THE HEAT IS ON!

Towards a Climate Resilient Education System in India

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Executive Summary

This India country study forms part of a UNICEF Regional Office for South Asia (ROSA) study on the impacts of and responses to climate change across education systems in South Asia. The overall aims of the regional study are:

- To generate evidence on how education systems in South Asia are monitoring, assessing and responding to the impacts of climate change
- To identify the main educational tools and mechanisms being employed in planning for and addressing climate risks
- To showcase the perceptions of key education sector stakeholders regarding further embedding climate change considerations and concerns into education tools and mechanisms.

This study is primarily focused at the national level with attention given to three Indian states: Bihar, Kerala and Odisha. The research methodology employed includes desk-based documentary review, national and state-level key stakeholder surveys, school-level focus group discussions (FGDs) and a U-Report process targeting youth from 14 to 24 years old.

India is one of the most vulnerable countries in the world to the adverse impacts of climate change. India is exposed to increasingly frequent and intense hydro-meteorological hazards and to extreme temperatures. Rapidly melting glaciers and snows in the Greater Himalayan region due to rising temperatures elevate the risk of glacial lake outburst floods (GLOFs), and pose a serious long-term threat to water security for a significant population depending on India's major rivers. Rapid urbanization creating a burgeoning concentration of global poor combined with high dependency on climate-sensitive agriculture serve to aggravate India's vulnerability to climate change. Food and water insecurities as well as climate change-induced internal displacement and migration are already serous concerns

and are likely to magnify unless decisive and urgent action is taken to tackle root causes of climate change. India ranks 26 out of 163 countries in UNICEF's children's climate risk index of 2021.

This study has examined the direct and indirect impacts of climate change on the education system in India. In terms of impact on learning facilities, destruction and damage have been caused by fast-onset hazards such as flooding, landslides and cyclones. Participants in this study commonly point to limited availability and quality of water at school as one of the key concerns in relation to climate change impacts in education.

Children's access to education is disrupted when schools are closed due to natural disasters or when they are used as relief centres. Children living in drought prone areas with family responsibilities for fetching water struggle with attending school regularly as collecting water now takes a longer time due to water scarcity and pollution. The recurrent adverse impacts of climate change-induced shocks on household economies are one of the key factors which trigger child protection issues such as child labour, child marriage and child trafficking, all leading to school dropout.

As to student physical health and wellbeing, climate change-exacerbated water-borne and vector-borne diseases are increasing concerns. Excessive heat in summer is making students fall ill and fall down at school. Air pollution, its causes overlapping with those of climate change, is another major health concern for children in India. Climate change also may very well be affecting student psychosocial wellbeing. 70 per cent of Indian youth U-Report respondents indicate that they are anxious about climate change and its implications for the future. Intensifying climate change-induced natural hazards as well as increasing human and elephant encounters cause trauma and anxiety among children.

With regard to climate change impacts on education provision and learning quality, no evidence has been found concerning systematic monitoring of lesson time loss and effect on student academic performance in relation to climate change-induced hazards and shocks. The Education Department in Bihar has adjusted the school timetable to take into consideration distinctive seasonal hazards and changing climatic conditions in different districts so as to ensure student safe journey to school and effective education provision. Teachers themselves are often caught up in the aftermath of disasters while often being involved in disaster response and recovery activities, thereby making it difficult for them to focus on their main duty, i.e., teaching.

This study has also examined education sector responses to climate change, exploring the seven key education system components (i.e., policies, plans and strategies; finance; curriculum, teaching and learning; teacher capacity development; communication, coordination and partnership; school/community student participation platforms; monitoring, evaluation and accountability). Main research findings include the following:

- The *National Education Policy* 2020 lacks detailed climate change risk reduction and resilience building considerations.
- Insufficient data have been found to analyse climate change-related financial aspects within the education sector both at the national and state levels.
- There are some examples of climate change, DRR and environment-related topics in school textbooks and syllabuses in Bihar, Kerala and Odisha. The mandatory Safe Saturday Programme in the state-wide Chief Minister School Safety Programme (CMSSP) in Bihar offers practical and action-oriented learning opportunities to address multi-faceted climate change challenges. Its peer-to-peer approach plays a vital role in empowering students to become change agents.
- While climate change-focused teacher capacity building programmes are ad hoc and limited in Kerala and Odisha, a systematic cascading teacher training exists in Bihar under the CMSSP.
- There is no clear evidence of inter-ministerial coordination and collaboration between the Ministry of Education and the Ministry of Environment, Forest and Climate Change focusing on education sector climate change adaptation, mitigation and resilience building.
- Student climate change and pro-environmental action opportunities outside of the classroom vary from state to state and differ widely from school to school. Bihar's Bihar's CMSSP reaches approximately 30 million students across the state, providing unique learning and action opportunities for all students. Kerala has great potential for making child participation an integral part of local planning and implementation to realize 'carbon-neutral panchayats' by forging synergies

between child-friendly local governance and climate change mitigation and adaptation.
- UDISE+, India's robust online data collection system for the education sector includes some indicators that can be used as proxy indicators for monitoring climate change impacts and school-level responses to them.

Recommendations to make the education system in India more resilient in the face of increasing climate change risk are as follows:

Climate Change Impact Monitoring and Assessment in the Education System

- Consult with relevant stakeholders, develop climate change impact and vulnerability indicators and subsequently integrate them into the UDISE+ as appropriate.
- Develop inter-ministerial and inter-departmental collaborative and partnership mechanisms between the education authorities (i.e., Ministry of Education, Department of Education) and relevant government ministries/ departments/ agencies with responsibility for climate change, disaster management, health, water and Panchayat Raj with a view to gathering, sharing and analysing climate change impact data as it concerns children and schools.

Policies, Plans and Strategies

- Incorporate climate change risk reduction and resilience building into the forthcoming *National Curriculum Frameworks* and relevant sub-national education policy, strategy and framework documents. In such a process ensure that the needs of children who are most vulnerable are met (e.g., children with disabilities, children from the Scheduled Castes and Scheduled Tribes, children of migrated families, girls).
- Integrate child protection measures into formal and non-formal education programmes to protect children from early marriage, child labour, child trafficking that are on the rise due to the adverse effects of climate change on the household economy. Also integrate education and health interventions more strongly to protect student physical and mental health and wellbeing from the adverse effects of climate change.
- Ensure the climate change adaptation and mitigation are prominently addressed in the *National School Safety Policy Guidelines* rollout at state/UT level.
- Raise awareness of local government personnel on climate change mitigation and adaptation as well as child-friendly local governance.
- Plan to ensure that children who migrate or are displaced by the impacts of climate change have access to education. Plan ahead for education continuity in the likely scenario of large scale migration and displacement due to climate change impacts.

- Integrate the programme and strategy for learning continuity developed during the COVID-19 school closure period in national and sub-national education systems as standard operating procedures for education in emergencies.
- Include climate change mitigation and adaptation criteria in the Ministry of Panchayat Raj's Child Friendly Gram Panchayat Award.

Finance

- Raise awareness among government personnel at national, state/UT and local government levels regarding the benefits of financing climate change mitigation and adaptation activities in the education sector and cultivate a shared understanding of the lines constituting a climate change education budget and how to utilize them effectively.
- Develop equity-focused budgeting in the education sector both at the national and sub-national levels as part of education sector resilience building in response to climate change.
- Explore ways to better mobilize and share resources among relevant government ministries, departments, agencies and their partners, including CSOs and the private sector, for climate change mitigation and adaptation activities in the education sector. Also mobilize and tap into local government resources as appropriate.
- Explore external climate change funding opportunities (e.g., Green Climate Fund, Adaptation Fund) with a view to filling the current resource gap so enhancing climate resilience in the education system.

Curriculum, Teaching and Learning

- Conduct a thorough curriculum audit at the state/UT level to identify existing opportunities and gaps for climate change risk reduction and resilience building learning and action. Build on the opportunities and close the gaps.

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- Ensuring curriculum contextualization by working closely with local stakeholders.
- Identify contextually appropriate green skills for a low carbon economy and integrate them into the secondary curriculum and into assessable learning outcomes. Help students become aware of green job and carrier opportunities. Green skills should be an integral part of the emerging 21st century skills agenda in India.
- Ensure clear curriculum progression in terms of knowledge, skills and dispositional learning outcomes concerning climate change mitigation and adaptation; also forge cross-curricular and interdisciplinary links between treatment of climate change mitigation and adaptation in different subjects at the same grade level.
- Develop child-friendly, gender-sensitive and age-appropriate learning support materials especially for students in rural areas to introduce climate change issues and convey pro-environmental messages. Such materials should be available in language(s) suitable for the target students to ensure accessibility.
- Provide students with hands-on opportunities and platforms to take concrete actions and play change agency and advocacy roles in mitigating climate change impacts at school, in their local community and beyond.

Teacher Capacity Development

- At the state/UT level, conduct a thorough teacher education curriculum audit for both pre-service and in-service training programmes to identify existing opportunities and gaps for climate change risk reduction and resilience building. Build on the opportunities and close the gaps.
- Build teacher capacities in employing a wide range of active/participatory and child-centred pedagogies, such learning modes being vital for action-oriented climate change education.
- Build teacher capacity in promoting environmentally sustainable practices at school that are most relevant to the locality (e.g., wise use of natural resources; water conservation; developing school gardens; tree and mangrove planting; waste management; using and maintaining renewable energy technology; awareness raising and advocacy techniques).
- Build teacher capacity in providing basic support to maintain student health and wellbeing if threatened or adversely impacted by climate change.
- Using existing online platforms such as DIKSHA[1] and UniLearn[2] exchange good teaching and action learning examples concerning climate change adaptation and mitigation.

Communication, Coordination and Partnership

- Incorporate education sector climate change risk reduction and resilience building components in the existing coordination mechanisms/platforms at the national and state/UT levels.
- Ensure a multi-sector partnership approach to embedding climate change components in the forthcoming *National Curriculum Frameworks* as well as in relevant education policy and curriculum framework documents and in teacher capacity development programme at sub-national levels.

School/Community Student Participation Platforms

- In the forthcoming *National Curriculum Frameworks* ensure linkages between formal curriculum and the existing non-formal learning platforms and programmes for climate change resilience-building learning and action.
- Embed climate change considerations into well-established platforms/programmes such as School/Child Cabinet, Swachh Vidyalaya Puraskar, National Service Scheme, Nehru Yuva Kendra Sangathan and National Adolescent Health Programme.
- Promote field-based and project-based learning activities such as biodiversity mapping, air pollution monitoring and water quality monitoring, followed by sharing findings at school and in the community and encouraging student-led actions to address the issues identified. Also organize exposure visits for students to learn about good practice examples of climate change mitigation and adaptation.
- Build local government capacity for implementing Child-friendly Local Governance as a means of promoting child-centred climate change action at the local government level.
- Create a 'green star' recognition scheme for individuals and schools making a unique contribution to mitigating and adapting to climate change.
- Develop an online platform, a 'clearing house' for sharing climate change related experiences and actions among students in India.
- Link Indian students to climate change movements/networks at state, national, regional and global levels through online platforms and/or face-to-face gatherings as appropriate.
- Support existing youth groups working on climate change and environmental issues so that they can sustain and expand their advocacy and change agency role so as to accelerate climate action.

Section 1
Introduction

1.1. Aims and Scope of the Study

This India country study is one of the eight country studies undertaken as part of a UNICEF Regional Office for South Asia (ROSA) study on the Impacts of and Responses to Climate Change across Education Systems in South Asia.

The overall aims of the regional study are threefold:

- To generate evidence on how education systems in South Asia are monitoring, assessing and responding to the impacts of climate change
- To identify the main educational tools and mechanisms being employed in planning for and addressing climate risks
- To showcase the perceptions of key education sector stakeholders regarding further embedding climate change considerations and concerns into education tools and mechanisms

In examining the interface between climate change and education, this study focuses on three areas:

- Direct and indirect climate change impacts on education systems in terms of learning facilities, access to education, student health and wellbeing, education provision (including teacher health and wellbeing) and learning quality, each having significant implications for the quality of education.
- Education system responses to climate change, exploring seven key education system components (i.e., policies, plans and strategies; finance; curriculum; teaching and learning; teacher capacity development; communication, cooperation and partnership; student participation platforms; monitoring, evaluation and accountability)
- Key education sector stakeholder experiences, perceptions and needs concerning climate change education.

It should be noted that this study is primarily focused at the national level with attention given to three Indian states: Bihar, Kerala and Odisha.[3] A comprehensive analysis of all 28 states and of the 8 union territories (UTs) which the federal government oversees, was outside the scope of this study. Nonetheless state-level information and analysis have been included selectively.

1.2. A Brief Note on Methodology

The methodology employed is desk-based documentary review involving consultations with and gathering information from key stakeholders in India through national- and state-level stakeholder surveys, school-level focus group discussions (FGDs) and a U-Report[4] targeting youth from 14 to 24 years old.

At the national level, according to the criteria set for the study the UNICEF India Country Office identified national-level stakeholders from the Government, UN organizations and national NGOs who were invited to participate in the national-level survey conducted via email or Zoom. Three survey contributions followed, including one group contribution, between 10 November 2020 and 22 February 2021.

At the state level, UNICEF State Office personnel in Bihar, Kerala and Odisha consulted with relevant state government officials to gather their responses to the stakeholder survey, the team responses being submitted between 17 September and 21 October 2020, followed by Zoom calls with UNICEF State Office teams for further clarification on 21 and 22 October 2020. The SWOT (strengths, weaknesses, opportunities and threats) analysis discussion in *Section 5* was one element of the stakeholder survey.

Six school-level FGDs were conducted between 2 February 2021 and 19 May 2021 using the Zoom facility. In Bihar, 8 middle school teachers (5 female, 3 male) from six districts (Bhagalpur, Darbhanga, Madhubani, Munger, Purnea and Saran) participated in the teacher FGD and 8 middle school students (5 girls, 3 boys) from two districts (Darbhanga and Madhubani) participated in the student FGD. In Kerala, 6 secondary school teachers (4 female, 2 male) from 2 districts (Thiruvananthapuram and Palakkad) and 6 secondary school students (5 girls, 1 boy) from the same two districts participated in the student FGD. They were all from the government schools, the participating students being between 13 and 16 years old.

As continuous school closures made it difficult to involve school students and teachers, FGDs in Odisha were organised with pre-service student teachers and teacher educators in the District Institute of Education and Training (DIET) and Block Institute of Education and Training (BIET) in the Mayurbhanj district. Six pre-service student teachers (4 female, 2 male) from three districts (Baripada, Gorumahisani, Kalinga) participated in a student teacher FGD. 9 teacher educators (5 female, 4 male) from two districts (Baripada, Gorumahisani) participated in the teacher educator FGD.

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[3] The three States were selected by the UNICEF India Country Office taking into account different geographical regions as well as their recent experience in responding to flooding.

[4] U-Report, run by UNICEF and its partners, is a messaging tool that empowers young people around the world to engage with and speak out on issues that matter to them.

UNICEF India personnel provided all necessary interpretation support. Before the FGD, student participants were asked to draw two images, i.e., one on 'climate change in my village/locality' and another on 'climate change impacts on my education'. Each drawing prepared by the student was presented and became a subject of discussion at the FGD. In Odisha both student teachers and teacher educators also prepared their drawings and they were discussed at the FGDs.

Analysis of the data gathered is integrated into the relevant sections of this report. The U-Report process was implemented and analysed by a UNICEF ROSA team leading to the completion of the publication, *Rising to the Challenge: Youth Perspectives on Climate Change and Education in India* (Lopez Rello & Ackers 2021)[5] upon which this report draws.

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[5] For a full report, go to: <https://www.unicef.org/rosa/media/12646/file/Rising%20to%20the%20Challenge%20-%20Youth%20Perspectives%20on%20Climate%20Change%20and%20Education%20in%20India.pdf>

Section 2
Climate Vulnerabilities in India

India is one of the most vulnerable countries in the world to the adverse impacts of climate change. According to the *Global Climate Risk Index*, it was the seventh most climate-affected country in the world in 2019 (Germanwatch 2021).

Located between the Himalayas and the Indian Ocean, India has a diverse topography including northern mountainous terrain, northern plains, a peninsula plateau, deserts, southern coastal plains and islands. India's unique geographical features produce a wide range of climatic conditions. They include the cold glacier-capped Himalaya, the humid subtropical climate in the north, centre, and east; the tropical south and southwest and arid and semi-arid west and south centre. The southwest monsoon occurring between June and September brings most of the country's annual rainfall with significant regional variabilities, while the northeast monsoon occurring between October and December supplies a good amount of the rainfall falling in the southern regions (Ministry of Environment and Forests 2012; USAID 2017).

Climate change impacts are manifested in the forms of more frequent extreme weather events and worsening hydro-meteorological hazards such as cyclones, floods and droughts. In recent decades accelerated warming has been clearly observed. During the fifteen-year period from 2005 to 2019, 11 out of 15 warmest years since 1901 were recorded. The intensity and frequency of heat waves has been on the rise (MoEFCC 2021a; NDMA 2019). In 2020, some cities in India experienced heat waves with maximum temperatures above 48°C, impacting those who live in crowded and poorly ventilated homes and urban slums (Golechha & Panigrahy 2020).

The category 5 Cyclone Amphan in May 2020 was one of the strongest cyclones recorded in decades. It severely affected 13.6 million people and triggered 2.4 million newly displaced people in India (IDMC 2021). Over the past two decades extremely high precipitation and flooding events have been also increased in the majority of the country's river basins (UNDRR & ADPC 2020). Glaciers and snow across the Greater Himalayan region are retreating at an alarming speed leading to a growing number of glacial lakes, exacerbating the likelihood of glacial lake outburst floods (GLOFs) in valleys downstream (MoEFCC 2021a). While there are more frequent heavy precipitation incidents,

there has been a constant decline in overall precipitation, thus driving up drought risk in some regions. While rapidly melting ice and snow in the Himalayas offset declines in precipitation, in the long term, those who depend on the India's major rivers – Indus, Ganges and Brahmapura – that are fed by Himalayan glaciers are likely to face severe water insecurity (USAID 2017).

India is the second most populous country in the world with a total population of 1.39 billion, of which 26.9 per cent are between 10 and 24 years old (UNFPA 2021). India is one of the most densely populated countries in the world and rapid urbanization is taking place. In 2011, there were approximately 377 million people living in the urban areas, comprising 31 per cent of the total population and it is projected that the urban population will reach 600 million by 2031, and 850 million by 2051 (MoEFCC 2018). Rapid urbanization exerts tremendous pressure on public services, natural resources, infrastructures, transport, proliferates illegal settlements and exacerbates existing issues such as poverty, waste management, traffic congestion and pollution, the confluence of factors causing multi-dimensional urban vulnerability to climate change (*ibid.*; UNDRR & ADPC 2020).

Climate change hits underprivileged communities and people disproportionately, given their lack of the capacity and resources to cope with and recover from recurring climate change-induced shocks. Despite recent significant poverty reduction efforts, there are about 33 million Indians living in poverty, the largest concentration of global poor (MoEFCC 2018). India is predominantly an agrarian society. Approximately 70 per cent of the population depend on agriculture in varying degree for their livelihood. More than 60 per cent of agricultural lands are rain-fed. Rural farming communities are particularly sensitive to crop-destroying climate shocks, combined with decades of rural poverty. Low-income populations living in slums and slum-like settlements in urban areas are most susceptible to climate change-inducted hazards and shocks (Ministry of Environment and Forests 2012; UNDRR & ADPC 2020).

Malnutrition is already a serious concern especially among children.[6] The situation is likely to be aggravated by climate-induced food insecurity (UNICEF ROSA 2020a). According to UNICEF's first child-focused climate risk index, based on children's exposure to climate change and environmental hazards, shocks and stresses as well as children's vulnerabilities to shock, India ranks 26 out of 163 countries (UNICEF 2021a).

The Scheduled Castes (SCs) and the Scheduled Tribes (STs)[7] are two of the most disadvantaged socioeconomic groups in

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[6] 35 per cent of children under five years of age in India suffer from stunting. 33 per cent of children under 5 years of age are underweight (UNICEF ROSA 2020a).
[7] In the Indian Constitution, certain castes and tribes are recognized as historically disadvantaged people and listed for affirmative policies and actions. The castes listed are known as Scheduled Castes and the tribes listed are known as Scheduled Tribes (NDMA 2019).

India. SCs and STs consist of 16.6 per cent and 8.6 per cent of the total national population respectively. Their vulnerabilities are compounded due to historical social exclusion, chronic poverty, geographical location (i.e., living in marginal and hazard-prone areas) and lack of access to basic social services, among others. Tribal communities' vulnerabilities are further aggravated as their livelihoods are strongly linked to climate sensitive ecosystems (NDMA 2019). Vulnerability to climate change is differentiable by gender. Limited control over resources and decision-making, constraints on access to education and information and less social mobility due to cultural norms manifest themselves through a higher level of vulnerability among women and girls compared to men and boys (Ministry of Environment and Forests 2012; NDMA 2019). In particular, girls experience multiple vulnerabilities, including poor nutritional status, early marriage and early childbearing.

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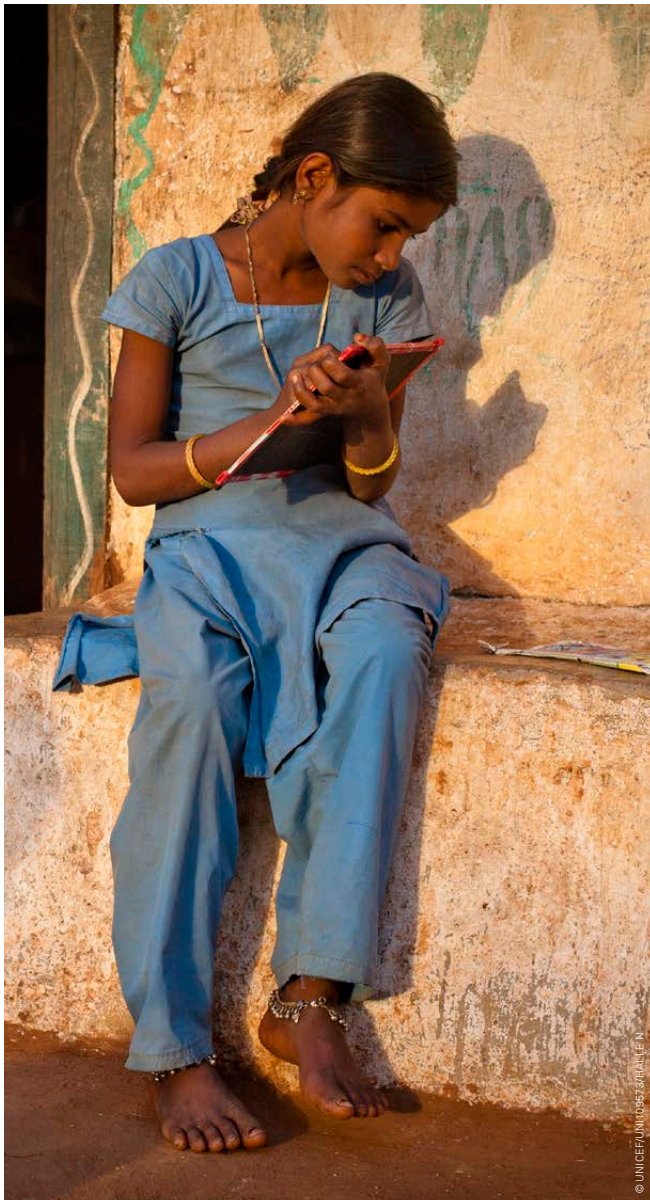
43 per cent of girls drop out without completing secondary education (UNICEF India undated a; UNICEF ROSA 2020b).

India has a long coastline stretching some 7,500km. There are 78 coastal districts in nine states that include many of India's largest cities. 14.2 per cent of the total population of India living in coastal communities are vulnerable to sea level rise, cyclones, storm surges, coastal inundation and saline water intrusion. Loss of reefs and mangrove forests further drives up flood risks in coastal communities (Government of India 2015; UNDRR & ADPC 2020).

There is an increasing risk of climate change-induced displacement and migration in India. Between 2008 and 2018 about 3.6 million Indians were displaced annually mostly due to flooding from monsoon rains (Panda 2020). In 2020 it is estimated that 14 million people may have migrated due to slow-onset climate change events such as sea-level rise, water stress, crop yield reduction, ecosystem loss and drought. This number does not include migration caused by sudden onset climate disasters such as cyclones. Without decisive and urgent actions to meet the Paris Agreement targets, it is projected that the migration linked to slow-onset climate shocks alone will increase threefold by 2050, involving a staggering 45.5 million people (Singh *et al*. 2020).

India's water resources are already under considerable stress in many regions especially during the summer. Water scarcity disproportionately affects the wellbeing of the millions of the poorest people (Ministry of Environment and Forests 2012) while 25 per cent of children in India are experiencing high or extremely high water vulnerability (UNICEF 2021b). In addition to changes in precipitation patterns, population growth, rapid urbanization and agricultural intensification all contribute to further water scarcity and greater water resource competition (Ministry of Environment and Forests 2012). As 20 major river basins are shared by multiple states and UTs in India, interstate collaboration and cooperation concerning river water governance is critical to ensure overall national water security. However, such interstate river water governance remains a lacuna in policy and institutional arrangements, each state/UT pursuing its own water resource development priorities, resulting in frequent interstate river water disputes (Arora 2020; Chokkakula 2019).

It is important to note that the above-mentioned climate change-induced hazards, shocks and vulnerabilities do not occur in isolation. They interact with one another and exacerbate existing social and economic inequalities, while feeding from those inequalities in a complex web of relationships. Unaddressed, the combined effect of climate change hit marginalized groups in the society first, hardest and longest. It is therefore critical to address multiple risk factors simultaneously (UNICEF 2015, 2021a).

Climate Change in My Locality

Teacher and student FGD participants were asked about climate change impacts they have noticed and experienced in their locality.

Bihar

Teacher FGD participants report that they have noticed 'drastic changes' due to climate change in recent years. For instance, rain patterns have become erratic and unpredictable. Flooding is not new, but the participants commonly affirm that the nature of flooding has changed. Intense rainfalls in a very short period of time lead to flash flooding. In the words of a male teacher in Madhubani, 'We see flooding happening even in October. This is unusual.' The maximum temperature is on the rise and periods of minimum temperature are reducing. Even the districts close to rivers such as Saran and Munger face water scarcity as most ponds, rivers and hand pumps dry up during the summer months. Wintertime is shifting from December/January to January/February and cold waves are intensifying. A female teacher in Darbhanga explains that her district has been disaster prone, but the intensity of most of the disasters has been significantly increased due to climate change in recent years.

Flooding and lightning are impacting almost everyone in my village. These things are happening due to climate change. Since 2015 my village suffers from floods almost every year. Most of the poor people live in huts and they were totally destroyed by flooding. Villagers have identified higher locations and keep dry foods to survive during the flood period. Once the floodwater goes, we come back to the village.

Nisha, Grade 8, Madhubani

We suffer from heat waves and drought conditions. Most of the agricultural fields are affected. Water sources are dried up. This situation affects food productivity, leading to food insecurity and poverty. As we have less green lands, we have less oxygen.

Nitin, Grade 8, Darbhanga

Due to cold waves schools are closed, as there are no facilities to keep the classroom warm. Intense cold and fog make it very difficult for children to go to school. Poor families cannot afford warm clothes for their children. During the cold waves, people prefer not to come out of the house. Some people burn wood to warm themselves up.

Sadhir, Grade 8, Madhubani

Due to global warming, the earth is much warmer. In my area, there are a lot of brick kilns that are polluting the entire environment. Due to global warming lightning incidents are also increasing in my area. People die due to lightning. This happens during the monsoon months.

Lakshmi, Grade 8, Darbhanga

Kerala

Teacher FGD participants report that they have been experiencing the impacts of climate change in recent years especially in the forms of floods, droughts and water shortage. In 2018 and 2019 very heavy continuous rains led to floods and serious landslides. A female teacher explains that although a good amount of monsoon rains and landslides are common every year in Kerala, floods are not common and the recent floods took place 'out of blue'. In 2016/2017 Kerala suffered from 'the worst, extreme and historical drought' and even after the recent floods, they went on to face water shortages, another female teacher points out. The topography of Kerala makes water management challenging, but changing precipitation patterns combined with rapid urbanization and industrialization affect water availability both at school and in the community. Another female teacher who regularly observes the growth and changes of the plants with her students reports that *Cassia Fistula*, the so-called Golden Shower flower and Kerala's state flower, is now flowering two months earlier. This unseasonal flowering is, she says, 'a clear symptom of unhealthy seasonal change'.

Droughts and floods affect the agriculture sector in my locality and the farmers are economically impacted. They cannot afford food and other essentials for their families. Due to floods, droughts, wildfires and changing habitats in the forest areas, animals like monkeys, wild boars enter villages. These animals destroy agricultural products, pollute water sources and spread diseases. We are facing such problems in the past two or three years.

Saina, Grade 10, Thiruvananthapuram

Climate change affects all organisms and human lives. One of the major causes is deforestation. There is severe drought in Kerala in April and May. Water is scarce during this period. Rivers and streams dry up. Plants are destroyed. Even enough drinking water is not available, which leads to a lot of health problems – skin problems and dehydration affect children's education. I believe these issues can be overcome. Our school has a rainwater-harvesting tank. Teachers and students are planting trees. Our school also has a beautiful vegetable garden and a big solar plant.

Akshara, Grade 8, Thiruvananthapuram

During the floods in Kerala, schools were used as emergency shelters. People from all walks of life – different economic status, castes, religious sects – sheltered in my school. We had the harvest festival at that time. We all united in spite of the differences. We all went out of our ways to help each other, all as one. A major lesson for all the children – people can work like that! The school is not just a place for academic activities. It has become a social institution.

Hashim, Grade 8, Palakkad

Every person in Kerala is affected by heat. The increasing heat creates great discomfort for the children. Many children are affected by heat-related diseases during the summer. Children cannot play outside as it is too hot. In summer, I feel very tired in the afternoon and cannot focus on the study. During the 2018 floods, all schools in Kerala were closed and many schools became relief camps. Children could not go to school. Learning materials were damaged by flood water.

Gadha, Grade 8, Thiruvananthapuram

Odisha

Teacher educator FGD participants report that in Odisha minimum and maximum temperatures have been rapidly increasing over the last 5 to 10 years. Thunderstorms, heat waves and water scarcity have become more frequent, threatening the lives and livelihoods of local people. Tropical cyclones, low pressures and wind speed have also been increased. Deforestation, air and water pollution are also concerns shared by the participants. Due to crop failures, farming communities migrate to look for better economic opportunities. Animals in the jungle are moving to the villages/towns as their natural habitats have significantly deteriorated as a result of human activity and climate change.

Due to climate change, there is a water crisis in my village. We have one pond and one water tank. In summer, villagers use up all the water, so I have to go a great distance – more than 3 km – to collect water. If we use water at this pace, what will happen? Due to lack of water and water pollution created by industries, this place will be a desert. If we don't have water, how can we plant and how can plants grow? Without water, life is not possible. We will all die. This is a very critical situation in our environment.

Rasmita, Student Teacher, Gorumahisan

Huge and dense smokes released from the factories. Global warming is a global crisis. In my locality I am experiencing a rapid and abnormal increase in temperatures. Without air conditioners (ACs) it is very difficult to survive even for one minute! ACs have become basic necessities but they contribute to global warming. Each house has 4 or 5 ACs. Even when people are out, they still use them, not being aware of the problem ACs are creating for our environment and climate. They use fossil fuels, not renewable energy. I am disappointed to say that people are not aware of these issues.

Swayamsidha, Student Teacher, Kalinga

The habitats for elephants are getting scarcer day by day due to deforestation and the impacts of climate change. So elephants are coming to the village. They eat crops and destroy houses in the tribal areas. Children are fearful when they encounter elephants. They cannot study properly at school. This is because they cannot sleep well at night, as they are fearful of elephants. Children are in a very imbalanced mental situation. Teachers have to handle distressed students and make them feel safe in the school.

Bijayini, Teacher Educator, Odisha

This drawing is a symbolic representation of the heat waves. The colour red represents the heat that is getting worse day by day. The left side is the township areas that are most severely affected. A green tree in the right symbolizes safer zones that tolerate high temperatures. A baby in a mother's womb cries out, 'Mum, I am very cool and happy here. Don't let me go!' The baby's brothers and sisters are badly affected by multiple hazards and they panic. They struggle to study for their future. My school is not in the safe green side of the drawing. My students suffer from digestive problems, sunstrokes and other illnesses due to high temperatures.

Prafulla, Teacher Educator, Odisha

Section 3
Climate Change Impacts on Education System

While the impacts of climate change in the education sector have not been researched systematically in India, the high prevalence of fast onset natural hazards (e.g., floods, cyclones) and slow onset events (e.g., droughts, environmental degradation and pollution) has been negatively affecting various aspects of the education system. According to the U-Report survey conducted for this study, an overall 80 per cent of Indian youth respondents (n=1,379) claim that their education/studies have been affected by climate change (Lopez Rello & Ackers 2021).

3.1. Learning Facilities

Because of global warming, hand pumps are dried up. Children are very sad, as they do not have safe drinking water from the hand pumps. Due to warming and other issues, schools are closed or not functioning. Due to lack of water, very hot weather, children become sick at school, so they prefer not to go to school.

Tannu, Grade 8, Madhubani, Bihar

Bihar experienced a most devastating flood in 2008. A breach of the Kosi river embarkment, 8 km north of the border between Nepal and India, diverted a normal river course and an intense amount of floodwater ran straight down south inundating five districts that hadn't experienced floods for a few decades. The schools in the new river path were washed away. An estimated 1,429 primary schools and 105 secondary schools were fully or partially damaged.

The estimated reconstruction and repair costs were US$ 28.4 million (Government of Bihar *et al.* 2010). Bihar experiences frequent annual flash floods. More recently, the 2017 flash floods seriously affected 17.16 million people including 7.89 million children in 21 districts (out of 38). 1,522 school buildings were severely damaged (BEPC *et al.* undated; UNICEF India 2017a).

In 2018 torrential rain from June to August caused devastating floods and severe landslides in all 14 districts in Kerala affecting estimated 5.4 million people including approximately 2.5 million children. It was the worst flooding Kerala had experienced since 1924, 1,613 schools being affected by the floods. 1,147 toilet facilities, 842 urinal facilities, about 34,251m of compound walls and 368,731m^2 of playground were damaged. Loss of kitchen infrastructures disrupted the school midday meal provision. An estimated 71,927 students lost their uniforms and 86,634 students lost school materials such as textbooks, notebooks and school bags. The total damage and loss to the education sector was estimated at INR 179.48 IND crore[8] (UN *et al.* 2018).

Odisha was hit by the category 4 Cyclone Fani in May 2019, affecting 16.5 million people across 14 of 30 districts. It was the worst cyclone since the 1999 super cyclone (UN *et al.* 2019). Old and unsound school buildings collapsed due to high wind speeds. 5,735 elementary and secondary schools, 19.2 per cent of the total number of elementary and secondary schools, were reported damaged. The main damage was concentrated on the Puri district where 86.2 per cent of schools were damaged. Damage was also done to school roofs, WASH facilities, kitchen sheds, windows, boundary walls among other facilities. The total damage in the education sector was estimated at 814 IND crore[9], including 360.68 IND crore of damage to classroom and office rooms and 99.35 IND crore spent resupplying textbooks for Grade 4 to 10 students in government schools in the affected districts (*ibid.*).

According to the Ministry of Education's UDISE+[10] statistics for 2019-20, 93.77 per cent of schools in India have functional drinking water facilities (99.31 per cent in Bihar, 99 per cent in Kerala, 96.99 per cent in Odisha) and 90.24 per cent have functional hand washing facilities (84.58 per cent in Bihar, 97.95 per cent in Kerala, 98.62 per cent in Odisha) (Ministry of Education undated, 105, 112). However, in relation to climate change impacts in education, water availability at school is one of the key concerns frequently expressed by the participants in this study. For instance, the schools in drought prone southern districts of Bihar face water scarcity. During times of water scarcity, water is provided by water tankers (Bihar State Rural Works

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[8] Approximately USD 26 million.
[9] Approximately USD 116 million.
[10] See *Section 4.7.*

Department 2021). A male teacher in the Bihar FGD explains that despite the fact that his district is surrounded by three rivers, the drying up of most ponds and hand pumps has become common as summer approaches. He observes that in the last two years children have faced more difficulties in accessing safe drinking water both at school and home, while lack of water at school made it difficult to arrange midday meals. A female teacher based in a remote hilly area in Kerala reports that due to climate change combined with land use change linked to rapid urbanization and industrialization in the hilly area, water has become scarce. Her secondary school with some 2,000 students faces water shortages from January for four to five months, the lack of water in the toilet and washing facilities particularly affecting female students.

Some of the FGD participants also refer to water contamination at school as another concern in relation to climate change. The main causes of water contamination include floodwater, waterlogging, temperature rises leading to algae and bacterial growth and saline water intrusion (Bihar Student FGD, Kerala Student and Teacher FGDs, Odisha State Stakeholder FGD).

Ensuring access to clean water at school is one of the important components of the national government initiative called *Swachh Bharat: Swachh Vidyalaya* (SBSV), (Clean India: Clean Schools) launched in 2014. It aims at promoting functioning and well-maintained water, sanitation and hygiene (WASH) facilities in every Indian school and has defined the essential elements and the standards for desirable WASH services in schools. The *Swachh Vidyalaya Puraskar* – the Ministry of Education national award scheme which recognises schools that have undertaken significant steps towards desired WASH standards – has been rolled out at the sub-national level (Ministry of Human Resource Development undated). For instance, the Government of Odisha launched the state-level annual award scheme, the *Odisha Swachh Vidyalaya Puraskar* (OSVP) in 2019 to recognise success and motivate schools in achieving the SBSV standard.[11]

3.2. Education Access
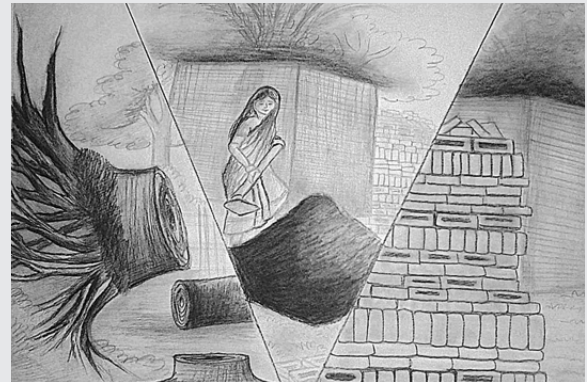
Brick making contributes to climate change by producing dangerous smoke. Trees are cut down and fertile topsoil is removed [to collect clay for brick production]. This leads to soil erosion and more flooding. Farmers are more attracted to alternative construction work such as brick kiln factories as they cannot get good crops due to frequent natural calamities. Children and young people also work in this industry.

Bikash, Student Teacher, Odisha

In the aftermath of the above-mentioned 2018 floods in Kerala, schools were closed for several days but many schools in Alappuzha district located in the low-lying areas were closed for more than a month due to inundation. After the schools re-opened, absenteeism was high in many schools, especially in the tribal areas, as children feared more flooding would happen. 1,779 schools and some colleges were used as emergency relief camps, interrupting children's education (UN *et al.* 2018). In the case of Cyclone Fani, as it hit Odisha during the school vacation period, it didn't cause any immediate interruption to children's education (UN *et al.* 2019). Bihar's northern districts are prone to annual flooding. When floods occur, most of the schools in the affected areas are used as relief (evacuation) centres and internally displaced people tend to stay there for a long time (such as two months) disrupting children's education significantly. Children also cannot go to school until the damaged roads are fixed (Bihar State Stakeholder FGD; Bihar Teacher FGD). In the U-Report survey conducted for this study, 13 per cent of Indian youth respondents (n=1,379) report that climate change has affected their journey to school (Lopez Rello & Ackers 2021).

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[11] The schools which submitted the OSVP application were ranked according to their score out of a total 100 points across five broad categories, i.e., water; toilets; hand washing facilities with toilets; operation and maintenance; behaviour change and capacity building. In 2019-2020, out of the total of 58,000 schools in Odisha, there were 40 winning schools at the state level, 234 winning schools at the district level and 1,256 schools at the block level. An additional 900 schools received awards under the various sub-categories. Winning schools were given a cash prize (Odisha School Education Programme Authority *et al.* 2020, 4).

According to the UNICEF India (2016), about 20 to 25 per cent of school absenteeism in the drought-prone areas is reportedly attributed to children fetching water or looking after livestock, a point echoed by participants in this study. In Bihar's southern districts that are prone to drought, children with family responsibilities for collecting water from far-flung areas tend to fall short in regular school attendance (Bihar State Stakeholder FGD). Children in Odisha experience the same. A female student teacher explains that it is getting difficult to fetch clean water as most of the water is polluted and children have to spend 3 to 4 hours to collect any water (Odisha Student Teacher FGD).

In the U-Report survey conducted for this study, 12 per cent of Indian youth respondents (n=1,379) state that their family's ability to afford schooling has been affected (Lopez Rello & Ackers 2021). A declining household economy due to climate change-induced shocks leads to reduced school attendance or dropout among children as they are required to spend more time supporting their families (PWC & Save the Children 2020). Children of seasonal workers are one of the groups which are prone to school dropout. For instance, in Odisha the number of people who migrate in search of better livelihood opportunities is on the rise due to drought and the duration of seasonal migration has extended from three to six months. This situation makes it difficult for children who migrate with their family to addend school regularly as they have to split their time between home and the temporary location. They end up by working at brick making, cement factories or stone quarries as unskilled day-wage workers. Lack of school attendance leads to higher rates of illiteracy and lower self-esteem (Terre des Hommes International Federation 2017).

While the prevalence of child marriage has declined in India over the last decade, it is estimated that at least 1.5 million girls under 18 are married off every year and nearly 16 per cent of girls between 15 and 19 years old are currently married (UNICEF India undated b). In the Eastern India states such as Bihar, Jharkhand, Odisha and West Bengal, child marriage remains persistent (Khanna & Kochhar 2020). Child marriage is one of the negative coping strategies when vulnerable families face economic hardship caused by climate change-induced shocks. In Odisha, three districts most devastated by Cyclone Fani - Mayurbhanj, Balasore, Ganjam - are also the districts where the child marriage rates are particularly high. Adolescent girls from the most marginalized communities in these districts were at elevated risks of forced marriage in the aftermath of Cyclone Fani (UN *et al.* 2019). Similarly, after Cyclone Amphan, a significant spike in child marriage was reported in the Sundarbans delta in West Bengal. A majority of the population is made up of subsistence farmers whose lives and livelihoods have been devastated by recurrent storms, floods, sea level rise and saline intrusion. Job losses due

to the COVID-19 pandemic restrictions further aggravated poverty. Families in situations of dire poverty more easily become targets of traffickers who lure women and children into forced prostitution, marriage and child labour. Prolonged school closures due to the pandemic made girls, especially 13 to 16 years old, vulnerable to child marriage (Acharya 2021; Dutta 2020).

In Bihar, analysis of data concerning natural disasters, child protection and school dropout reveals that districts prone to disasters have higher percentages of child marriage and are also hotspots of child trafficking and child labour. In these districts, school dropout rates are the highest and transition rates from elementary to secondary schools are lower compared to other districts (UNICEF 2017a). According to a female participant in the Bihar teacher FGD, lots of girls are married off at an early age and these girls migrate to the different parts of the country. She points out that this is 'a new mode of trafficking in the facade of marriage' as the families who gained financial benefits from the marriage never hear from their daughters again after one post-marriage visit.

3.3. Student Health and Wellbeing
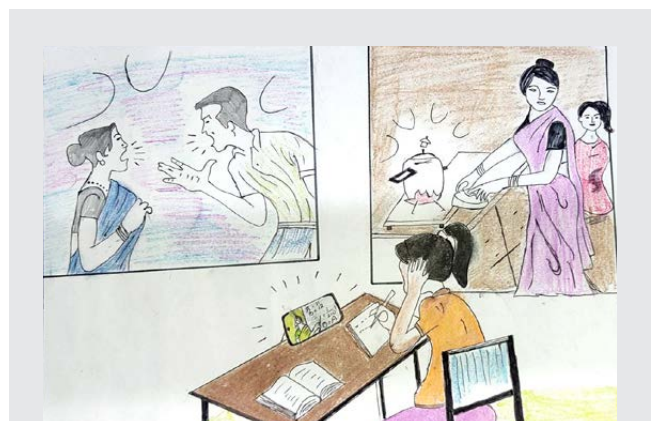
When there are problems outside, disturbances occur in the family, parents start to argue. I cannot concentrate on my study at home. Climate change affects mental health of children. When there are problems at home, I used to go out and sit under the tree and read there. But now, in my village there are no big trees anymore as they were all cut down.

Binapani, Student Teacher, Odisha

In India diarrheal disease is linked to high child mortality (approximately 300,000 death per year). Temperature rise, extreme precipitation and drought conditions are conducive to pathogen growth and spread, so it is expected that diarrheal disease will be exacerbated (USAID 2017). Vector-borne diseases such as malaria and dengue fever are

climate sensitive. Increases in temperature and changing precipitation patterns alter the distribution of vector species and are likely to spread into new regions at higher altitude. Seasonal transmission windows for vector-borne disease are also projected to extend (Ministry of Environment and Forests 2012).

Although the average summer temperatures are generally high in India (from March to June), the rise in the average temperature during these months affects human health severely. Symptoms of heat exhaustion include dizziness, fatigue, fainting, nausea, vomiting and headache, among others. When unrecognized and untreated, heat exhaustion leads to more severe conditions including heatstroke (Ministry of Environment and Forests 2012). Teacher educator FGD participants in Odisha report that when excessive heat (43°C or 44°C in their locality) combined with water scarcity, young children are prone to skin problems, heavy sweating, dehydration, high body temperature, vomiting, headache and digestive problems. Bihar teacher FGD participants have encountered students falling ill and falling down suddenly due to the excessive heat. They found it difficult to look after sick students. Intensifying cold is also a challenge as students from poor families do not have warm clothes and schools do not have facilities to keep them warm. In the words of a female teacher in Bihar FGD 'children are badly affected by intense heat and intense cold.'

Air pollution is also a major health concern for children in India. The country is ranked the third most polluted country globally[12]. 22 of the 30 most polluted cities in the world are in India (IQAir 2020). Polluted air increases risk of chronic and acute lower respiratory infections, pneumonia and associated mortality among young children (UNICEF India 2017b). A massive expansion of industries and coal-fired power plants as well as the increase in use of vehicles powered by fossil fuels are some of the major drivers of air pollution in India (Gurjar 2021; UNICEF ROSA 2020b), just as they are major drivers of climate change. A female student teacher in the Odisha FGD also points out that the increasing forest fire incidents cause air pollution, impacting the health of people miles away.

Asked how worried they were about climate change and what it meant for the future, 36 per cent of Indian youth U-Report respondents (n=1,536) indicated that they are 'very/extremely worried' or 'a little worried' (34 per cent) (Lopez Rello & Ackers 2021, 16). The above-mentioned Kosi flood caused psychological trauma in many, especially girl students in Bihar (Government of Bihar *et al.* 2010). Cyclone Fani took a heavy emotional tall on children and adolescents in Odisha (UN *et al.* 2019). More than a month after the cyclone, in Puri district alone over 10,000 children

under 17 years old required psychosocial counselling as they presented post-traumatic stress disorder (PTSD) symptoms such as anxiety and insomnia (Moneycontrol News 2019). For the children living in some parts in Odisha, the increasing number of life-threatening thunderstorms and elephant encounters cause trauma and anxiety (Odisha Teacher Educator and Student Teachers FGDs). In Kerala, there are some initiatives for school children's mental wellbeing through non-education government departments such as the Health Department and the Women and Child Development (Kerala State Stakeholder FGD). No specific programmes for mental health for students currently exist in Bihar (Bihar State Stakeholder FGD).

3.4. Education Provision and Learning Quality

We have less teaching and working time in the District Institute of Education and Training. We used to have 6 hours for teaching each day but now we teach only for 4 hours. 2 hours shorter everyday due to excessive heat. No air conditioners in the classroom with 50 students. There are only ceiling fans. Students are heavily sweating. They are disgusted and do not want to come to the classroom and they even tell a lie to avoid lessons. Excessive heat negatively affects their learning. It is difficult for me, as teacher educator, to teach in a shorter teaching period (reduced from 60 minutes to 30 minutes) using an activity-based approach. For those who miss classes, I have to repeat the lessons adding an extra burden.

Bijayini, Teacher Educator, Mayurbhanj, Odisha

There are no mechanisms in the education sector to systematically monitor lesson time lost and student academic performance in relation to climate change-induced hazards and events. According to UNICEF India (2016), schools do not have a system to capture loss of school

[12] Based on particulate matter (PM 2.5) concentration, the pollutant widely considered most harmful to human health (IQAir 2020).

days due to seasonal absenteeism as triggered by drought. Combined with the issue of school closures and learning loss due to the COVID-19 pandemic, this becomes an even more critical concern.

The Education Department in Bihar has adjusted the school timetable in response to particular seasonal hazards faced in different districts. In summer schools are run in the morning to protect students from sun stroke, while in winter the entire school timetable shifts to the afternoon to protect them from cold stroke. In some flood-affected districts, school sessions are delayed during the monsoon season, so the summer vacation duration is reduced to compensate for the lesson time lost (Bihar State Stakeholders). In the District Institute of Education and Training in Mayurbhanj, Odisha, the class timetable has been changed due to excessive heat, the teacher education programmes now being scheduled from 6:30 am to 11:30 am instead of 10:00 am to 4:00 pm (Odisha Teacher Educator FGD). It is not clear if such a timetable change is common to all the schools and teacher education institutions across the state. In Kerala, adjusting school timetable due to climate change-induced hazards is yet to formally happen but state-level stakeholders indicate that school timetables 'have to be changed' during the heat wave period and monsoon seasons, together with exam time.

'Unbearable' and 'extreme' temperatures and high humidity in classrooms lacking effective cooling and ventilation facilities presents a challenge for quality learning and teaching. For instance, a female student in Kerala says, 'it used to be cool to study in the morning but now we find it too hot to study even in the morning'. Similarly, in the words of another female student, 'We feel more gloomy and tired in the classroom' due to the excessive heat and 'we cannot perform well' (Kerala Student FGD). 'Students are not feeling comfortable and heat is affecting their mood, which affects their learning. If they are not comfortable, how can they learn?', a teacher educator in Odisha observes. It is also challenging for teachers since heat-exhausted students do not engage well during lessons (Kerala Teacher FGD).

It is important to highlight that there are extra pressures put on teachers in the aftermath of climate-induced disasters when the teachers themselves are also affected by the disasters. In addition to their normal teaching duties, some teachers have taken additional roles: volunteering for disaster response and recovery activities; visiting and engaging with community and family members to ensure children return to school; supporting children staying in schools for flood shelter (Bihar Teacher FGD; Kerala Teacher FGD). In the words of a male teacher in Bihar, 'We are supposed to teach but due to the changing climate, we have to play different roles. We have to run extra miles.'

Section 4
Education Sector Responses to Climate Change

4.1. Policies, Plans and Strategies

Indian's environmental policies are underpinned by a strong constitutional commitment to conservation of nature. While 'the State shall endeavour to protect and improve the environment and to safeguard the forests and wildlife of the country', it is one of the fundamental duties of every citizen of India 'to protect and improve the natural environment including forests, lakes, rivers and wild life, and to have compassion for living creatures' (Government of India 2020, 36).

In 2008 India adopted the *National Action Plan on Climate Change* (NAPCC) outlining priorities for both climate change mitigation and adaptation and laying out details of implementation through the following designated National Missions:

- National Solar Mission
- National Mission for Enhanced Energy Efficiency
- National Mission on Sustainable Habitat (including energy efficiency in building, solid waste management, public transport)
- National Water Mission
- National Mission for Sustaining the Himalayan Ecosystem
- National Mission for a 'Green India' (preservation of biodiversity)
- National Mission for Sustainable Agriculture
- National Mission on Strategic Knowledge for Climate Change (including research, communication, open source platforms that support and inform national climate change action) (Government of India 2008).

The NAPCC identifies priority sectors such as energy, industry, agriculture, water and forests. Reference to the education sector is overall lacking except for a very brief reference to human resource development through 'changes in curricula at the school and college levels' (*ibid*., 37). The NAPCC recognises children, together with women and the elderly, as the most vulnerable to the impacts of climate change, but children's potential role as change agents is not mentioned.

The *Second National Communication to the United Nations Framework Convention on Climate Change* (Ministry of Environment and Forests 2012) lists seven important ministries and departments[13] with a remit for awareness

raising on environment and climate change, but the Ministry of Education is not included.[14] In line with the NAPCC, *India's Intended Nationally Determined Contribution* (Government of India 2015) does not include the education sector as one of the priority sectors for climate change mitigation and adaptation efforts.

There are other sector policy documents laying out no primary remit for education but where specific reference to the education sector is nonetheless included. The 2005 *Disaster Management Act* envisages awareness raising among stakeholders including school teachers and students on multi-hazard mitigation, preparedness and response measures (Ministry of Law and Justice 2005). The *National Policy on Disaster Management* highlights curriculum integration of disaster management with a focus on skills, psychological resilience and leadership qualities. There is reference to optimising the role that existing youth-based organizations might play in supporting community-based disaster management initiatives (NDMA 2009). The *National Disaster Management Plan* is the country's comprehensive disaster and climate risk reduction framework corresponding to the three post-2015 global pillars for DRR, sustainable development and climate change mitigation and adaptation.[15] To 'promote disaster resilient schools, colleges and other education facilities' is one of the 30 broad objectives identified in the *Plan* (NDMA 2019, 10).

The *National School Safety Policy Guidelines* aim at creating safe learning environment for all school children and highlight concrete actions to be taken by different stakeholders at national, state, district and school levels (NDMA 2016). Further to a recent Supreme Court judgement[16], it is the central and state governments' responsibilities to strictly follow the *National School Safety Policy Guidelines* (BEPC *et al.* undated). The *Guidelines* take an 'all hazard approach', covering both natural and human-made hazards which may be sudden onset or slow onset. While hazards of 'climatic origin' are part of the *Guidelines*, there is no specific reference to drought, heat waves, sea level rise, saline intrusion, environmental degradation and biodiversity loss and the direct and indirect threat they pose to student safety and wellbeing.

At state level, in line with the NAPCC, 32 states/UTs (out of 36) have developed its *State Action Plan on Climate Change* (SAPCC) to mainstream climate change concerns in sub-national level planning (Government of India 2015). As to disaster management, in line with the *Disaster Management Act 2005* each state is mandated to lay down a *State Disaster Management Policy* and a *State Disaster Management Plan*.

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[13] They are the Ministry of Environment and Forests; the Department of Science and Technology; the Ministry of New and Renewable Energy; the Ministry of Agriculture; the Ministry of Earth Sciences; the Ministry of Water Resources; the Ministry of Power (Ministry of Environment and Forests 2012).
[14] Former Ministry of Human Resource Development (MHRD).
[15] They are the *Sendai Framework for Disaster Risk Reduction*, the *Sustainable Development Goals* and the *Paris Agreement*.
[16] Hon'ble Supreme Court verdict on a petition (483/2004) by Avinash Mehrotra vs Union of India (BEPC *et al.* undated).

There are some references to the education sector in the DRR and climate change policy documents of Bihar, Kerala and Odisha:

- **Bihar**: The *State Disaster Management Plan* recognizes the Department of Education as one of the 26 departments with a major role to play in disaster management. The *Plan* lists the Education Department's roles and responsibilities in pre-, during and post-disaster phases. The Education Department's hazard specific considerations are limited to earthquakes, floods and fires (Bihar State Disaster Management Authority 2014). Seeking integration of disaster management and climate change adaptation, the *Bihar State Action Plan on Climate Change* highlights the important role of school curriculum in awareness raising. The *Action Plan* suggests that climate change-related issues should be incorporated into the school curriculum at various levels (Government of Bihar 2015). The *DRR Bihar Roadmap 2015-2030* is one of the first comprehensive government strategies for the implementation of the *Sendai Framework for Disaster Risk Reduction* globally. It considers a wide range of risks and takes an integrated and multi-sectorial approach to disaster management. The *Roadmap* recognizes the vital importance of investing in education of children and youth in realizing a 'Resilient Bihar' and institutionalizes the Chief Minister School Safety Programme (see *Section 4.3*) (Government of Bihar 2016).

- **Kerala**: The *Kerala State Disaster Management Policy* and the *Kerala State Disaster Management Plan* highlight the Education Department's responsibilities for integrating DRR in the school curriculum and syllabuses and developing school disaster awareness programmes. The former also calls for the formation of Safety Clubs, while the latter seeks to ensure school management plans and first aid kits in all schools (Kerala State Disaster Management Authority 2010, 2016). In the *Kerala State Action Plan on Climate Change,* the school sector's role is limited to tree planting programmes by education institutions and educational material and programme development on biodiversity conservation for school children (Department of Environment and Climate Change 2014).

While disaster management has clear implementation and coordination mechanisms from the national to the local self-government level, climate change lacks the similar arrangements.[17] At the time of research, there is an on-going discussion around integrating the *Kerala State Action Plan on Climate Change* and the *Kerala State Disaster Management Plan* in order to facilitate more integrated implementation. Predicated on the concerted efforts made to progress Child-friendly Local Governance (CFLG) (see *Box 1*), the convergence of CFLG and DRR/climate change resilience building has great potential for advancing child-centred climate change local policy making (Kerala State Stakeholder FGD).

BOX 1. Child-friendly Local Governance (CFLG) in Kerala

Kerala has a long history of successful democratic decentralization and it is one of the few Indian states with well-established and functioning local government (Panchayat Raj) system. There are 1,200 local self-governments in Kerala. Kerala's local self-governments have a significant degree of local autonomy due to devolution of power. All local self-governments develop and implement their own development plans and have freedom to allocate funds according to local priorities. Education is one of the devolved functions to local self-governments. In Kerala people's participation in local policy planning, monitoring and implementation is greater than elsewhere in India (KILA & UNICEF Chennai 2016).

UNICEF working closely with the Kerala Institute of Local Administration has helped build capacity of local self-government in Kerala to realize child-friendly local governance (CFLG) across all sectors. Child-friendly local governance refers to both 'a principle and practice by which all duty-bearers of children's rights are able to progressively ensure that every child within their area of jurisdiction is fully able to enjoy their rights for survival, development, participation and protection' (ibid., 13).

Inspired by Kerala's good practices, several other states have followed suit to make CFLG a reality. Another positive impetus to advancing CFLG is a special award titled 'Child-friendly Gram Panchayat Award' that has been instituted by the Ministry of Panchayat Raj since 2012 in recognition of Gram Panchayat's work in achieving holistic child development. The award seeks to encourage local governments to create a conducive environment for child-centred policy making (NIRDPR-UNICEF-CRRU 2021).

- **Odisha**: In the *State Disaster Management Policy*, integrating disaster management in school curricula is one of the activities in the pre-disaster phase, while trauma counselling for children is one of the activities during the disaster response phase (Orissa State Disaster Management Authority 2005). According to the

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[17] In fact, this is a common gap in India. SAPCCs have not articulated the roles of local government at the municipal, district and gram panchayat (village) level (IBP & UNDP 2018).

State Disaster Management Plan, disaster management themes have been included in the school curriculum (Odisha State Disaster Management Authority 2017). The *Odisha State Action Plan on Climate Change* for 2018 to 2023 includes no reference to the education sector, except for changing school timetables in relation to heat wave and to building capacities of students and teachers within the community-based disaster risk reduction framework (Government of Odisha 2018). The Odisha Education Department has developed its *Disaster Risk Reduction Plan* with safety components. All schools in Odisha have been asked to develop the school disaster preparedness plans (Odisha State Stakeholder FGD).

The Government of India *National Education Policy 2020* acknowledges climate change together with increasing pollution and natural resource depletion as major challenges facing the country. In the *Policy*, climate change curriculum integration is mentioned only for higher education, professional education and academic research. The *Policy* very briefly touches upon 'environmental awareness, including water and resource conservation' as one of the capacities which students should develop through the school education (Ministry of Human Resource Development 2020).

According to the U-Report survey conducted for this study, 47 per cent of Indian youth respondents consider that the government should be taking more action to address climate change, followed by children (29 per cent) and business (11 per cent) (See *Box 2*). The figure for action by children is the highest among eight countries surveyed in this study, which indicates that the Indian respondents are more likely to recognize an active role to be played by young people themselves. 68 per cent of Indian youth respondents also think that it is at least 'likely' that the government will take action to address climate change in the wake of the COVID-19 pandemic (Lopez Rello & Ackers 2021).

BOX 2. UNICEF ROSA U-Report: Who should be taking the most action to address climate change? (n= 1,206 in India; n= 13,532 in the region)
(Lopez Rello & Ackers 2021, 21)

Response	Governments	Businesses	Parents
	Children	Teachers	Other

Overall

India	47%	29%	11%
Region	62%	18%	11%
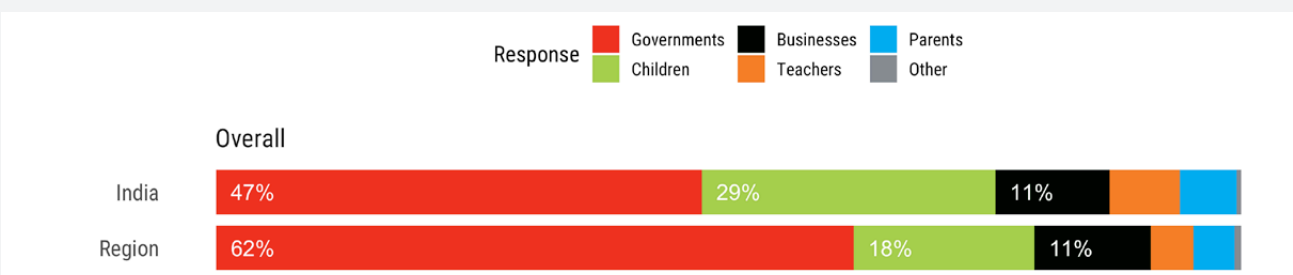
4.2. Finance

The *National Education Policy 2020* highlights the government commitment to 'a substantial increase in public investment in education' by the central and all state governments so that it reaches 6 per cent of GDP[18]. In terms of the *Policy*'s financial support on 'various critical elements and components of education, there is no mention of climate change risk reduction and resilience building (Ministry of Human Resource Development 2020).

Overall data was not obtainable allowing for a comprehensive analysis of climate change-related financial aspects of the education system at national level and in the three states focused upon in this study. The limited findings include the following:

- School safety and climate change is one of the budget items in the annual education work plan for Odisha (Odisha State Stakeholder FGD)
- School maintenance/rehabilitation costs incurred due to floods and landslides have so far been covered by the local self-government in Kerala but resources are becoming exhausted. Public financing in education need to be improved so that increasing climate change impacts are better addressed (Kerala State Stakeholder FGD).

More widely, gathering detailed climate-specific public finance information is not easy both at national and state levels. At national level there are no delineations of climate change-related budget expenditures. At state level, climate change planning and financing is at an early stage. A clear framework for mainstreaming climate objectives in the budget is lacking and the capacity of state governments to embed climate change concerns into planning and budgeting processes is limited (IBP & UNDP 2018). State governments are heavily dependent on central government fiscal transfers. On average, states raise only 45 per cent of their own revenue from sources under their jurisdiction. There is a wider disparity concerning state fiscal autonomy. There is no dedicated budget line in the central funding to *State Action Plans on Climate Change* (Pillai & Dubash 2021).

4.3. Curriculum, Teaching and Learning

The formal education system in India has a long history of environmental education. The 1986 *National Policy of Education* highlights the importance of integrating environmental awareness into educational processes at all stages of education. Following the 1991 Supreme Court judgement, environmental education has become mandatory at all levels in the formal education system in India (Sharma & Menon undated). The 2005 *National Curriculum Framework* (NCF) suggests infusing the components of environmental

education into different subjects by ensuring adequate earmarked time (NCERT 2005a). Through environmental education, students are to be exposed to the 'real-life world, natural and social, in which they live' and should have opportunities to 'analyse, evaluate and draw inferences about problems and concerns related to the environment'. Through environment education, students are expected to understand environmental issues as well as to take 'positive environmental actions' to realize sustainable development (NCERT 2005b, 2-3).

As per the 2005 NCF, the National Council of Education Research and Training (NCERT) recommends the following for teaching environmental education in the school curricula:

- Grades 1 and 2: Integrate environment-related concerns in core subjects such as *Language* and *Mathematics*
- Grades 3 to 5: Teach environmental education in a separate curricular area, *Environmental Studies*, with a dedicated textbook (*My Environment*). Environmental concerns and concepts are integrated in *Science* and *Social Science*
- Grades 6 to 9: Integrate environmental education primarily in *Science* and *Social Science*
- Grades 9 and 10: Teach environment education as an integrated strand or through separate subjects
- Grades 11 and 12: Integrate the concepts of environmental education into the multiple subjects such as *Biology*, *Chemistry*, *Physics*, *Geography*, *Economics*, *Sociology* and *Political Science;* Also teach environmental education as part of project-based learning. (NCERT 2005b, 2017; Sharma & Menon undated).

At the time of this research NCERT is developing the new *National Curriculum Framework,* one each for pre-primary education, school education and adult education (including parents), while the National Council of Teacher Education (NCTE) is developing new pre- and in-service teacher education framework (Jebaraj 2020). It is anticipated that the 'environment', 'technology' and 'life skills' will be strongly featured in the new curriculum frameworks (National Stakeholder 1).

In the U-Report, 63 per cent of Indian youth respondents (n= 2,716) report that they are unable to explain what climate change and global warning are about. 54 per cent of the youth respondents (n= 1,597) state that they have learned about climate change through *Geography* lessons and 20 per cent through the *Science* lessons, while 9 per cent of respondents claim that they have not learnt about climate change at school (Lopez Rello & Ackers 2021).

In each of the three states focused upon in this study, climate change-related curriculum development has taken its own unique trajectory.

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[18] The current public expenditures on education is around 4.43 per cent of GDP (Ministry of Human Resource Development 2020).

In the case of Bihar, predicated on an earlier school safety pilot programme, the Chief Minister (Mukhyamantri) School Safety Programme (CMSSP) was launched in 2016. Its main aims include making school premises a safe place from all hazards, integrating disaster management in the education system and empowering children as change agents on DRR and climate change. CMSSP covers all schools in Bihar, i.e., more than 80,000 schools consisting of government schools, government aided schools, residential schools, Madrasa and Sanskrit schools and private schools reaching approximately 30 million children across the state (BEPC *et al.* undated). CMSSP is being implemented by the Education Department including the Bihar Education Project Council (BEPC) and the State Council of Education Research and Training (SCERT). The programme is being technically assisted and guided by the Bihar State Disaster Management Authority along with the Disaster Management Department, UNICEF and several other departmental partners.

Integrating DRR and environment-related topics in the curriculum and textbooks is one of the key CMSSP components. The State Council of Education Research and

Training (SCERT) is the focal agency and it works closely with the Bihar Education Project Council and the Bihar State Disaster Management Authority. DRR and environment-related topics have been included in different subjects from Grade 2 onwards, using stories and examples of recent disasters in Bihar (*ibid.*). Participants in the Bihar teacher FGD report that a booklet covering the topic of climate change (*Environment and Us*) is available for Grade 2 to 5 students and that the *Environmental Science* subject (Grade 6 to 9) covers a topic of climate change using various case studies and stories. In Grade 9 and 10, DRR-related topics appear in various textbooks, for instance:

- Grade 9: Introduction to disaster management; disasters caused by human errors; eradication and control of common disasters; community-based disaster management
- Grade 10: Introduction to natural hazards; natural hazards and management (floods and drought); life-saving skills during emergencies; disaster mitigation (BEPC et al. undated, 15).

The Safe Saturday Programme is another CMSSC component. It aims at building student knowledge, life skills and confidence necessary to better prepare for any disaster situation. Students participate in this compulsory programme during the second half of every Saturday and follow the weekly topic as indicated in the knowledge and life skills building Wagon Wheel diagram (see *Figure 1*).

The topics in the Wagon Wheel diagram are chosen and organized considering not only the seasonality of natural hazards (e.g., heat wave, cold wave, flooding, thunderstorms) but also a wide range of issues concerning which children in Bihar feel uncomfortable and unsafe (e.g., hygiene and cleanliness, diseases such as diarrhoea, child protection issues such as child marriage). Very importantly, the Safe Saturday Programme employs a peer-to-peer learning approach. In every class two students with good communication skills are chosen and trained by the programme focal teachers. Trained students, in turn, train other students as 'peer educators', while teachers play a facilitative and supportive role. A female participant in the Bihar teacher FGD points out that in this child-friendly and child-centred programme, 'children are leading the processes, not the teachers.' She goes on to say that:

> Children identify risks and vulnerabilities and lead the school planning process. Children participate in every and each step that has helped build their confidence. Even in the schools where teachers are not active, the programme works very well as children take a leadership role!

Another important feature of the Safe Saturday Programme concerns school and community links. Children and teachers engage with the community. In the words of another female teacher attending the FGD, 'children learn beyond the school boundaries.' Teacher FGD participants have witnessed that parents and community members began to follow what children say and both children and community members have augmented confidence about being more prepared for disasters. Student FGD participants display their sense of pride in taking a change agent role. A female student affirms that 'we should not keep this learning to ourselves. We should keep sharing it with our parents, siblings and community people!' In the words of another female student, 'Many places are flooded due to soil erosion, which is a big issue. We should promote tree and mangrove plantations to prevent soil erosion. Children can do these as change makers!'

In Kerala in the aftermath of the devastating 2018 floods and landslides, the State Council of Education Research and Training (SCERT) supported by UNICEF took swift action

to integrate long-term disaster mitigation and management measures as well as life skills and psychosocial care into school lessons by updating the textbooks (Kerala State Stakeholder FGD; Salian 2018). UNICEF also supported the Education Department to develop and publish life skills education materials, titled *Ullasaparavagal* in Malayalam (meaning 'Blue Birds' in English) for Grades 1 to 12.[19] A male student at the FGD confirms that he and his peers have become more familiar with flood risk reduction as the 8th, 9th and 10th textbooks now include flood-related topics. Teachers in the FGD note that after having first-hand experience of flooding, it is easier for their students to engage with the flood-related topics included in the textbooks.

See *Box 3* for an indicative list of DRR and climate change-related topics in secondary *Social Science* textbooks.

BOX 3. DRR and Climate Change-related Topics in the Social Science Textbook in Kerala: Indicative List

Textbook Chapter Titles (Topics)
Grade 8
- In Search of Earth's Secrets (Soil conservation)
- As the Torrential Rains Poured Down (Human and economic impacts; Land use-related issues)

Grade 9
- Blanket of the Earth (Global warming)
- Water on Earth (Water conservation)
- Sun, the Ultimate Source (Atmospheric parameters)
- For a Safer Future (Disaster management and mitigation measures)
- Ocean and Human (Influence of ocean on climate)

Grade 10
- Seasons and Time (Movements of the sun and seasons)
- In Search of Source of Wind (Influence of temperature on winds)
- Ice in the Sky and Analysis of Information (GIS and its use in climatic change)

(Kerala Teacher FGD follow-up communication)

A male teacher attending the FGD reports that while volunteering in flood and landslide affected areas, he created videos and took some photos. He later used them in his *Social Science* lessons to raise student awareness of climate change and disasters. Such resources created by teachers (e.g., videos, photos, audios) can be uploaded and

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[19] It covers life skills such as: negotiation, decision making, critical thinking, creativity, problem solving, participation, empathy, resilience, communication and self-awareness.

Figure 1. Wagon Wheel Diagram
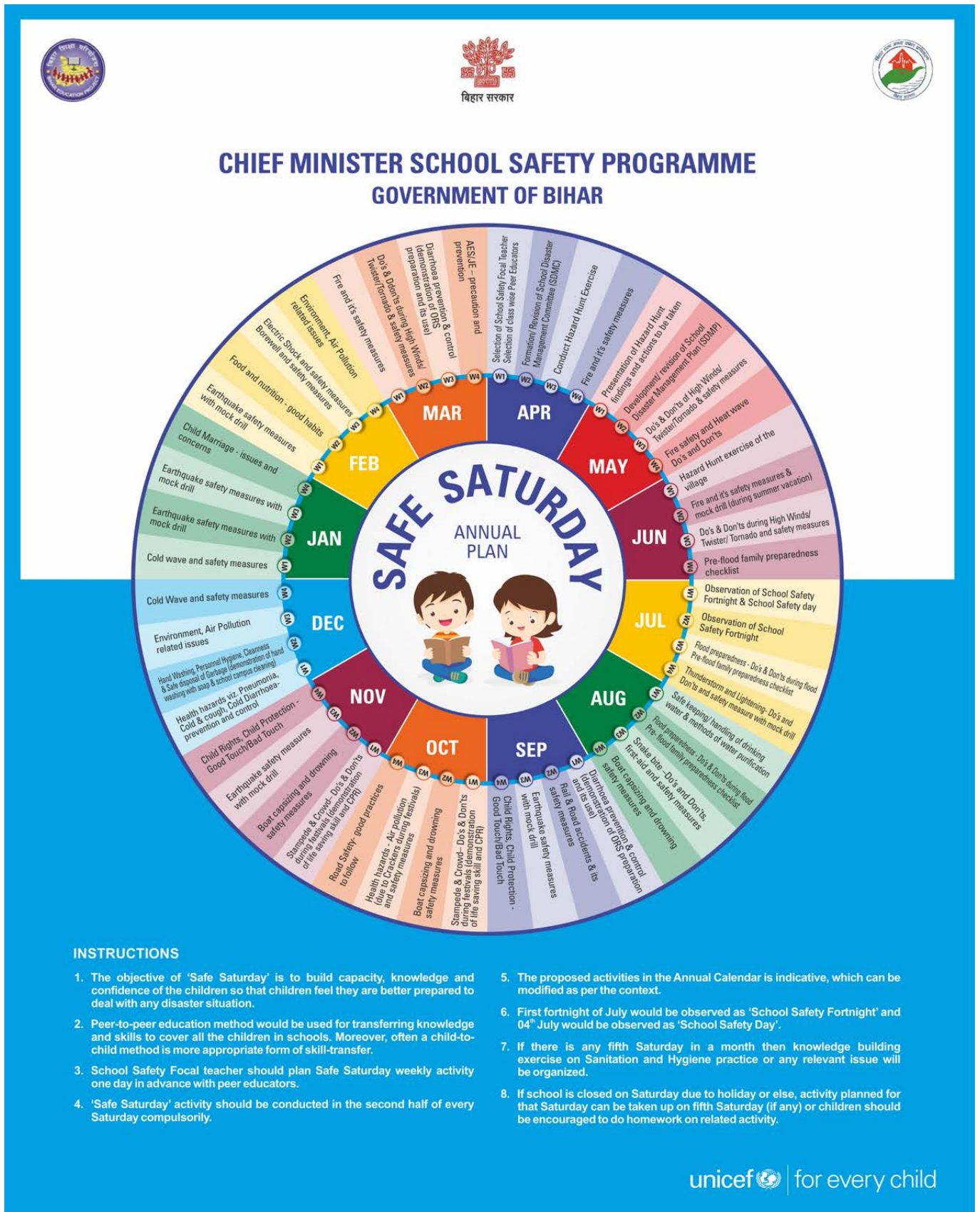
shared widely through the SCERT's teacher-student online portal, SAMAGRA[20], a repository of digital resources of all subjects from Grades 1 to 12.

In the case of Odisha, school syllabuses, textbooks and supplemental materials for Grades 1 to 10 have integrated thematic areas, such as environmental protection, natural resource conservation and disaster management (UNICEF Odisha undated a). In particular, *Science* textbooks have integrated climate change and seasonality of various hazards. See *Box 4* for some examples of DRR and safety-related topics in the curriculum of Odisha.

BOX 4. Odisha: Disaster and Safety-related Topics in the Curriculum: Indicative List	
Subjects	**Topics**
Environmental Science	**Grade 4** Disaster and safety (heat waves, lightning)
Environmental Science	**Grade 5** Disaster and safety (cyclones, earthquakes)
Science	**Grade 7** Natural hazards (super cyclones)
	Grade 8 Natural hazards (lightning, thunder storms)

(UNICEF Odisha undated b)

A male teacher educator in the FGD points out that while DRR and climate change-related topics exist in Grade 1 to 10 textbooks in Odisha, they are 'not continuous, not step-by-step.' He goes on to say that only enthusiastic teachers implement co-curricular activities concerning climate change at school. In his view, such activities should be made mandatory and climate change-related topics should be more systematically integrated in the school syllabuses and textbooks in Odisha so that every child can fully benefit.

In the context of the on-going COVID-19 pandemic, the State Council of Ministers in Odisha has passed a resolution to include disaster and pandemic management in the high school and college curriculum as well as to develop systematic training programmes to enhance citizens' capacities for disaster and pandemic management. This strong government commitment to making Odisha disaster-ready, whether the disaster be biological or climatic (Bisoyi 2021) is likely to create momentum in progressing DRR/climate change school curriculum development.
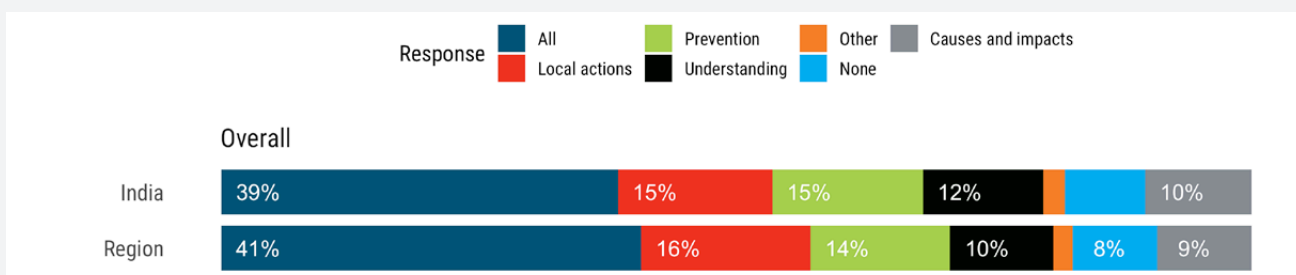
When asked about what they most wanted to learn about climate change in the U-Report, 39 per cent of Indian youth participants (n=1,782) report that they would like to learn all aspects of climate change, followed by learning about local actions (15 per cent) and learning about climate change prevention measures (15 per cent). However, 8 per cent of the respondents report that they have no interest in learning anything about climate change (see *Box 5*).

Some student FGD participants report that they would like to gain more detailed knowledge of climate change and how to cope and live with the changing climate (Bihar Student FGD) while others would like to have opportunities to practice what they have learned in the classroom and reach out to wider society and make positive changes (Kerala Student FGD). Asked what they would like to do were they Minister of Education so as to help children and young people contribute to positive actions in tackling climate change challenges, students were keen to share their visions (see *Box 6* for some examples of student remarks).

The practical, creative and action-oriented learning students are calling for is in line with the *National Education Policy 2020* which suggests moving away from the prevailing

BOX 5. UNICEF ROSA U-Report: What do you most want to learn about climate change? (n=1,782 in India; n=18,266 in the region)
(Lopez Rello & Ackers 2021, 18)

Response — All, Local actions, Prevention, Understanding, Other, None, Causes and impacts

Overall

	All	Local actions	Prevention	Understanding	Other	None	Causes and impacts
India	39%	15%	15%	12%			10%
Region	41%	16%	14%	10%		8%	9%

BOX 6. If I were the Minister or Education …

I would like to implement a massive tree planting initiative involving children and make my state known as a green state. I will promote creativity among children through painting, drawing, or other events so that more and more people are engaged in learning about climate change in a creative way (Lakshmi, Grade 8, Bihar).

I would like to start a committee under the leadership of the students in our state. We consult and gather student opinions about climate change and conserve the environment in the local areas. We can provide pamphlets and books about environmental conservation for the students. We can start an environmental movement - like the Chipko Movement and Green Revolution in India - under the leadership of the students (Saina, Grade 10. Kerala).

I would like to include a lot of environmental topics in the school curriculum and ensure they are actually implemented. All students should learn about and implement 'reduce, reuse and recycle'. Through social media I will promote environmentally friendly actions and tree planting among students. I will also implement environment-related competitions at school (Parabi, Student Teacher, Odisha).

'culture of rote learning' to more experiential learning (Ministry of Human Resource Development 2020, 12). Prescriptive learning focused on memorization and an inadequate connection between school learning and learning outside the school are identified as key shortcomings of environmental education (NCERT 2005b).

4.4. Teacher Capacity Development

The 2009 *National Framework of Teacher Education* highlights the need of urgent and comprehensive reform of the teacher education as a whole. A severe shortage of qualified teachers and teacher educators, the rapid proliferation of sub-standard private teacher education institutions, and heavily didactic and theoretical training courses are some of the key issues highlighted (NCTE 2009). While climate change is not specifically mentioned in the *Framework*, it indicates 'equitable and sustainable development' as one of the contemporary concerns that should inform teacher education reform. Recognising that the current ecological crisis is caused by 'extremely commercialised and competitive lifestyles', the *Framework* importantly notes that both teachers and students should be educated to change their consumption patterns and to use natural resources more sustainably.

Available data have revealed the varied status of climate change-related teacher education as follows:

- **Bihar**: DRR components have been integrated in existing teacher-training programmes such as the Diploma in Elementary Education and other regular in-service capacity building programmes. DRR and climate change topics have also been integrated in the induction training and on-the-job training of all the teachers serving the Government of Bihar and more than 76,000 teachers have so far been trained on the topics. Under the Chief Minister School Safety Programme, a cascade mode of teacher training programme has been developed and implemented at state, district, block and cluster/school levels. Key topics covered in the cascade training include disaster and climate change in Bihar, rationale for and concepts of the School Safety Programme and Safe Saturday Programme, risks and hazards around school, school disaster management planning, DRR curriculum integration and mock drills (BEPC *et al.* undated).

- **Kerala**: There are various in-service teacher-training programmes provided by a number of institutions in Kerala (e.g., the State Council of Education Research and Training, the Institute of Climate Change Studies, the Indian Institute of Science Education and Research, the Indian Institute of Information Technology and Management). However, limited time availability for teacher training and multiple demands placed upon teacher training from different thematic areas mean that climate change-focused training opportunities have been sporadic (Kerala Stakeholder FGD).

- **Odisha**: A few tools on school safety have been developed and endorsed by the Education Department. They include the school safety guidelines and checklists and the *INEE Minimum Standards for Education* adapted for Odisha. These tools have been widely disseminated among teacher education institutions and teachers. Teacher orientation sessions on these tools have been provided from time to time (Odisha Stakeholder FGD).

Teacher FGD participants in Bihar and Kerala commonly calls for an online platform where teachers and students can share their own climate change-related experiences and good practice examples with their peers in other schools inside or, indeed, outside of India.

## 4.5. Communication, Coordination and Partnership

The Ministry of Environment, Forest and Climate Change (MoEFCC) is the nodal Ministry for planning, promotion, coordination and oversight of the implementation of the

government's environmental, forestry and climate change policies and programmes. It approves the *State Action Plans on Climate Change* (MoEFCC 2021a; IBP & UNDP 2018). Chaired by the Prime Minister, the Prime Minister's Council on Climate Change oversees and monitors the implementation of the *National Action Plan on Climate Change* and it coordinates responses to climate change issues at the national level. The 18-member Council does not include Minister of Education representation (Menon 2014).

At the state level, there is a nodal department tasked with addressing climate change-related issues and coordinating with other line departments. The name of the department is slightly different from state to state (e.g., the Environment, Forest and Climate Change Department in Bihar, the Department of Environment and Climate Change in Kerala, the Forest, Environment and Climate Change Department in Odisha). Details of how each of the climate change nodal department coordinates and collaborates with the respective Education Department have not been unearthed.

In contrast, cross-sectorial coordination and collaboration mechanisms involving the education sector are better established in DRR. Further to the *Bihar DRR Roadmap*, 27 line departments/agents have been working in 'a convergent manner' for DRR/climate change/resilience-building actions (Bihar State Stakeholder FGD). In Odisha, the Odisha State Disaster Management Authority plays a strong coordination role working with all the departments and relevant partners (Odisha State Stakeholder FGD). Similarly, in Kerala, there exists an established disaster management coordination mechanism that reaches to the decentralized local self-government level. Its well-acclaimed local self-governments structure is yet to establish concrete steps for dealing with climate change (DoECC 2014; Kerala State Stakeholder FGD).

See *Box 7* for Kerala state's ongoing community-based carbon-neutral panchayat initiative involving multiple stakeholder groups and partners.
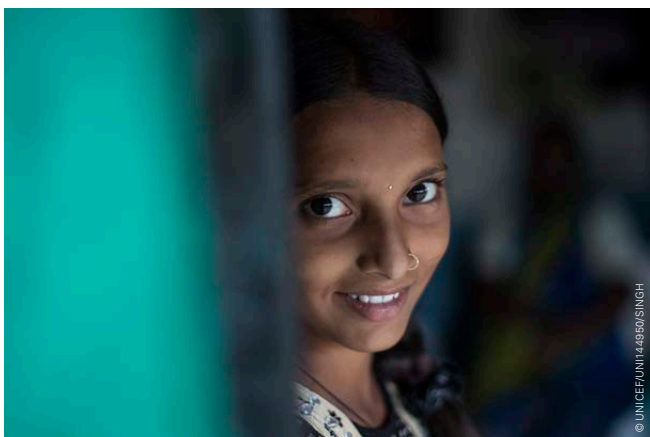
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BOX 7. Carbon-Neutral Wayanad, Kerala

Wayanad district in Kerala is one of the major climate change hotspots in Kerala. Launched in 2016 in the Meenangadi panchayat of Wayanad district, the Carbon Neutral Panchayat Project is Kerala state's flagship innovation to create a model carbon-neutral panchayat that other panchayats in Wayanad district and rest of the country could follow.

The project aims at achieving low carbon development involving all sectors at the local self-government level. With technical assistance from a Kerala-based NGO, Thanal, this project has been a collective effort involving local self-government, youth clubs, students from various educational institutions, Kudumbashree (women's self-help groups), research institutions, various experts and local volunteers with the support of District Administration and Government of Kerala.

After conducting detailed greenhouse gas emission and carbon sequestration analysis, the Meenangadi panchayat set targets to reduce greenhouse gas emissions and increase carbon sink capacity to neutralise excess carbon emissions. The annual plans for the local government were the main instrument to achieve the targets and various projects have been undertaken, including waste management, water resource preservation and tree planting. In the period 2017-19, some 400,000 trees were planted. With a grant from the state government, the 'tree-banking scheme' provides financial incentives for farmers who plant and protect trees. Importantly, trees planted in Meenangadi were well chosen by the state government so that they are environmentally and socially beneficial to the area.

The Kerala Institute of Local Administration's training on climate change for elected panchayat representatives highlights actions in the Meenangadi panchayat to inspire leaders of other panchayats to opt for similar change.

The Meenangadi panchayat is well on the way to realizing its target of becoming India's first carbon-neutral panchayat by 2027.

(Nidheesh 2021; Thanal 2018; Warrier 2017).

4.6. School/Community Student Participation Platforms

This study has come across multiple co-curricular and non-formal education platforms through which students can engage with pro-environmental and climate action.

According to teacher and student participants in Kerala FGDs, examples include school clubs (e.g., eco/nature clubs, water clubs, school safety clubs), awareness raising activities (e.g., street drama, photo exhibitions, public rallies), celebration of the special environmental days, tree planting, school gardens, school biodiversity parks, 'SeasonWatch'[21] with some support provided by local self-governments. A female student affirms that 'from elementary to high schools, many activities that make students aware of climate change and environmental change exist. We make other children and the elders know about these issues. We are making small changes!'

Through the above-mentioned Chief Minister School Safety Programme, students in Bihar have ample engagement opportunities – identifying hazards, being involved in school development planning and implementation, conducting awareness raising among their peers, families and community members. A female teacher in the FGD reports that having been empowered by the programme, students in her school have started their own initiatives to tackle the issues they have identified. A 'soap bank' and a 'sanitary pad bank' at school are two such examples of child-led initiatives. Students collected soap and sanitary pad donations on their birthday or festivals from child and adult members of the school and village and made them freely available for those children who need them. The 'sanitary pad bank' also gives an opportunity for girls in addressing menstrual hygiene, taboos and myths around menstrual hygiene management. In the context of the COVID-19 pandemic, students have also initiated a 'mask bank'. The masks are provided to children who can't afford one and so come to school without mask.

In Odisha, a state-wide annual children's festival involving some 5,000 children provides a fun and creative engagement opportunity to raise awareness on a chosen theme (e.g., environmental protection) using child-friendly performances, debates and competitions (Odisha State Stakeholder FGD).

Other existing school and youth programmes such as School/Child Cabinets (i.e., elected student governments), *National Service Scheme* (NSS)[22] and *Nehru Yuva Kendra Sangathan* (NYKS)[23] can be explicitly galvanised behind climate change learning and action. The Ministry of Education's WASH award scheme, the *Swachh Vidyalaya Puraskar* (see *Section 3.1*) can integrate climate change mitigation and adaptation components more prominently. The National Adolescent Health Programme[24] of the Ministry of Health and Family Welfare is another avenue for embedding climate-related issues and considerations.

According to the U-Report survey conducted for this study, 84 per cent of Indian youth respondents express that they would like to do something to address climate change with necessary support. 'Joining an organization that addresses climate change' is the most dominant wish expressed (25 per cent) followed by 'teaching own community the impact of climate change' (22 per cent) and 'starting an organization that addresses climate change' (15 per cent). However, 16 per cent of the respondents do not consider that they can do anything or need to do anything (see *Box 8*).

BOX 8. UNICEF ROSA U-Report: If you had the necessary support, what would you like to do to address climate change in the future?
(n=985 in India; n=11,607 in the region)
(Lopez Rello & Ackers 2021, 26)

Response		
■ Teach community	■ Join organization	■ Get involved to address climate change	■ Don't need to do anything
■ Start and organization	■ Help community suffer less	■ Don't think I can do anything	

Overall

	Teach community	Start and organization	Join organization	Help community suffer less	Get involved	Don't think I can do anything	Don't need
India	22%	15%	25%	13%	9%	9%	
Region	24%	16%	28%	15%			

[21] SeasonWatch is an Indian-wide citizen science programme on phenology. It studies the changing seasons by monitoring the annual cycles of local trees. For further information go to: <https://www.seasonwatch.in>

[22] NSS provides youth (i.e., Grade 11 and 12 school students, students at Technical Institutions, graduate and post-graduate students at the college and university level) of practical experience in various government-led community service activities and programmes (Ministry of Youth Affairs and Sports 2018).

[23] NYKS is a large network of village youth clubs. It promotes youth action and leadership at the grassroot level in rural areas (Ministry of Youth Affairs and Sports 2012).

[24] National Adolescent Health Programme (*Rashtriya Kishor Swasthya Karyakram*, RKSK) comprehensively addresses the health needs of an approximately 243 million adolescent population (10-19 years old) focusing on sexual and reproductive health, nutrition, mental health, injuries and violence, healthy life styles, gender equality. It employs community-based interventions through peer education (Government of India 2021).

See *Box 9* for a few examples of noteworthy child and youth engagement opportunities aiming to raise awareness of climate change and to have young people exercise their agency in pursuance of positive change. It should be noted that there are many more examples in India[25]. To include an exhaustive list lies outside the scope of this study.

BOX 9. Child and Youth Engagement and Action

The Environmental Education, Awareness and Training (EEAT) Scheme

The Environmental Education, Awareness and Training (EEAP) scheme is an initiative by the Ministry of Environment, Forest and Climate Change aimed at promoting student awareness and participation in environment conservation. Key programmes under this scheme includes the following:

- The *National Green Corps 'Ecoclub' Programme* aims at sensitising students about nature and developing pro-environmental attitudes by engaging them in practical activities especially towards local environmental conservation. Since 2001, about one million ecoclubs have been created across the country and thus potentially creating cadres of students focussed on environmental protection. Ecoclub members are engaged in activities such as solid waste management, plantation, cleaning of the local environment and celebration of important environmental days at schools such as World Environment Day and Earth Day, among others.

- The *National Nature Camping Programme* provides ecoclub students and teachers nature immersion and experiential learning opportunities through camping for two to three days in nature (e.g., national parks, nature reserves). It is considered that this programme has the potential to trigger the sensitivity and appreciation towards nature, leading to positive environmental action.

- Targeting school and college students and teachers of Ecoclubs, the *Capacity Building Activities* provide training opportunities focused on various thematic areas (e.g., biodiversity, conservation, waste management, climate change mitigation and adaptation, pollution control).

(MoEFCC 2019, 2021b)

Green Skills Development Programme (GSDP)

The Green Skills Development Programme (GSDP) launched by the Ministry of Environment, Forest and Climate Change in May 2018 is a skills development programme for India's youth in the environmental and forestry sectors. Over the three years, it aims at skilling approximately 560,000 youth so that they will become 'green skilled workers' with technical knowledge and commitment to creating a more sustainable and greener future. They are expected to contribute to achieving India's national goals such as the Nationally Determined Contributions and Sustainable Development Goals. GSDP offers 35 certificate courses covering diverse areas such as pollution monitoring, waste management, forest management, water budgeting and biodiversity conservation, among others. The courses are offered through a network of 66 Environment Information Systems Centres across the country. The youth who successfully complete the course(s) are more likely to gain employment and pick up self-employment opportunities. For instance, those who successfully completed a 3-mounth biodiversity conservation course are qualified as skilled biodiversity conservationists (Aggarwal 2018; MoEFCC undated).

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[25] UNICEF India recently conducted a survey with stakeholders from nearly 60 organizations working on climate change, environmental and sustainability education for youth in India. Out of nearly 60 organizations surveyed, it found that 25 organizations run on-the-ground and high impact programmes (UNICEF India 2021).

Youth Climate Action and Advocacy Groups

There has been the rise of youth climate action and advocacy groups in India. Established in 2008, the *India Youth Climate Network* (IYCN) is India's largest youth network aimed at empowering youth to take effective action to combat climate change and make youth voice heard in decision making processes at local, state, national and international level (IYCN 2020).

By 2019, *Fridays for Future (FFF) India and Extinction Rebellion* (XR)[25] emerged in multiple locations in India and they have regularly organised climate strikes and marches. The former is the Indian chapter of the global campaign, Fridays for Future[26] and has 60 local chapters across the country, while the latter currently has 19 groups in different parts in India. The membership of FFF India and XR varies from 14 years old to the late-20s or older. These groups largely rely on social media platforms to mobilise membership and support for their work (Adve 2021).

The Green School Programme

The Green School Programme run by a New Delhi-based CSO, Centre for Science and Environment (CSE), is an environmental education programme focused on rigorous annual school environmental audit exercises. Approximately 6,000 schools across India are part of the CSE's Green Schools network. Participating students collect a wide range of information under six categories: air, energy, food, land, water and waste to gain a holistic picture of resource consumption and efficiency at school. In 2018-2019, conscious efforts were made to link the six categories to climate change and 1,704 schools submitted complete school audit reports. Out of these, 172 were selected for the Climate Change Awards for 2019. This audit exercise helps the schools minimise the resource footprint of the school premises (Centre for Science and Environment 2021).

4.7. Monitoring, Evaluation and Accountability

The school education system in India is one of the largest in the world with more than 1.5 million schools. Since the early 1990s there have been efforts to gather credible information on the education system in order to better design interventions for further improvement. The United District Information System for Education Plus (UDISE+) introduced in the academic year 2018-2019 collects information from all schools from pre-primary to higher secondary levels across India through its digital platform. Uploading the data using the online UDISE+ form is mandatory for schools and this can be done at the school level or the block level. The UDISE+ form consists of 11 sections, including one on school safety (Ministry of Education undated). Some data captured through the UDISE+ system (see *Box 10*) can be used as proxy indicators to monitor climate change impacts and/or school actions to address climate change impacts.

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[26] Launched in the United Kingdom in 2018, Extinction Rebellion is an international movement to demand governments to act justly and urgently on the climate and ecological emergency. The movement has a presence in 75 countries including India. For more information go to: https://extinctionrebellion.uk

[27] Fridays For Future is a global movement started in 2018 after a young Swedish activist, Greta Thunberg sat every Friday in front of the Swedish parliament protesting against the lack of action on climate crisis. For more information go to: https://fridaysforfuture.org

BOX 10. Climate Change-Relevant Indicators In UDISE+ [27]	
Section/Information	**Indicators**
Section 1: School Profile	• Availability of all-weather roads to school
Section 2: Physical Facilities and Equipment	• Availability of hand washing facilities with soap • Availability and functionality of drinking water (also information on main source of drinking water; availability of water purifier, the existence of water quality test) • Availability and functionality of rainwater harvesting facilities • Availability and functionality of solar panel(s) • Availability of a kitchen garden
Section 10: Performance Grading Index (PGI) 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 non-structural safety audit • Existence of a nodal teacher for school safety • Regular student and teacher training for school safety and disaster preparedness • Availability of disaster management teaching through the curriculum • Implementation of the following: sensitizing parents; generating awareness for students and community; installing safety suggestion/complaint box in the school; providing copies of safety guidelines to the students

During the time of research, most of the data indicated in *Box 10* are not available from the UDISE+ website. It is not clear if and how the data gathered has informed education sector policy making in general and climate change risk reduction in particular.

A child tracking system (*Bal Panchi*) maintained by each school in Bihar consists of the basic data of children (e.g., name, date of birth, parent names, address) up to 14 years of age. The information is gathered by the teachers and maintained by the head teachers. Students might move with parents or alone due to drought or floods or other reasons. This system can capture the information of children moving from one place to another within the state (Bihar State Stakeholder FGD). Considering the increasing level of child migration seasonally and permanently this provides useful information to ensure education continuity of migrant children. It is not clear whether the data concerning child migration within the state has been used to inform state education policy making. Nor is it clear if and how the data concerning child migration across states are monitored.

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[28] For Data Capture Format for UDISE + 2020-2021, go to: <https://udiseplus.gov.in/#/Download>

Section 5
Discussion and Recommendations

Box 11 below synthesises the perspectives of national and state-level stakeholders participating in this study.

It indicates the overall strengths and weaknesses of the education system's response to climate change in India as well as opportunities presented and threats/obstacles to be faced.[29]

The recommendations put forward in this section are primarily for education authorities at national and state-level and their partners.

BOX 11. Education System Response to Climate Change in India: National and State-level Stakeholders' Perspectives

Strengths

- National Policy Frameworks (e.g., *National Action Plan on Climate Change, National School Safety Policy Guidelines*)
- Various school level platforms for climate change learning and action
- A very strong and functioning education system, strong CSOs and a high level of community participation in development matters; strong community ownership of schools (Kerala)
- Devolved local self-governments with resource allocation powers; Child-friendly Local Governance (Kerala)
- Disaster preparedness included in the textbooks and supplementary materials (Odisha and Bihar)
- An annual state-wide children's festival (Odisha)
- A strong DRR coordination mechanism by the Odisha State Disaster Management Authority (Odisha)
- A comprehensive *DRR Bihar Roadmap* and the Chief Minister School Safety Programme (Bihar)
- Annual state-wide School Safety Day celebrated on 4 July every year (Bihar)
- Annual review of the *DRR Bihar Roadmap* implementation by Chief Minister and all the departments including Education (Bihar)

Weaknesses

- Inter-ministerial collaboration and convergence
- Lack of climate change impact data (including gender-specific data) at the school level
- Lack of systematic climate change curriculum integration
- Lack of contextualized climate change learning resources (especially for rural and non-English speaking youth)
- Ineffective implementation and monitoring of the climate change-relevant programmes
- Low teacher capacity
- Insufficient psychosocial support for students impacted by climate change
- Weak systems/mechanisms to address climate change issues in a timely and coordinate manner through the local self-government bodies (Kerala)
- Reaching out a large number of schools in the state (Odisha)
- Climate change not being prioritised in the education sector (Odisha, Kerala)
- Lack of proactive emergency planning by the Education Department to ensure education continuity in the face of hazard/disaster (Bihar)

Opportunities

- The *National Education Policy 2020*
- Mandatory status of environmental education providing an opportunity to integrate climate change considerations in the curriculum
- Recent upsurge of youth climate change activism globally
- Convergence between education, health, nutrition, child protection and WASH sector interventions focusing on children most vulnerable to multi-faceted climate change impacts
- Active CSOs, faith-based groups, specialized institutions, networks (e.g., Kerala Institute for Local Administration, the institute of Climate Change Studies) working in the field of climate change (Kerala)
- Integration of the *State Disaster Management Plan* and the *State Climate Change Action Plan* and implement them as one (Kerala)
- Coastal community's demand for urgent climate action (Kerala)
- Hazard/disaster events pushing the climate agenda forward (Kerala)
- Private donation for development work (Kerala)

Threats/Obstacles

- The increasing number and intensity of disasters (happening with more regular pandemic incidents)
- Overcrowded curriculum with less space to integrate all the necessary climate change related themes and topics holistically

[29] Note: SWOT entries indicate participants' own placement of ideas but some entries are open to different interpretation as to where they should be placed.

Climate Change Impact Monitoring and Assessment in the Education System

The United District Information System for Education Plus (UDISE+) is a robust online data collection system for the school sector in India. There are some indicators that can be used as proxy indicators to monitor climate change impacts and school-level responses to them. To capture climate change impacts and actions more comprehensively, further indicators should be developed and built into the UDISE+. It is also important to ensure that the data gathered actually informs policy making at school, district, state, and national levels. Mechanisms and relevant stakeholder capacity should be enhanced in this regard.

Recommendations

- Consult with relevant stakeholders, develop climate change impact and vulnerability indicators and subsequently integrate them into the UDISE+ as appropriate.
- Develop inter-ministerial and inter-departmental collaborative and partnership mechanisms between the education authorities (i.e., Ministry of Education, Department of Education) and relevant government ministries/departments/ agencies with responsibility for climate change, disaster management, health, water and Panchayat Raj with a view to gathering, sharing and analysing climate change impact data as it concerns children and schools.

Policies, Plans and Strategies

In the key national climate change policy documents (i.e., *the National Action Plan on Climate Change*, *India's Intended Nationally Determined Contribution*) the education sector is not identified as a priority sector and the role of the Ministry of Education in achieving the national climate change targets has not been articulated. While the *National Education Policy 2020* has a fleeting reference to climate change, detailed considerations of climate change risk reduction and resilience building in the education sector are yet to be developed.

At the time of research, new *National Curriculum Frameworks* are under development, presenting ideal opportunities to embed climate change considerations

systematically in the school curriculum and in teacher education provision. The *National School Safety Policy Guidelines* document is a significant achievement in creating safe learning environments for children. Concrete steps to address climate-induced slow-onset hazards and shocks constitute an omission from the guidelines. This research has not explored the implementation status of the guidelines.

Without urgent and effective climate action, large-scale internal migration streams triggered by sea level rise, coastal erosion, saline intrusion and drought are most likely to take place in the future, posing significant development challenges. On the issue of climate migration, 'anticipatory development policies that respond to the scale of the issue over the medium and long term' are urgently required in all the sectors, including education. Such policy shifts include providing alternative job opportunities, investing in human capital, making social protection scalable and facilitating informed migration decisions so that vulnerabilities of climate migrants are lessened (World Bank 2018, 7).

At the state level, climate change and DRR-related policy documents reviewed for this study refer to the role of education sector in broad terms. Kerala presents a unique opportunity to advance child friendly local planning as well as carbon-neutral development. Capacity building of local self-government officials for child-friendly local governance (see *Box 1*) and climate change mitigation and adaptation (see *Box 7*) signal that Kerala is very well placed to apply both child-friendly local governance and climate change lenses to local policy planning, implementation and monitoring involving children and young people.

When education access is likely to be disrupted by recurring extreme weather events and oftentimes gradual but sometimes rapid environmental degradation, alternative learning pathways become vital in efforts to ensure education access, retention and quality of learning. During the COVID-19 pandemic school closures, various distance education programmes were developed by the state governments,[30] those not having access to digital devices being supported (e.g., 'Mobile Learning Centres' in Bihar[31]). These programmes help develop standard operating procedures for education which can also be implemented in other emergencies.

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[30] For instance, the Kerala government swiftly developed multiple virtual platforms to ensure learning continuity. Telecast lesson sessions (for classes 1 to 12) through the KITE Victers channel, the education TV channel of the Kerala government, were reinforced by the support of class teachers using social media platforms or phone on a regular basis. The televised classes are also available via YouTube and Samara portal (George 2021).

[31] The Mobile Learning Centre in Bihar, which is run by UNICEF and facilitated by the Government, is an innovative approach to reaching out to and empowering the most marginalized children, especially girls, living in hard-to-reach areas. It is a bus/van equipped with teaching and learning materials in both digital and non-digital forms for different age groups. Reaching out to the community, the Mobile Learning Centre also raises community awareness on available social protection schemes.

Recommendations

- Incorporate climate change risk reduction and resilience building into the forthcoming *National Curriculum Frameworks* and relevant sub-national education policy, strategy and framework documents. In such a process ensure that the needs of children who are most vulnerable are met (e.g., children with disabilities, children from the Scheduled Castes and Scheduled Tribes, children of migrated families, girls).
- Integrate child protection measures into formal and non-formal education programmes to protect children from early marriage, child labour, child trafficking that are on the rise due to the adverse effects of climate change on the household economy. Also integrate education and health interventions more strongly to protect student physical and mental health and wellbeing from the adverse effects of climate change.
- Ensure the climate change adaptation and mitigation are prominently addressed in the *National School Safety Policy Guidelines* rollout at state/UT level.
- Raise awareness of local government personnel on climate change mitigation and adaptation as well as child-friendly local governance.
- Plan to ensure that children who migrate or are displaced by the impacts of climate change have access to education. Plan ahead for education continuity in the likely scenario of large scale migration and displacement due to climate change impacts.
- Integrate the programme and strategy for learning continuity developed during the COVID-19 school closure period in national and sub-national education systems as standard operating procedures for education in emergencies.
- Include climate change mitigation and adaptation criteria in the Ministry of Panchayat Raj's Child Friendly Gram Panchayat Award.

Finance

This study has not obtained sufficient data to analyse climate change-related financial aspects within the education sector both at the national and state levels. A suspicion, and no more than that, is that very little focus on climate change-related budget allocations exist within education sector finance. There should be discussion and consensus on what climate change relevant budget would look like for the education sector in India.

This study has not identified funding mechanisms to address existing disparities in the education sector, either. Further research into and development of such mechanisms

would be beneficial to education sector resilience building since climate change impacts are disproportionately affecting those who are experiencing the most severe multiple disparities.

In Kerala, local self-governments' high level of autonomy in terms of function and funding means that they can carry out comprehensive programmes to build climate resilience capacities in schools and communities in a locally appropriate manner, while ensuring fulfilment of child rights.

Recommendations

- Raise awareness among government personnel at national, state/UT and local government levels regarding the benefits of financing climate change mitigation and adaptation activities in the education sector and cultivate a shared understanding of the lines constituting a climate change education budget and how to utilize them effectively.
- Develop equity-focused budgeting in the education sector both at the national and sub-national levels as part of education sector resilience building in response to climate change.
- Explore ways to better mobilize and share resources among relevant government ministries, departments, agencies and their partners, including CSOs and the private sector, for climate change mitigation and adaptation activities in the education sector. Also mobilize and tap into local government resources as appropriate.
- Explore external climate change funding opportunities (e.g., Green Climate Fund, Adaptation Fund) with a view to filling the current resource gap so enhancing climate resilience in the education system.

Curriculum, Teaching and Learning

As said earlier (see *Section 4.3*), environmental education has a long history in India and is mandatory in the school curriculum. This unique context is highly conducive to integrating climate change mitigation and adaptation-related concerns into the school curriculum. This study has come across some examples of climate change, DRR and environment-related topics in the textbooks and syllabuses in Bihar, Kerala and Odisha, but it is clear that more systematic integration needs to happen.

Future steps should include conducting a comprehensive curriculum audit from climate change risk reduction and resilience building perspectives. Such an audit should be followed by strengthening more systematic vertical and

horizontal (i.e., cross-curricular) age-appropriate integration of climate change-related themes and topics from primary to secondary level, placing a greater emphasis on skills and attitudinal development within a broader life skills context while employing learner-centred active pedagogies. Facing multi-faceted climate crisis, it is vital for students to acquire board life skills to address inter-related issues of child protection, WASH, health and nutrition holistically. They need to develop and hone critical and creative thinking skills, problem solving skills, self-management skills to better cope with difficult emotions and uncertainties, advocacy and leadership skills as well as skills and attitudes disposing them to live in harmony with nature, among others.[32] Integration of climate change into curriculum should build on the lessons learned from environmental education curriculum development and implementation experience. According to UNICEF India (2021), environmental education curriculum in India is dated and theoretical. It lacks focus on behavioural change and does not address the current crisis situation.

In Kerala and Odisha, co- or extra-curricular learning opportunities linked to climate change mitigation and adaptation depend on the enthusiasm and capacity of teachers and schools. In contrast, the state-wide Chief Minister School Safety Programme in Bihar involves all schools (more than 80,000 schools) and its mandatory Safe Saturday Programme provides practical and contextually relevant learning and action opportunities to all school children. By employing a broad view on what safety means, the Safe Saturday Programme opens up opportunities to address inter-related issues of child protection, WASH, health and nutrition holistically. This innovative life skills-based programme combined with its peer-to-peer learning approach provides a low-cost replicable model to tackle multi-faceted climate change challenges by enhancing knowledge, confidence and change agency capacities among students.

In line with the Indian government's vision to adapt a 'climate friendly and a cleaner path' in development and to widely promote a 'healthy and sustainable way of living based on traditions and values of conservation and moderation' (Government of India 2015, 29), students should develop new skills and competencies necessary for contributing to a greener economy, livelihoods and lifestyles. This may include competencies concerning sustainable agriculture, environmental protection and conservation, renewable energy, sustainable waste management, wise use of natural resources, among others. The skills for a new and emerging low-carbon economy can also be purposefully linked to the 21st century skills which are mentioned without elaboration in the *National Education Policy 2020*.

Recommendations

- Conduct a thorough curriculum audit at the state/UT level to identify existing opportunities and gaps for climate change risk reduction and resilience building learning and action. Build on the opportunities and close the gaps.
- Ensuring curriculum contextualization by working closely with local stakeholders.
- Identify contextually appropriate green skills for a low carbon economy and integrate them into the secondary curriculum and into assessable learning outcomes. Help students become aware of green job and carrier opportunities. Green skills should be an integral part of the emerging 21st century skills agenda in India.
- Ensure clear curriculum progression in terms of knowledge, skills and dispositional learning outcomes concerning climate change mitigation and adaptation; also forge cross-curricular and interdisciplinary links between treatment of climate change mitigation and adaptation in different subjects at the same grade level.
- Develop child-friendly, gender-sensitive and age-appropriate learning support materials especially for students in rural areas to introduce climate change issues and convey pro-environmental messages. Such materials should be available in language(s) suitable for the target students to ensure accessibility.
- Provide students with hands-on opportunities and platforms to take concrete actions and play change agency and advocacy roles in mitigating climate change impacts at school, in their local community and beyond.

Teacher Capacity Development

According to participants in this study, climate change-focused teacher training is *ad hoc* and limited in Kerala. The systematic cascading teacher training under the Bihar's Chief Minister School Safety Programme includes some climate change risk reduction components. In the case of Odisha, there are occasional teacher orientation sessions for new tools on school safety and Education in Emergencies.

Further research to analyse existing and potential windows of opportunity for integrating climate-change related knowledge, skills, attitudes and behaviours in teacher training programmes will be beneficial in efforts to mainstream climate change considerations in both pre- and in-service teacher training programmes.

The prevailing 'culture of rote learning', especially at the upper primary and secondary school levels, is a huge obstacle standing in the way of developing student capacity necessary in the face of multifaceted climate change challenges. To address the issue of rote learning, a child-friendly pedagogical model called activity-based learning (ABL) has been adapted, piloted and up-scaled in some 13 Indian states supported by UNICEF (UNICEF ROSA 2018). Lessons learned from the ABL implementation experiences could be applied to the teacher capacity development programmes to mainstream action-oriented climate change learning.

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Recommendations

- At the state/UT level, conduct a thorough teacher education curriculum audit for both pre-service and in-service training programmes to identify existing opportunities and gaps for climate change risk reduction and resilience building. Build on the opportunities and close the gaps.
- Build teacher capacities in employing a wide range of active/participatory and child-centred pedagogies, such learning modes being vital for action-oriented climate change education.
- Build teacher capacity in promoting environmentally sustainable practices at school that are most relevant to the locality (e.g., wise use of natural resources; water conservation; developing school gardens; tree and mangrove planting; waste management; using and maintaining renewable energy technology; awareness raising and advocacy techniques).
- Build teacher capacity in providing basic support to maintain student health and wellbeing if threatened or adversely impacted by climate change.
- Using existing online platforms such as DIKSHA[33] and UniLearn[34] exchange good teaching and action learning examples concerning climate change adaptation and mitigation.

Communication, Coordination and Partnership

There is no systematic coordination mechanism focused on education sector climate change risk mitigation and resilience building. At the national level, no evidence has been found concerning inter-ministerial collaboration and coordination between the Ministry of Education and the Ministry of Environment, Forest and Climate Change for education sector climate change resilience building.

At the state level, functional cross-sectorial DRR coordination mechanisms have been established in the three states covered in this study, but similar mechanisms for climate change are yet to be established. How DRR coordination mechanisms and climate change-specific mechanisms relate is a moot point.

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[33] <https://diksha.gov.in>
[34] <https://unilearn.org.in>

Recommendations

- Incorporate education sector climate change risk reduction and resilience building components in the existing coordination mechanisms/platforms at the national and state/UT levels.
- Ensure a multi-sector partnership approach to embedding climate change components in the forthcoming *National Curriculum Frameworks* as well as in relevant education policy and curriculum framework documents and in teacher capacity development programme at sub-national levels.

Recommendations

- In the forthcoming *National Curriculum Frameworks* ensure linkages between formal curriculum and the existing non-formal learning platforms and programmes for climate change resilience-building learning and action.
- Embed climate change considerations into well-established platforms/programmes such as School/Child Cabinet, *Swachh Vidyalaya Puraskar,* National Service Scheme, *Nehru Yuva Kendra Sangathan* and National Adolescent Health Programme.
- Promote field-based and project-based learning activities such as biodiversity mapping, air pollution monitoring and water quality monitoring, followed by sharing findings at school and in the community and encouraging student-led actions to address the issues identified. Also organize exposure visits for students to learn about good practice examples of climate change mitigation and adaptation.
- Build local government capacity for implementing Child-friendly Local Governance as a means of promoting child-centred climate change action at the local government level.
- Create a 'green star' recognition scheme for individuals and schools making a unique contribution to mitigating and adapting to climate change.
- Develop an online platform, a 'clearing house' for sharing climate change related experiences and actions among students in India.
- Link Indian students to climate change movements/networks at state, national, regional and global levels through online platforms and/or face-to-face gatherings as appropriate.
- Support existing youth groups working on climate change and environmental issues so that they can sustain and expand their advocacy and change agency role so as to accelerate climate action.

School/Community Student Participation Platforms

This study has identified a wide range of pro-environmental learning and action opportunities outside of classroom for school-age children. Some are organized by enthusiastic teachers and schools often supported by local self-governments as seen in Kerala. There are state-wide platforms such as the Safe Saturday Programme in Bihar and the annual children's festival in Odisha where environmental themes can be addressed. Nation-wide initiatives captured in this study are run by ministries in the national government, by CSOs and by young people themselves. There are other existing nation-wide school and youth programmes that carry great potential for embedding climate change considerations more explicitly into student formal and non-formal learning trajectories. They include the Ministry of Education's School/Child Cabinet and *Swachh Vidyalaya Puraska,* the Ministry of Youth Affairs and Sports' National Service Scheme and *Nehru Yuva Kendra Sangathan* and the Ministry of Health and Family Welfare's National Adolescent Health Programme.

In developing the new *National Curriculum Frameworks*, the Ministry of Education should explicitly create synergies between the formal curriculum and existing vibrant co-curricular and non-formal education platforms and programmes in order to promote action-oriented learning for climate change mitigation and adaptation.

Considering a wide range of resource capacities among India's 1.5 million schools, ensuring participation opportunities for students especially from resource-constrained schools remains an enormous challenge. This study has suggested that the peer-to-peer approach employed in the Safe Saturday Programme in Bihar is not only effective in empowering students but also low cost. Kerala's local self-governments trained for Child-friendly Local Governance (CFLG) and climate change have great potential for actively addressing climate change mitigation and adaption concerns in local planning and implementation involving children.

Section 6
Conclusion

While the mechanisms and tools to systematically monitor and assess climate change impacts on the different aspects of the education system are yet to be developed in India, this study has highlighted some examples of damaging impacts of climate change as experienced primarily in Bihar, Kerala and Odisha. They include: school infrastructure destruction and damage caused by climate change-induced disasters; lack of clean water at schools in drought prone areas; interrupted education access due to natural disasters; school dropout due to child marriage and child labour, linked to family hardship caused by the climate change-induced shocks; increasing incidents of student ill-health due to water- and vector-borne diseases, excessive heat coupled with air pollution; psychosocial distress of students due to disasters and changing climatic conditions; difficulty in teaching and learning in the classrooms with extreme temperatures without facilities to ease the adverse impacts.

Key gaps in education system responses to climate change include: insufficient climate change considerations in existing education policy and planning documents both at national and state levels; difficulties in identifying climate change-relevant financial information in the education sector; lack of coordination mechanisms focused on education sector climate change risk mitigation and resilience building both at and between national and state levels; providing all students with pro-environmental action opportunities; school curriculum and teacher capacity building programmes leaving plenty of space for further development.

Key recommendations included are: further develop climate change impact and vulnerability indicators for UDISE+; integrating climate change considerations in key education sector policy and planning documents; developing shared understanding of what constitutes a climate change education budget; developing climate change education curriculum more systematically; developing teacher capacity development programmes that incorporate both climate change-related content and active pedagogies; ensuring a multi-sector partnership and collaboration approach in mainstreaming climate change considerations in education policies, curriculum, capacity building programmes; ensuring student participation through multiple platforms for climate change learning and action.

The education sector has a critical role to play in protecting children and preparing present and future generations to face the full consequences of the climate crisis and in helping them to play a proactive part in finding solutions to the multi-pronged threats we face. It is hoped that this report helps stimulate the discussion and action that is urgently needed to make the Indian education system more climate change resilient and to empower Indian students – both girls and boys – to become advocates and agents of change possessing the knowledge, skills and dispositions to actively contribute to building a greener and safer future for their communities and country, and beyond.

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