wide and varied range of interactive, participatory and experiential learning modalities, linking student learning in the classroom to learning in the wider

school context and out in the community. Support materials for teachers dovetailing with the curriculum (a resource manual, a learning facilitation guide and a post-trauma teaching and learning guide for teachers) have also been developed, among others.

Source: Selby, Kagawa, and Oberman 2020.

Example 10. Pre-primary Year Curriculum [Solomon Islands]

The Solomon Islands' Pre-primary Year Curriculum Framework is informed by all nine key learning outcomes of the primary curriculum. One outcome, "Environment, Conservation and Climate Change," references "development of positive attitudes and values towards the preservation and conservation of the environment, the adaptation and management of the effects of climate change." "This," the outcome affirms, "will include understanding of hazards and planning and management of the impact of disasters." The framework highlights that pre-primary children are assisted to "learn to live in harmony with the environment and the community" and employs a play-based approach, that is, children learning through hands-on activities designed to actively explore the environment. Inquiry and curiosity are promoted through open-ended questioning, experimentation and cooperation in discovering answers to the problem.

Source: MEHRD, Solomon Islands 2018.

Example 11. Farukoe [The Maldives]

The Maldivian Ministry of Education's Farukoe program was a nation-wide ocean exploration program implemented in 2018. All students had a chance to explore local reefs through snorkeling. The program aimed to inspire every child to become a "voice of the ocean." It was based on the ministry's belief that direct student exposure to reefs helps students develop a "strong love and bond with the ocean," which organically leads to a passion to protect the ocean.

Before snorkeling, teachers facilitated awareness-raising sessions, often involving local fishermen and elders. Teachers also facilitated post-snorkeling debriefing and reflection sessions, which included a sharing of student feelings and experiences and, importantly, discussions on pro-environmental projects students could take up. The Farukoe program triggered school-level actions such as beach cleanups, school gardens, tree planting, banning plastics and awareness-raising campaigns, to name a few. Teachers and students testify that the Farukoe program was a catalyst for deepening student understanding of the

local environment and recognizing individual and collective responsibility and agency to take action.

The program has ended, but there is a strong call from key stakeholders to revive the program.

Source: Kagawa 2022e.

Example 12. Teaching resources integrating Indigenous and place-based knowledge [Vanuatu and the Solomon Islands]

The UNESCO LINKS (Local and Indigenous Knowledge Systems) program promotes local and Indigenous knowledge as a foundation for locally appropriate sustainable decision making and practices. It also promotes the integration of local and Indigenous knowledge in policy processes at the different levels with respect to climate change, biodiversity, disaster preparedness and sustainable development. As part of the LINKS program, Vanuatu and the Solomon Islands developed innovative resources for schools.

In Vanuatu, the Vanuatu National Cultural Council developed the *Teaching Indigenous Knowledge and Resource Management in the Primary School* series of teacher guides for grades 1 to 6, one for each grade. Used in primary schools since 2011, each guide provides advice on how teachers can embed Indigenous knowledge within the school environmental science curriculum. There is a strong emphasis on student learning with community members using vernacular languages. Students learn about the names of local plants and animals and traditional beliefs and rituals attached to them; they learn about seasonal shifts; and they become familiar with stories and songs connected to local nature so that they come to internalize a "sense of obligation" surrounding their relationship with the island environment.

In the Solomon Islands, the Marovo Lagoon area of the Western Province has extraordinary biological and cultural diversity but is facing a range of serious environmental threats. In 2005, Indigenous communities in the Marovo Lagoon, the Ministry of Education and UNESCO collaborated to develop a bilingual English–Marovo language environmental encyclopedia alongside an online wiki version of the encyclopedia that allows teachers and students to update the content regularly. Following Marovan cultural norms, the encyclopedia describes the fauna, flora and topographical features of the lagoon environment as well as the lives and livelihoods of the people living there. The encyclopedia was used for a pilot project in a small number of primary and secondary schools. Participating students visited village adults and elders to learn more about their assigned

species or environmental phenomenon for coverage in the encyclopedia and documented the findings in narrative form using vernacular language, often accompanied by drawings and graphs. Classroom presentations and discussions followed. Data gathered by students are added to on the wiki. Lesson plans, teacher guidance and student assignments are also made available online for nationwide usage in multiple subjects.

Both examples above helped intergenerational dialogue on Indigenous knowledge about the local ecosystem and on ways of living as informed by a nature connection.

Sources: Hviding 2005; Selby and Kagawa 2018b; UNESCO 2014; LINKS: https://en.unesco.org/links.

School and Community Linkages

Example 13. Eco-Schools Indian Ocean [Comoros, Madagascar, Mauritius, Reunion, the Seychelles and Zanzibar]

Eco-Schools Indian Ocean is part of the international Eco-Schools program run by the Foundation for Environmental Education (FEE). It was introduced to the Indian Ocean region by the Indian Ocean Commission ISLAND project in 2015 and is run by a wide range of government, nongovernmental organization and private sector partners. The program involves over 22,500 students in more than 72 schools in the region. It is a voluntary program open to any school in participating countries and jurisdictions.

The program integrates the themes of sustainable development, climate change and disaster risk reduction into curriculum, campus and community aspects of school following a seven-step methodology developed by FEE: (1) establishing an Eco-School Committee; (2) informing and involving stakeholders widely; (3) conducting a school environmental review; (4) developing an eco-code outlining the school's commitment; (5) integrating Eco-School themes (e.g., waste, water, climate change) into the curriculum; (6) developing a school action plan; and (7) conducting monitoring and evaluation initiatives. Participating schools have engaged in practical projects such as rainwater harvesting, soil stabilization, food production and waste management, among others.

Sources: Emilie 2015; #connectISLANDS 2016.

Example 14. Child-Centred Disaster Risk Reduction Programme [Nepal]

Child-centered disaster risk reduction (CCDRR) promotes "working for and with children for DRR to ensure participation/view of children during risk assessment, preparedness planning, emergency response and recovery actions." The UNICEF-supported CCDRR Programme in Nepal was implemented from 2013 to 2019 in two phases (2013–16 for phase 1; 2016–19 for phase 2) covering eight districts. The program involved school- and community-based DRR components. In phase 1, 81 ward-level child clubs as well as 9 children's networks consisting of representatives from each club at the municipal level were formed. In phase 2, at least 57 school safety clubs were formed.

Community- and school-based clubs and networks were important vehicles through which children conducted risk assessments, communicated identified risks for action and influenced local-level decision making processes and resource allocation for risk mitigation. At the ward level, child clubs were closely coordinated with the community disaster management committee, with one or two child club representatives engaged in consultation and decision making processes on matters concerning DRR and children. At the school level, school safety club members were actively involved in school risk assessments and engaged with the school management committees for school safety improvement.

Sources: Kagawa 2022f; UNICEF Nepal 2019.

Example 15. Unite 4 Climate [Zambia]

Unite 4 Climate was a nationwide child-led advocacy and action program in Zambia implemented from 2010 to 2015 by the Ministry of Education, the Wildlife and Environmental Conservation Society of Zambia (WECSZ) and UNICEF Zambia. Its aim was to empower 11- to 17-year-old children across Zambia to become "climate ambassadors" who go on to inspire thousands of other children.

During the five-year program, 1,325 children were trained as climate ambassadors. They were trained not only on climate change and conservation issues but also on leadership, communication and action planning. Trained climate ambassadors reached more than 1 million children, youth and community members through peer-to-peer outreach and education, media programs, theater performances, debates, and implementation of low-cost community projects on climate change mitigation and adaptation. Their advocacy efforts led to concrete actions such as the planting of 30,000 trees in school grounds and communities in 2015 alone, child-led radio shows on climate change and action, and the construction of a floating school in an area highly

susceptible to flooding. Climate ambassadors also engaged in national-level decision making processes. Some 350 climate ambassadors provided inputs to the Zambian government's position paper for the 21st Conference of the Parties meeting in Paris in 2015.

Sources: UNICEF 2017, n.d. b; "Unite 4 Climate and Conservation," What We Do, Wildlife and Environmental Conservation Society of Zambia, undated, https://conservationzambia.org/u4cc/.

Example 16. Safe Saturday [Bihar State, India]

The Safe Saturday program is a key component of the state-wide Chief Minister School Safety Programme (CMSSP) launched in 2016 by the government of India's Bihar State. The CMSSP aims to make all the schools in Bihar safe from all hazards, integrating disaster management into the school system and empowering children as agents of change on DRR and climate change.

Safe Saturday is a compulsory program for all of the more than 80,000 schools in Bihar. It provides opportunities to build knowledge, confidence and life skills of children so that the students are better prepared to deal with any disaster. The program takes place during the second half of every Saturday and follows weekly topics covering a wide range of locally relevant and interrelated issues on which children in Bihar feel uncomfortable and unsafe—such as natural hazards, diseases and child marriage, to name a few. In every class, the program focal teacher chooses and trains two students as "peer educators." These peer educators, in turn, train other students. The program has a strong school and community link. Students actively share what they have learned at school with their parents and community members. Parents and adults in the community have begun to follow what children say. Both children and the community attest to their increased confidence in matters of disaster preparedness.

Source: Kagawa 2022d.

Coordination and Partnerships

Example 17. Caribbean Safe School Initiative and the Caribbean Ministerial Forum on School Safety

Launched in 2017 at the first Caribbean Ministerial Forum on School Safety held in Antigua and Barbuda, the Caribbean Safe School Initiative (CSSI) aims to advance school safety and strengthen regional cooperation in the face of increased systemic risks affecting the education sector in the region. The CSSI is guided by the Regional Road Map of School Safety and by the Antigua and

Barbuda Declaration on School Safety (the latter being replaced by the St. Maarten Declaration on School Safety in 2022), among others. To date, some 19 countries and territories in the region have become part of the CSSI, supported by their regional and international partners.

The CSSI is part of the World Initiative for School Safety (WISS), which is a government-led global partnership for advancing safe school at the national level, building upon the Comprehensive School Safety Framework.

The third Caribbean Ministerial Forum on School Safety took place in 2022 in St. Maarten, primarily targeting the education ministries (in particular, the ministers and the Safe School focal points) in the region. The forum provided an opportunity for peer-to-peer discussion to reflect upon challenges and lessons learned and to consider ways forward to further advance the CSSI in a more collaborative and coordinated manner in the education sector while working with other relevant sectors.

Sources: UNDRR 2022a, 2022b.

Data and Evidence

Example 18. Climate change and disaster-related categories in the annual *Bangladesh Education Statistics* [Bangladesh]

The annual *Bangladesh Education Statistics* from the Bangladesh Bureau of Education Information and Statistics (BANBEIS) includes a chapter on "Climate Change and Disaster Impacts on Education Institution." Data on the following seven categories were included in the 2022 edition:

1. Number of institutions affected by each type of disaster
2. Damages/loss that institutions did not recover from after the last disaster
3. Details of damage done to the education institutions in the last 10 years, including 2021
4. The number of students dropping out
5. [Curriculum] subjects that are subject to competency loss due to disaster impacts
6. Measures taken to increase disaster response capacity
7. Evaluation reports written and sent by institutions concerning long-term disaster threats and risk they face.

Source: BANBEIS 2022.

Example 19. Climate change and disaster-relevant indicators in UDISE+ [India]

The Unified District Information System for Education Plus (UDISE+) collects information from all schools from pre-primary to higher secondary levels in India through its digital platform. The data captured under the following indicators can be used as a proxy indicator for monitoring climate change impacts and for school actions to address those impacts.

Section 1: School Profile
- Availability of all-weather roads to school

Section 2: Physical Facilities and Equipment
- Availability of handwashing facilities with soap
- Availability and functionality of drinking water (also information on main source of drinking water; availability of water purifier; and existence of water quality testing)
- Availability and functionality of rainwater harvesting facilities
- Availability and functionality of solar panel(s)
- Availability of a kitchen garden

Section 10: Performance Grading Index and Other Indicators
- Constitution of youth club(s) at school
- Constitution of eco club(s) at school

Section 11: School Safety
- Development of the School Disaster Management Plan
- Implementation of structural and nonstructural safety audit
- Existence of a nodal/coordinating point teacher for school safety
- Regular student and teacher training and practicing for school safety and disaster emergency preparedness
- Availability of disaster management teaching through the curriculum
- Implementation of the following: sensitizing of parents; generating awareness among students and community; installing a safety suggestions/complaints box in the school; provision of copies of safety guidelines to the students.

Source: Kagawa 2022d.

Example 20. Disaster Risk Reduction and Management Information System [The Philippines]

The Philippines' Disaster Risk Reduction and Management Information System (DRRMIS), launched by the Department of Education (DepEd) in partnership with Save the Children Philippines and the Prudence Foundation, is an information management and communication system to improve safety measures for all

schools in the country. Developed through Save the Children Philippines' Education Safe from Disasters (Comprehensive School Safety Ecosystems) Program, DRRMIS consists of three application systems for disaster preparedness and response as part of the Department of Education's information system:

- The Rapid Assessment of Damages Report (RADaR) is a school-level reporting tool that gathers impact information as well as information on the needs of schools within the first 72 hours after a disaster to ensure speedy response and learning continuity. The RADaR's mobile and web applications gather school-level information on such matters as damage to school infrastructure and learning resources, individual casualties, classroom use as evacuation centers, and temporary learning spaces needed. To date, RADaR has been used by more than 21,000 schools across all 17 regions in the country.
- The School Watching Application (SWApp) is a student-led school hazard-mapping checklist. Students engage in identifying and addressing hazards and risks in and around their schools. The information gathered is used to hone and extend risk reduction and adaptation measures laid out in the School Improvement Plan.
- The Comprehensive School Safety (CSS) Monitoring Tool is an application for schools to evaluate their compliance with the CSS Framework for implementing safety programs. This app offers online training for schools and DepEd officials.

Sources: Department of Education, Philippines 2022; School Watching Application, Save the Children Philippines, undated, https://m.apkpure.com/school-watching-application/com.hyperworx.melvin.cliks.

Appendix 2. Selected Tools and Guidance Documents

This section details some practical tools and guidance notes to inform the development of different dimensions of climate-responsive and nature-positive education systems. This list is not meant to be comprehensive or exhaustive.

Tools and guidance documents	Most relevant dimensions
Asia Pacific Coalition for School Safety. 2017. *Limiting and Planning for Schools as Temporary Evacuation Centres in Emergencies*. Policy Brief and Practice Guidance for Pacific Nations. Save the Children. Intended to support education and disaster management authorities in the Pacific nations, this document provides guidance on making decisions and allocating resources to meet shelter needs while protecting children's rights to safety, well-being and education. It includes a checklist to both limit and plan for schools as temporary evacuation centers.	Policy & Planning; Physical Infrastructure
Caribbean Disaster Emergency Management Agency. 2014. *Model Safe School Programme for the Caribbean: A Toolkit*. St. Michael, Barbados: Caribbean Disaster Emergency Management Agency. This toolkit is designed to assist CDEMA participating states to implement processes that result in safer and greener education facilities. It includes checklists for both "safety" and "green" assessments of schools.	Policy & Planning; Physical Infrastructure; Data & Evidence
Education International Asia-Pacific Regional Office. 2021. *Teach for Climate Action: An Advocacy Toolkit on Climate Change Education for Educators and Their Unions*. Kuala Lumpur: Education International Asia-Pacific Regional Office.	Policy & Planning; Curriculum, Learning & Teaching

Intended for teachers, educators and education union members, this document introduces climate change education within the framework of education for sustainable development, provides an overview of key climate change education teaching and learning approaches, and offers practical guidance on campaigning for the inclusion of climate change education in national education plans and climate agendas.	
GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit). 2022. *Peer Learning for Climate Action*. Bonn and Eschborn: GIZ. This document highlights the importance of South-South peer learning as an approach for strengthening national capacity for responding to the challenges of climate change. It provides practical recommendations for effectively funding and supporting peer learning for climate action.	Finance; Coordination & Partnerships
IFRC (International Federation of Red Cross and Red Crescent Societies) and Save the Children. 2018. *Public Awareness and Education for Disaster Risk Reduction: Action-Oriented Key Messages for Households and Schools*. Second Edition. Updated and Revised. Geneva: IFRC; London: Save the Children International. This document includes action-oriented "key messages" (that is, evidence-based, concise, and actionable information for hazard prevention) for households and schools covering 13 major hazards.	Policy & Planning; School & Community Linkages
IIEP-UNESCO, UNICEF, Global Partnership for Education, and the (UK) Foreign, Commonwealth and Development Office. 2021. *Education Sector Analysis: Methodological Guidelines*. Volume 3. New York: UNESCO. Chapter 12 of these guidelines discusses risk analysis for resilient education systems. The chapter provides guidance on conducting a hazard and conflict analysis of the education sector and highlights a two-way relationship between risks and education. It also explains the political, institutional and governance mechanisms that contribute to education system vulnerability or resilience.	Policy & Planning; Data & Evidence

Kagawa, F. 2022. *Towards Climate Resilient Education Systems: A Tool for Reflection, Dialogue and Progress Assessment for Ministries of Education and Its Partners*. Kathmandu: UNICEF Regional Office for South Asia. This tool is for ministry of education personnel and their partners to discuss and assess whether the education system is moving in the direction of increased climate change responsiveness. It includes system-wide standards and progress indicators for climate-resilient education systems covering key education system components.	Policy & Planning; Finance; Curriculum, Learning & Teaching; School & Community Linkages; Coordination & Partnerships; Data & Evidence
Plan International. 2018. *Child-Centred Multi-risk Assessments: A Field Guide and Toolkit*. Woking, UK: Plan International. This tool provides step-by-step guidance for Plan International staff and their community-level partners—including children and youth—for conducting multi-risk assessments at the community level. It includes several practical risk assessment tools for use by children, youth and/or adults.	School & Community Linkages
Selby, D., and F Kagawa. 2014. *Towards a Learning Culture of Safety and Resilience: Technical Guidance for Integrating Disaster Risk Reduction in the School Curriculum*. Paris: UNESCO; New York: UNICEF. Designed for ministries of education, other educational jurisdictions, international and national nongovernmental organizations and those in multiplier positions within education, this document offers in-depth guidance on systematically integrating disaster risk reduction in primary and secondary school curricula.	Curriculum, Learning & Teaching

SEAMEO INNOTECH. 2014. *Toolkit for Building Disaster-Resilient School Communities in Southeast Asia*. Quezon City, Philippines: SEAMEO INNOTECH. Designed for high-risk communities in Southeast Asia, this tool kit presents key concepts and practical examples concerning school-level disaster risk reduction and management (DRRM). The tool kit intends to support school principals and teachers to coordinate, set up, maintain and sustain DRRM programs effectively in their school communities.	School & Community Linkages
UNDP (United Nations Development Programme). 2019. *Knowing What You Spend: A Guidance Note for Governments to Track Climate Finance in Their Budget*. Climate Change Financing Framework Technical Series. New York: UNDP. This overview guidance note helps government ministries responsible for climate finance and policy making learn about the Climate Budget Tagging (CBT) system, which is designed to mainstream climate change considerations in public financial management systems.	Finance
UNDRR (United Nations Office for Disaster Risk Reduction). 2020. *Words into Action: Engaging Children and Youth in Disaster Risk Reduction and Resilience Building*. Geneva: UNDRR. This document offers practical advice on how to support, engage and empower children and youth in disaster risk reduction and resilience building while implementing the Sendai Framework for Disaster Risk Reduction using child-centered and multisectoral approaches.	Curriculum, Learning & Teaching; School & Community Linkages
UNEP (United Nations Environment Programme). 2021. *A Practical Guide to Climate-Resilient Building & Communities*. Nairobi: UNEP.	Physical Infrastructure

This guide presents key approaches and techniques for creating a climate-resilient built environment focusing on a lower-income country context. The techniques can be scaled up and applied to buildings of any type, including schools.	
UNESCO (United Nations Educational, Scientific, and Cultural Organization). 2016. *Getting Climate-Ready: A Guide for Schools on Climate Action.* Paris: UNESCO. This guide explains why schools should take a whole-school approach to climate action. It provides key guidelines on how to concretely include climate action in school governance, teaching and learning, campus and facility management, and partnerships with the community.	Curriculum, Learning and Teaching; School & Community Linkages
UNESCO Office in Hanoi and Vietnam Ministry of Education and Training. 2016. *Assessment and Preparedness Toolkit for Safe and Sustainable Schools Prepared for Natural Hazards, Climate Change, Biodiversity Loss, Safety Threats and Other Risks*. Hanoi: UNESCO and Ministry of Education and Training. This tool kit intends to support school-level stakeholders (including students) in identifying and reducing risks that exist in and around the school. It provides step-by-step instructions and practical tools and templates concerning school risk assessment and school and family preparedness planning.	Curriculum, Learning and Teaching; School & Community Linkages; Data & Evidence
UNESCO and UNFCCC. 2016. *Action for Climate Empowerment: Guidelines for Accelerating Solutions through Education, Training and Public Awareness*. Paris: UNESCO; Bonn: UNFCCC. These guidelines are designed to help national-level decision makers and a wide variety of stakeholders better understand the components of Action for Climate Empowerment (ACE), as adapted by article 6 of the UNFCCC. This document advises on how to establish cross-sector partnerships and mobilize technical and financial support for ACE implementation.	Policy & Planning; Finance; Coordination & Partnerships

UNICEF (United Nations Children's Fund). 2019. *Risk-Informed Education Programming for Resilience*. Guidance Note. New York: UNICEF. This guidance note intends to help those working in humanitarian, transitional and development contexts analyze risk and adapt education policies and programs to take the identified risk into account. The note includes a few education program strategies that target specific hazards and shocks, including climate change.	Policy & Planning; Data & Evidence
UNICEF, International Organization for Migration, Georgetown University, and the United Nations University. 2022. *Guiding Principles for Children on the Move in the Context of Climate Change*. New York: UNICEF. This document includes nine guiding principles to safeguard the rights and well-being of children migrating in the context of climate change (that is, right-based approach; best interests of the child; accountability; awareness and participation in decision making; family unity; protection, safety and security; access to education, health care and social services; nondiscrimination; nationality). These principles are to inform relevant personnel in national and local governments, international organizations and civil society groups.	Policy & Planning; Coordination & Partnerships