

Climate Resilient School Planning

*A Manual for
District Education Managers*



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INTRODUCTION

Pakistan is currently grappling with significant environmental challenges. The country is feeling the brunt of climate change, rapid urbanisation, and environmental degradation. This has led to a surge in severe and large-scale natural disasters, such as floods, droughts, heat waves, and leading to earthquakes indirectly, hurricanes, rising sea level threatening coastal communities, wildfire etc which have grown in frequency and intensity over the past decades. The Climate Risk Index 2023 has ranked Pakistan as the fifth most affected country globally by extreme weather events, underscoring the urgent need to address these escalating threats.¹.

The recent history of natural disasters in Pakistan vividly illustrates the close link between climate change and the increasing occurrence of these hazards. The devastating floods of 2022, which submerged nearly one-third of the country, were triggered by climate change-induced heavy monsoon rains, causing widespread destruction. Over 1,700 lives were lost, and more than 33 million people were directly affected. Similarly, persistent drought conditions, intensified by changing weather patterns, have left millions needing humanitarian assistance. These events are part of a broader global trend, where rising temperatures, shifting rainfall patterns, melting glaciers, disruption to ecosystem and extreme weather are direct consequences of climate change.

Geographically, Pakistan's diverse landscape, comprising the Himalayan Mountain ranges, some of the biggest glaciers in the world, the vast Indus River plains, and expansive deserts, exposes the country to a variety of natural hazards. However, the rapid and unplanned urbanisation, deforestation, and environmental mismanagement have further exacerbated these disasters' impact. The absence of adequate infrastructure, especially in rural and underdeveloped areas, increases vulnerability, with schools often located in disaster-prone zones suffering greatly. Floods, for instance, are the most frequent natural disaster in Pakistan, including Khyber Pakhtunkhwa (KP), repeatedly disrupting communities and educational services.

While national and provincial disaster management authorities (NDMA, PDMAs) have made strides in preparing for and responding to these disasters, there is a critical gap at the grassroots level, particularly within schools. Despite the evident risks, most schools in Pakistan lack comprehensive disaster management and resilience plans. The education sector, responsible for millions of children and young adults, remains inadequately prepared to face the challenges posed by these recurrent disasters. School closures due to floods, earthquakes, or extreme weather have become a frequent occurrence, leading to significant disruptions in learning and long-term severe consequences for education causing irreparable losses setbacks in an already struggling education system

This lack of planning at the school level highlights the urgent need for a systematic approach to disaster preparedness and resilience building in educational institutions. Schools, as central pillars of communities, must be equipped to safeguard students and ensure the continuity of education during and after disasters. A School Resilience Plan (SRP) addresses the immediate safety concerns and embeds a culture of awareness and preparedness within the school environment, empowering students and staff to respond effectively to future challenges.

This training for District Education Managers bridges this critical gap by providing the tools and knowledge necessary to develop and implement School Resilience Plans (SRPs). Through this training, participants will understand how climate change drives the increasing frequency of natural disasters and how to incorporate climate resilience into school operations. The school leaders and teachers will

¹ UN-Habitat, 2023. *Pakistan Country Report*. United Nations Human Settlements Programme. Islamabad.

be equipped to lead efforts in reducing risk, ensuring students' safety, and maintaining educational continuity in times of crisis.

In a world where climate change impacts are accelerating, it is imperative that schools take a proactive approach. This training manual offers a step-by-step guide to help schools create context-specific and need-responsive resilience plans. The exercise is intended to strengthen the culture of preparedness, thus ensuring that schools not only survive natural disasters but also play a pivotal role in building community resilience against the growing threats posed by climate change.

Purpose and Scope:

This manual has been designed to build the capacities, knowledge and skills of Education Managers including DEOs, DDEOs, ADEOs, SDEOs and ASDEOs of Khyber Pakhtunkhwa (KP) to respond to the various impacts of climate change. The Manual will enable training participants to understand the processes and whole spectrum of Climate Change and its impacts, disaster risk management and climate resilience. The manual also discusses climate-resilient schools and school plans for the participants' understanding. It will help in strengthening their ability to integrate climate adaptation strategies into school development plans. The manual aligns with policy documents, available literature, manuals and guidelines prepared at the country level by national and provincial climate change departments and disaster management authorities.

Training Objectives

- The main objective of training District Education Managers is to build an understanding of the term climate change and its causes and effects in Khyber Pakhtunkhwa (KP).
- Strengthen the ability of the participants to integrate climate adaptation strategies into school development plans.
- Help the participants to understand how climate change directly affects local communities, schools, and students in the province.
- Ensure that schools are prepared to respond to climate-related emergencies, ensuring the safety and wellbeing of students and staff.
- Equip the participants to advocate for the necessary resources, infrastructure improvements, and policy changes to support climate resilience in schools.

Target Audience of Training

The manual has been developed to train Education Managers including DEOs, DDEOs, SDEOs and ASDEOs in KP. This training will indirectly benefit students, parents and communities, especially those from disaster-prone areas of the province.

Summary of the Manual

The structure of this manual is as follows:

Opening Session: 1 It contains the activities to open the training formally. It includes opening the training program, introducing participants, establishing expectations for participants, setting up rules for training, and discussing training objectives, etc.

Session 2: Discussing in detail the term climate change and key trends of climate induced disasters in Pakistan with special focus on KP

Session 3: Introducing climate resilience and climate resilient schools in detail.

Session 4: Explaining school resilience plans for the understanding of the participants.

Training Methodologies

The following methodologies will be adopted for conducting the training program:

- Interactive lectures
- PowerPoint presentations
- Facilitated discussions
- Group work and individual activities
- Games and exercises

Session: 1

Introduction



Session: 1

INTRODUCTION

Objectives of the Session

To introduce the participants to each other and to the course program

Outcome of this session

By the end of this session, participants will have:

- Been welcomed and introduced
- Discussed their expectations
- Reviewed the training objectives and the programme
- Discussed norms and logistics for the training

Materials and handouts

- Programme objectives
- Index Cards
- Training Manual
- Flipcharts

Session Overview

1 hour



Step	Time	Activity/method	Content	Resources Needed
1	15min	Individual	Registration	
2	15min	Participants Introduction	Introduction	Icebreaker
3	05min	Individual	Expectations	Index cards
4	10 min	Facilitator Presentation	Objectives and agenda of the training program	PowerPoint presentation
6	10min	Facilitator Presentation	Training overview	Training Manual
7	5 min	Brainstorm	Ground rules	Flipchart

Icebreaker Activity: Introduction of Participants

- i. The trainer shall welcome the participants and introduce himself/herself to them.
- ii. The trainer shall ask each participant to introduce his/her name by adding an adjective before their name that begins with the same letter before disclosing the name of their organisation and designation.
- iii. The trainer shall begin by introducing himself/herself.
- iv. For example: *"I am happy Sohail. I work in "X" as a Training Coordinator."* *"I am mischievous Maryam. I work in "Y" as a Project Manager."*
 - v. This can be done when seated but becomes more fun and active if the participants are standing in a circle. Each participant moves into the circle while introducing himself/herself.
 - vi. Hand out a card to each participant and ask them to put one expectation from the training on a card. Those who have more than one expectation can get more cards. Stress that the name should not be put on the card as this will prevent people from being open. Assemble the cards, read them aloud and group them if possible (people may have similar expectations). Pin up the cards at some suitable place in the hall, or alternatively, write the grouped expectations on a flip chart and stick it on a wall. The expectations should be left there throughout the training.
 - vii. Present the objectives of the training using a PowerPoint presentation.
 - viii. Discuss if expectations and objectives match. If there are expectations that cannot be met, make this clear.
- ix. Everyone taking part in the training needs to agree on some rules of behaviour for everyone's benefit. Ask the group to suggest them and write them on a flip chart. These could include:
 - a. Respect each other and each other's views
 - b. An individual may choose not to involve him or herself in a particular activity
 - c. Each person should raise his/her hand before speaking so that we don't interrupt each other
 - d. Participants and trainers should never be late
 - e. Mobile phones have to be switched off
 - f. Make sure everyone agrees to these rules and paste them on the wall throughout the training course. Discuss what to do if someone breaks the rule (such as sing a song or recite a poem).
- x. Discuss the course logistics, including break times, lunch information, accommodation, payment of travel costs, etc.

Session: 2

Understanding the Concept of Climate Change and its Impacts



Session 2: Understanding the Concept of Climate Change and its Impacts

Objectives of the Session:

At the end of the session, participants will be able to understand and explain basic concepts related to Climate Change and its Impacts.

Outcomes of Session

By the end of the session participants will be able to:

- Explain climate change and related issues.
- Identify and understand various types of disasters occurring in Pakistan.



Session Overview

2 hours

Step	Time	Activity/method	Content	Resources Needed
1	40 min	Presentation and facilitated discussion	Concept of Climate Change, Explanation of different types of disasters in Pakistan, with special focus on KP	Training Manual
2	30 min	Presentations and facilitated discussion	Key Trends of Climate change in Pakistan	Training manual
3	40 min	Group Work	Listing down the most recent disasters that occurred in your respective areas	Flip charts, cards and markers
4	10 min	Synthesis of session	Questions Answers	

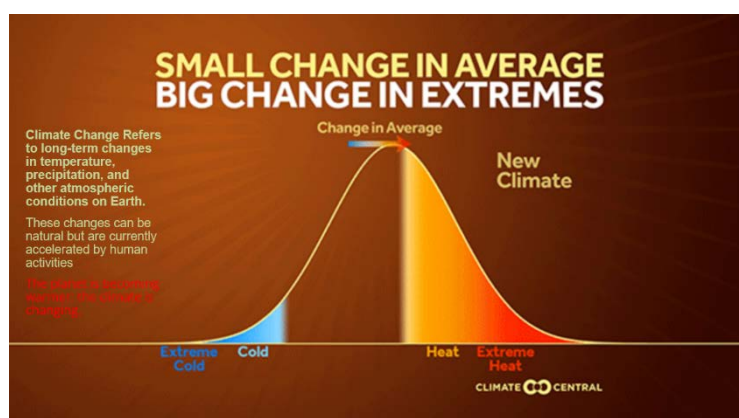
Handout 1: Key Concepts

Climate Change

United Nations defines climate change as “a long-term shifts in temperatures and weather patterns”. Such shifts can be natural, due to changes in the sun’s activity or large volcanic eruptions. But since the 1800s, human activities have been the main driver of climate change, primarily due to the burning of fossil fuels like coal, oil and gas during the post industrial revolution era. Burning fossil fuels generates greenhouse gas emissions that act like a blanket wrapped around the Earth, trapping the sun’s heat and raising temperatures.

During the past century, an annual mean temperature increases of around 0.63°C has been observed in the country, and sea level along the Karachi coast has risen by approximately 1.1mm per year². Though, during the period 2006– 2015, the sea level reportedly rose at a rate of 3.6mm per year³.

The image illustrates how a small change in average climate conditions can lead to big changes in extreme weather patterns. This is depicted using a bell curve, where the middle represents the average temperature and the ends signify extreme cold and heat events.



As the global average temperature shifts to the right due to climate change, the curve moves into a new climate state, where extreme heat becomes more common, and extreme cold less so. This shift leads to more frequent and intense heatwaves and other extreme weather phenomena. It emphasizes that while climate change can naturally occur over long periods due to variations in Earth's atmosphere, it is currently accelerated by human activities like fossil fuel consumption, deforestation, and industrial processes. The consequence of these actions is that the planet is warming, altering the climate in significant ways. In summary, even a small rise in average temperature has large implications, leading to extreme weather conditions becoming more frequent and severe, reshaping Earth's climate.

Climate change can be caused gradually by natural processes or suddenly by large events, such as a massive meteorite strike or volcanic activity. However, the rapid climate change the country is experiencing now is due to three main human activities:

- **Burning fossil fuels** for heating and cooking, generating electricity and powering vehicles releases carbon dioxide, carbon mono oxide, sulphur dioxide and nitrogen oxide and a few other toxic material into the atmosphere.
- **Deforestation** (destruction of forests) The forests releases oxygen and absorbs carbon dioxide from the atmosphere, and deforestation causes severe damage to environment. Moreover, it results into soil erosion and rising temperature with in turn causes
- **Reduction of biodiversity** creates an unstable ecosystem. Nature loss leads to ecosystems that are less able to capture carbon dioxide and other poisonous gases and particles from the atmosphere and becomes less resilient to rising temperatures.

Key Trends

Temperature

Warming in Pakistan was estimated at 0.57°C over the 20th century, slightly less than the average for the South Asia region of 0.75°C . Warming has accelerated more recently, with 0.47°C of warming

² Pakistan's First Biennial Update Report (BUR-1) to the United Nations Framework Convention on Climate Change (UNFCCC); April 2022, retrieved at <https://unfccc.int/sites/default/files/resource/Pakistan%E2%80%99s%20First%20Biennial%20Update%20Report%20%28BUR-1%29%20-%202022.pdf>

³ Climate Change Impacts on Health and Livelihood: Pakistan Assessment https://www.climatecentre.org/wp-content/uploads/RCRC_IFRC-Country-assessments-PAKISTAN-3.pdf

measured between 1961–2007. Warming is strongly biased towards the winter and post-monsoon months (November–February). On a sub-national level, warming is also strongly biased towards the more southerly regions, with Punjab, Sind, and Balochistan all experiencing winter warming in the region of 0.91°C–1.12°C over the same period, and Khyber Pakhtunkhwa in the north experiencing only 0.52°C. The average daily maximum temperatures (0.87°C between 1961–2007) has been slightly stronger than the rise in average temperatures.

Precipitation

Pakistan has a complex historical precipitation profile. The early 20th century was characterized by a prolonged decline in annual rainfall, but since 1960, a slight increasing trend has prevailed. This overall trend hides considerable sub-national variation. Mean rainfall in the arid plains of Pakistan and the coastal belt has decreased by 10%–15% since 1960, contributing to the ongoing degradation of the country’s wetlands and mangrove ecosystems. Most other regions have experienced a slight increase, seen both in the monsoon and dry seasons. The number of heavy rainfall events has increased since 1960, and the nine heaviest rains in 24 hours were recorded in 2010. Recent evidence suggests the glaciers in the headwaters of the Indus Basin may be expanding due to increased winter precipitation over the Himalayan region in the last 40 years. CMIP5 ensemble projected change in annual temperature and precipitation by 2040–2059 relative to 1986–2005 baseline under maximum climate emissions projection scenarios for Pakistan.

Flood

The World Resources Institute’s Global Flood Analyzer AQUEDUCT can be used to establish a baseline level of flood exposure. As of 2010, assuming protection for up to a 1 in 25-year event, the population annually affected by flooding in Pakistan is estimated at 714,000 people and expected annual impact on GDP at \$1.7 billion. Development and climate change are both likely to increase these figures. The climate change component can be isolated and by 2030 is expected to increase the annually affected population by 1.5 million people, and the impact on GDP by \$5.8 billion under the RCP8.5 emissions pathway (AQUEDUCT Scenario B). Given this vulnerability, the uncertainty around issues such as glacial melt, average precipitation, and extreme precipitation change is a major concern. By 2035–2044 an additional five million people will be affected by river flooding annually. Pakistan’s mountain regions also hold vulnerability to glacial lake outburst floods, triggered when ice melt and moraine failure releases large volumes of water trapped at high altitudes.⁴

Droughts

Drought is a phenomenon which means a “period of deficiency of moisture in the soil such that there is inadequate water required for plants, animals, and human beings.”⁴. According to Pakistan Meteorological Department (PMD), a drought is an extended period of months or years when a region notes a deficiency in its water supply. Generally, this occurs when a region receives consistently below average precipitation. It can have a substantial impact on the ecosystem and agriculture of the affected region. Although droughts can persist for several years, even a short, intense drought can cause significant damage and harm the local economy⁵. There are four different types of droughts;

⁴ Perez E, Thompson P: Natural hazards: Causes and effects. Lesson 7: Drought. Prehosp Disast Med 1996;11:72–79.

⁵ National Drought Monitoring Centre, Islamabad: Pakistan Meteorological Department: <https://ndmc.pmd.gov.pk/new/>

a. Meteorological Drought

Meteorological drought is the dryness and the dry period's duration. Atmospheric conditions that result in deficiencies of precipitation change from area to area.

b. Agricultural Drought

Agricultural drought mainly effects food production and farming. Agricultural drought and precipitation shortages bring soil water deficits, reduced ground water or reservoir levels, and so on. Deficient topsoil moisture at planting may stop germination, leading to low plant populations.

c. Hydrological Drought

Hydrological drought is associated with the effects of periods of precipitation shortages on water supply. Water in hydrologic storage systems such as reservoirs and rivers are often used for multiple purposes such as flood control, irrigation, recreation, navigation, hydropower, and wildlife habitat. Competition for water in these storage systems escalates during drought and conflicts between water users increase significantly.

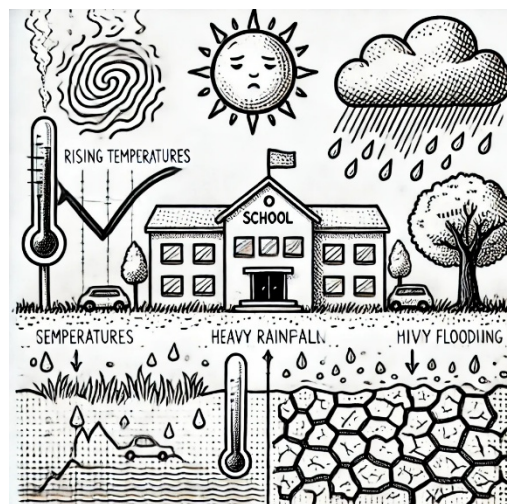
d. Socioeconomic Drought

Socioeconomic drought occurs when the demand for an economic good exceeds supply as a result of a weather-related shortfall in water supply.

Due to Pakistan's topography, rainfall variability is quite high, making droughts an intermittent phenomenon. In recent years, droughts are reported to have caused extensive damage to Balochistan, Sindh, and Southern Punjab, where the average annual rainfall is as low as 200-250 mm.

Glacial Lake Outburst Floods (GLOFs)

GLOFs are sudden events which can release millions of cubic metres of water and debris, leading to the loss of lives, property and livelihoods amongst remote and impoverished mountain communities. Due to rising temperatures, glaciers in Pakistan's northern mountain ranges (the Hindu Kush, Himalayas and Karakorum) are melting rapidly and a total of 3,044 glacial lakes have developed in Gilgit-Baltistan (GB) and Khyber Pakhtunkhwa (KP)⁶ 33 glacial lakes have been assessed to be prone to hazardous glacial lake outburst flooding (GLOF). Over 7.1 million people in GB and KP are vulnerable; in these areas, 26.7 percent and 22 percent of the population, respectively, are below the poverty line. If not addressed properly, GLOFs can potentially cause devastation in these areas.



⁶ Scaling-up of Glacial Lake Outburst Flood (GLOF) risk reduction in Northern Pakistan: Ministry of Climate Change Government of Pakistan:

<http://mocc.gov.pk/Detail/ZmI3OWZlMzYtMTdkYy00ZGU5LTgyZjAtMzIxODdkMTBmMTEy>

Sediments/Landslides

Sediment disasters are defined as phenomena that cause direct or indirect damage to lives and property through a large-scale movement of soil and rock. Sediment disasters are likely to occur in mountainous areas of Pakistan due to the particular organic phenomena and downspouts resulting in the destabilisation of the slope. Sediment disasters occur after heavy rains, which weaken the soil/ ground. In particular, the northern regions of Pakistan (GB, AJ&K and KP) are vulnerable to landslides because of their steep hilly/ mountainous topography.

In January 2010, a massive landslide blocked the flow of River Hunza, creating a natural lake and dam killing at least 20 people. The rising water displaced thousands of residents and submerged countless villages, fields, orchards as well as a 19-kilometre stretch of the Karakoram Highway (KKH). Attabad Lake grew to about 21 km in length. It snakes along the narrow valley like a massive blue serpent, complementing the spectacular beauty of the valleys of Gilgit and Hunza, already dotted with dozens of beautiful turquoise mountain lakes. The lake has become a big draw for tourists. A few hotels and guesthouses have sprung up around the lake, and various recreational activities such as boating, jet skiing, and fishing occur on the lake. But for those affected by the landslide, the reality is not quite so picturesque.

Extreme Temperature

In 2015, a severe heat wave with temperatures as high as 51 °C (124 °F) hit Pakistan, especially its southern parts. This heat wave broke the old temperature records of many cities in the country. A few cities in the province of Sindh experienced temperatures as high as 51.0 °C.

Impacts of Climate Change and Climate-Induced Disasters for Pakistan

- i. Pakistan faces warming rates considerably above the global average with a potential rise of 1.3°C–4.9°C by the 2090s over the 1986–2005 baseline. The range in possible temperature rises highlights the significant differences between 21st-century emissions pathways.
- ii. Rises in the annual maximum and minimum temperature are projected to be stronger than the rise in average.
- iii. Temperature, likely amplifying the pressure on human health, livelihoods, and ecosystems.
- iv. Changes to Pakistan's rainfall and runoff regimes, and hence its water resources, are highly uncertain, but an increase in drought conditions is likely.
- v. The frequency and intensity of extreme climate events are projected to increase, increasing disaster risk remarkably for vulnerable poor and minority groups
- vi. The number of people affected by flooding is projected to increase, with a likely increase of around 5 million people exposed to extreme river floods by 2035–2044 and a potential increase of around 1 million annually exposed to coastal flooding by 2070–2100.
- vii. Projections suggest yield declines in essential food and cash crops, including cotton, wheat, sugarcane, maize, and rice.
- viii. Temperature increases will likely strain urban dwellers and outdoor labourers, with an increased risk of heat-related sickness and death likely under all emissions pathways.
- ix. All of the above should be seen in the context of high and persistent levels of undernourishment and deprivation.
- x. There is an urgent need for further research and delivery of effective adaptation and disaster risk reduction measures.

- xi. 35% of the schools across Sindh, Punjab and KP were partially or fully damaged.
- xii. 44% of the schools are inaccessible across the affected regions due to partial / destruction or use as shelter.
- xiii. The prolonged closures and infrastructural damage have led to increased dropout rates, with children being forced into child labour or early marriage due to economic pressures.
- xiv. Additionally, the increased travel time and costs associated with reaching schools in flood-affected areas have further hindered children's ability to return to their studies.

Key Climatic Impacts in KP

Climate change and the increasing frequency of natural disasters pose significant threats to KP's already fragile school infrastructure and the continuity of education. In 2022, the province experienced several devastating floods. This led to widespread destruction of schools, severe damage to educational infrastructure and the displacement of teachers and students; vital teaching and learning materials were lost, compounding the challenges faced by affected communities. According to national data from the Post-Disaster Needs Assessment, KP suffered damages of 7.2 billion PKR and incurred losses of 2.4 billion PKR. 108 educational institutions were fully damaged, while 1,199 others were partially damaged. Consequently, 203,985 students experienced learning losses, including 54,603 girls, who were particularly affected. The province's geographical location and climatic conditions make it is susceptible to a range of natural disasters, including floods, earthquakes, droughts and landslides. These disasters not only cause physical damage to school infrastructure but also result in extended school closures, displacement, psychological and emotional distress and the loss of educational materials. These disruptions profoundly impact the continuity of education, leading to substantial learning losses.

Activity: List the most recent disasters that occurred in your respective areas

- i. Divide the participants into five groups depending upon the area they are representing.
- ii. Hand over charts and markers to each group and ask them to list the disasters (both man-made and natural) that occurred in their areas recently.
- iii. Ask each group to write down the climate changes and recent natural disasters in their respective areas and how they responded.
- iv. What three main actions would help make the planning more responsive to the needs of the students from the catchment areas?
- v. Each group will be given 3 minutes to present their views to the larger group.
- vi. Display the charts in the hall

Session: 3

Climate Resilience and Climate Resilient Schools



Session 3:

Climate Resilience and Climate Resilient Schools

Objectives of the Session:

At the end of this session, the participants will better understand the terms Climate Resilience and Climate Resilient Schools. They will understand the fundamentals of climate resilience and its importance in the school context. This session also explains climate-resilient schools and climate adaptation plans.

Outcomes of the Session

By the end of the session, participants will be able to

- Understand the fundamentals of climate resilience and its importance in the school context.
- Examine case studies of successful climate-resilient schools and understand how to apply similar strategies.
- Formulate actionable climate adaptation strategies for their own schools.
- Empower students and staff to integrate climate awareness and action into everyday school life.



Session Overview

2 Hours

Step	Time	Activity/method	Content	Resources needed
1	30 min	Facilitated discussion	Introduction of the term Climate Resilience	Training Manual
3	45min	Facilitated discussion	Climate Resilient Schools and Climate Adaptation Plan	Training Manual
4	45 min	Facilitated Discussions	Case studies - climate resilience initiatives	Training Manual

Handout: Definitions of the Key Terms

i. Resilience

Resilience can be defined as “the capacity of interconnected social, economic, and ecological systems to;

- i. Cope with a hazardous event, trend, or disturbance, responding or reorganising in ways that maintain their essential function, identity, and structure;
- ii. Resilience is a positive attribute when it maintains the capacity for adaptation, learning, and/or transformation.

ii. Climate Risk Assessment

- i. It seeks to understand the likelihood of future climate hazards and the potential impacts of these hazards.
- ii. The assessment is an essential tool for prioritising actions and investments in climate adaptation and resilience

iii. Climate Resilience

Climate resilience refers to the capacity of individuals, communities, institutions, businesses, and systems to survive, adapt, and thrive in the face of climate-related shocks and stresses. This involves recovering from acute events like hurricanes, floods, and heatwaves and managing chronic challenges such as rising sea levels, prolonged droughts, and shifting weather patterns.

Climate resilience is the ability to anticipate, prepare for, and respond to hazardous events, trends, or disturbances related to climate. Improving climate resilience involves assessing how climate change will create new or alter current climate-related risks and taking steps to better cope with these risks. Climate resilience is often associated with acute events – like heat waves, heavy downpours, hurricanes, or wildfires – that will become more frequent or intense as the climate changes. However, good resilience planning also accounts for chronic events like rising sea levels, worsening air quality, and population migration.

iv. Climate-integrated Planning

Climate-integrated planning means integrating climate action seamlessly into cross-departmental urban planning and development, emphasising inclusive and equitable principles. This can be done by taking into consideration the following;

- Develop **climate-resilient master plans** and action plans that entail climate-informed planning,
- Align development planning with Sustainable Development Goals (SDGs) – Addressing Risks
- Focus on **developing resilient infrastructure** to **withstand climate shocks** by maintaining reliable service delivery and adopting net zero/green building codes in cities

v. Climate Resilient Education

Climate Resilient Education is a multifaceted approach that prepares children and their communities to cope with and adapt to challenges posed by climate change. It involves practical measures integrated into educational programming, policy, and advocacy efforts that minimise vulnerabilities and enhance adaptability to adverse impacts of climate change. Almost every child alive now faces at least one climate shock a year, such as a (flash) flood, earthquake or heatwave. Climate crises result in hunger and displacement for children and families. There is an urgent need to elevate the role of education in addressing the climate crisis. As today's children and future generations are the most impacted by climate change, governments and education providers must work to identify promising education interventions and focus on anticipatory action.

Climate Change Adaptation and Schools

Climate change is a pressing global issue with far-reaching consequences that affect numerous sectors, including education. Schools are increasingly vulnerable to the impacts of a changing climate, such as extreme weather events, rising temperatures, and water scarcity. This literature review explores the concept of climate change adaptation in schools, exploring their vulnerabilities and examining strategies to build resilience.

Vulnerability of Schools to Climate Change

Several studies highlight the vulnerability of schools to climate change. The Greater London Authority⁷ identifies risks such as overheating, flooding, and water scarcity, which can disrupt learning environments and threaten the safety of students and staff. The World Bank emphasises how extreme weather events can lead to school closures, hindering educational progress.⁸

Strategies for Climate Change Adaptation in Schools

Schools can adopt various strategies to adapt to climate change, broadly categorised into infrastructure improvements and community engagement.

Infrastructure Improvements

Upgrading school buildings with better building codes, improved insulation, energy-efficient appliances, and rainwater harvesting systems can enhance resilience to extreme temperatures and water scarcity.

Community Engagement

Collaboration with local communities is crucial for effective adaptation. Schools can engage parents, local authorities, and NGOs in developing climate resilience plans, identifying volunteers to help in emergencies and exploring other community-based solutions.⁹



Benefits of Climate Change Adaptation in Schools

Investing in climate change adaptation in schools offers several benefits beyond immediate resilience. Schools can:

a. Reduce Operational Costs

Energy-efficient infrastructure can lead to significant cost savings, freeing up resources for educational purposes.¹⁰

⁷ <https://www.london.gov.uk/programmes-strategies/environment-and-climate-change/environment-and-climate-change-publications/climate-adaptation-plans-schools>

⁸ Education and climate change: The critical role of adaptation investments; The World Bank Feb 2023; Retrieved at <https://blogs.worldbank.org/en/developmenttalk/education-and-climate-change-critical-role-adaptation-investments>

⁹ Global Center on Adaptation. *Case Studies on Adaptation and Climate Resilience in Schools and Educational Settings*. May 2022. Available at: <https://gca.org/reports/case-studies-on-adaptation-and-climate-resilience-in-schools-and-educational-settings>.

¹⁰ World Bank. *Education and Climate Change: The Critical Role of Adaptation Investments*. July 2022. Available at: <https://blogs.worldbank.org/en/developmenttalk/education-and-climate-change-critical-role-adaptation-investments>.

b. Improve Learning Environments

Comfortable and safe learning environments created through adaptation measures can enhance student focus and academic performance.

c. Promote Sustainability Education

Implementing climate-friendly practices within schools sets a powerful example and fosters a culture of sustainability among students and staff.

Adapting schools to climate change is essential for maintaining educational continuity and preparing a generation equipped to address the challenges of a changing climate. By integrating adaptation strategies into infrastructure, curriculum, and community engagement, schools can become more resilient, promote sustainable education, and contribute to a more sustainable future. Despite these benefits, implementing climate change adaptation strategies in schools is not without challenges. Resource constraints, lack of awareness, and insufficient policy support can hinder progress. However, opportunities exist through partnerships with public and private entities, leveraging available funding mechanisms, and promoting climate-conscious design in new school construction projects.

The escalating impacts of climate change present a significant threat to schools globally. From extreme weather events to rising temperatures and water scarcity, the educational sector is at risk of disruption and potential setbacks. However, schools can enhance their resilience by adopting best practices for climate change adaptation. This section explores key strategies for building climate-resilient schools, focusing on infrastructure improvements and community engagement.

Infrastructure for Resilience

a. Energy Efficiency

Upgrading building envelopes with better insulation, upgraded windows, and roofing can significantly reduce energy needs for heating and cooling. Implementing energy-efficient appliances and lighting systems further cuts energy consumption and reduces greenhouse gas emissions. Examples of schools incorporating these measures can be found in the “Case Studies on Adaptation and Climate Resilience in Schools and Educational Settings.”¹¹

b. Water Management

Installing rainwater harvesting systems allows schools to capture rainwater for use in irrigation, toilet flushing, and other non-potable uses. This approach conserves water and reduces dependence on municipal supplies, especially in drought-affected areas.

c. Passive Cooling Strategies:

Utilising natural ventilation and shading techniques can mitigate the impact of rising temperatures. Planting trees strategically around school buildings provides shade and helps reduce the urban heat island effect. Schools can also consider installing cool roofs that reflect sunlight and absorb less heat.

d. Disaster Preparedness:

Schools in areas prone to extreme weather events should invest in infrastructure designed to minimise damage and ensure continuity of operations. This may include reinforcing buildings to withstand high winds and floods, installing backup power generation systems, and creating designated emergency shelters.

¹¹ Global Center on Adaptation. *Case Studies on Adaptation and Climate Resilience in Schools and Educational Settings*. May 2022. Available at: <https://gca.org/reports/case-studies-on-adaptation-and-climate-resilience-in-schools-and-educational-settings>

Community Engagement for Collective Action

Stakeholder Involvement

Effective climate change adaptation requires actively collaborating with diverse stakeholders, including parents, teachers, local communities, and relevant government agencies. By organising Joint workshops and planning sessions, schools can foster a sense of shared responsibility and encourage community-driven solutions.

Knowledge Sharing

Schools can partner with local environmental experts and NGOs to organize workshops and awareness campaigns on climate change and adaptation strategies. Sharing best practices and lessons learned across different schools can strengthen collective adaptation efforts.

Local Solutions

Schools can work closely with local communities to identify and implement context-specific adaptation measures tailored to their area's specific needs and challenges. This approach may include leveraging traditional knowledge and practices that have effectively addressed local environmental challenges.

Global Examples of Climate Change Adaptation in Schools (Share these examples in simple language with the participants)

- a. **Green Schools Initiative (Multiple Countries):** The Green Schools Initiative, an international program led by the Foundation for Environmental Education (<https://www.fee.global/fee-academy-1>), empowers schools to become more sustainable. Through a seven-step framework that addresses energy, water, waste, transport, healthy living, biodiversity, and global citizenship, schools reduce their environmental impact while promoting climate-friendly practices.
- b. **School Rainwater Harvesting Systems (Multiple Countries):** In response to growing water scarcity, schools in drought-prone regions such as Australia, Kenya, and India install rainwater harvesting systems. The captured rain is utilised for toilets, cleaning, and irrigation, reducing dependence on municipal water supplies and promoting water conservation efforts.
- d. **Climate Change Education Integration (Multiple Countries):** Countries like the United Kingdom, Canada, and New Zealand are integrating climate change education into their national curriculums. This ensures students learn about climate science, its impacts, and potential solutions. Project-based learning and outdoor activities further engage students and empower them to take action on climate-related challenges.

Examples from Asia - Climate Change Adaptation in Schools

- a. **Eco-Schools Programme in Singapore:** The Singapore Environment Council's Eco-Schools Programme encourages schools to adopt sustainable practices. Schools implement environmental management systems, participate in eco-audits, and organise campaigns to raise awareness about climate change. This multi-faceted approach promotes environmental responsibility among students and the broader school community.
- b. **Flood-resilient School Design in Bangladesh:** Bangladesh is highly vulnerable to floods, so the government has collaborated with NGOs to construct flood-resilient schools on elevated platforms.

These schools provide continued education during floods and serve as emergency shelters, ensuring the community's safety during disasters.

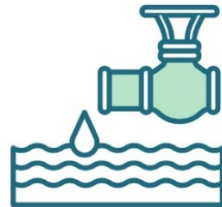
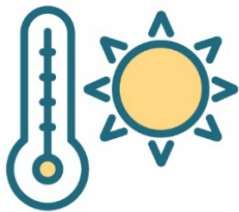
c. Climate-Smart Agriculture Training in Bhutan: Bhutan, a mountainous country, faces climate change challenges that impact agriculture. Schools are incorporating climate-smart agriculture training into their curriculum, teaching students sustainable farming techniques such as water conservation and adapting crop choices to changing weather patterns. This equips future generations with the knowledge and skills to adapt to a changing climate.

e. The Green School Bali, Indonesia: A well-documented example of climate change adaptation in Asia is the Green School in Bali, Indonesia. This school showcases a comprehensive effort to integrate sustainable practices into infrastructure, curriculum and community engagement, making it a model for climate-resilient education in the region. Some of the technical activities include:

- **Bamboo Buildings:** The school structures are predominantly made from bamboo, a fast-growing and renewable resource that reduces the environmental footprint compared to conventional building materials.
- **Solar Power:** A large solar power system supplies the school's energy needs, promoting clean energy and reducing reliance on fossil fuels.
- **Wastewater Treatment:** The Green School features an on-site wastewater treatment system that recycles wastewater for irrigation and other non-potable uses, effectively minimising water waste.
- **Organic Farming:** The school runs its organic farm, supplying fresh, nutritious food for students while teaching and promoting sustainable farming practices.
- **Climate Change Curriculum:** Climate change education is integrated throughout the curriculum, where students explore the science, impacts, and solutions. Students are encouraged to devise solutions for local climate challenges through project-based learning.

Session: 4

School Resilience Planning



Session 4: SCHOOL RESILIENCE PLANNING

Objectives of the Session

This session aims to equip teachers and head teachers with the knowledge and practical tools needed to develop and implement a School Resilience Plan that ensures schools are safe, sustainable, and prepared to cope with the increasing impacts of climate change.

Outcomes of Session

At the end of this session, the participants will be able to

- Understand the key components of a School Resilience Plan (SRP).
- Be able to assess their school's vulnerabilities to climate change.
- Have developed an initial draft of an SRP tailored to their school's needs.
- Be equipped with practical examples and strategies to implement climate resilience in their schools.
- Be prepared to engage students and the community in climate adaptation and sustainability efforts.

Session Overview

1 hour 45 minutes



Step	Time	Activity/method	Content	Resources needed
1	10 mins	Facilitated discussion	Introduction of SRP	Training Manual
2	40 mins	Facilitated discussion	Components of a School Resilience Plan	Training Manual
3	30 mins	Group Activity	Practical Workshop: School Vulnerability Assessment	Training Manual
4	20 mins	Facilitated discussion	Developing Action Plans for Climate Resilience	Training Manual
5	5 mins	Interactive discussion	Question/Answers	

Handout: Introduction to the School Resilience Plan (SRP)

A School Resilience Plan is a comprehensive framework designed to mitigate the impacts of climate change by improving school infrastructure, preparing for emergencies, and fostering sustainability. Schools with SRPs are better equipped to handle climate-related hazards and continue delivering education during and after such events.

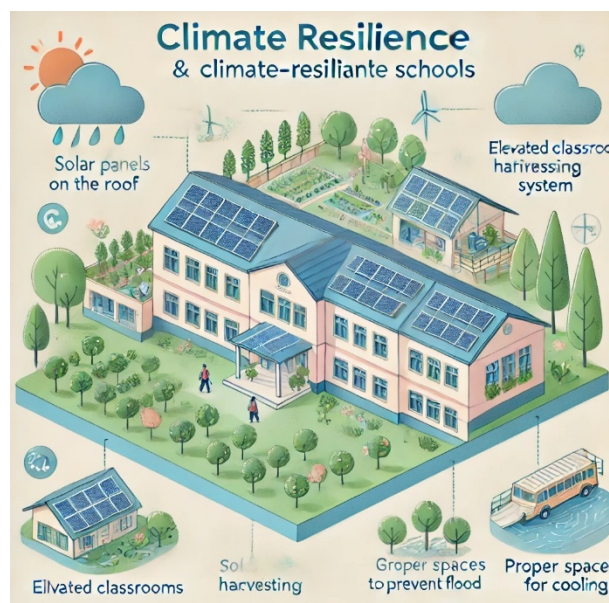
Key Takeaways:

- Schools must become more resilient to protect students, staff, and infrastructure.
- An SRP encompasses key features and measures, from physical infrastructure upgrades to emergency preparedness and student engagement, for better preparedness for the challenge of climate change.

What is Climate Resilient Schools?

Schools, particularly in developing countries, are increasingly facing the challenges posed by climate change. Various measures are being implemented to enhance their resilience, including improving water efficiency, reducing the risk of surface water flooding, helping schools develop climate adaptation plans and teaching children the importance of climate adaptation. Priority is given to the most vulnerable schools, especially those with the highest risk of surface water flooding, as identified by the Climate Risk Map. Flooding can significantly impact schools, and in response, the concept of a climate-resilient model school is being developed. This model focuses on integrating climate-friendly technologies into school infrastructure, ensuring that the buildings are energy and water-efficient. These will include:

- Rainwater harvesting system.
- Solar energy provides uninterrupted electricity.
- Retrofitting buildings with climate-friendly cooling or heating techniques
- Significant increase in green cover on the school premises
- Zero plastic zone



Considerations for Resilient Schools

- Student and Staff Safety
- Infrastructure Safety
- Storm and Hazard Preparedness
- Community Safety
- Campus-Wide Health and Safety

Understanding the risks and setting priorities

- How space-constrained is your school?

- How permeable is your school site?
- What types of buildings does your school include?
- Do you have resources or dedicated budgets for implementing adaptation measures?

Approach to Develop School Resilience Plans

Developing the School Resilience Plan will employ a participatory approach that fosters ownership and buy-in from key stakeholders.

- i. **Collaborative Needs Assessment:** School teachers and Parent Teachers Council members will collaborate to identify their school's specific needs and vulnerabilities regarding climate change. This assessment will provide a comprehensive understanding of the school's challenges and inform the development of tailored solutions.
- ii. **Non-Structural Assessment:** School staff and PTC members will conduct a participatory assessment to identify school-specific vulnerability and climate change risks. This may involve mapping vulnerable areas within the school campus, assessing the condition of school infrastructure, and identifying potential hazards.
- i. **Identification of Climate-Related Risks and Vulnerabilities:** Based on the assessment, schools will identify specific climate-related risks such as floods, droughts, earthquakes, or extreme temperatures. This will help prioritise interventions and develop targeted mitigation measures.
- ii. **Development of a School-Level Database:** Schools will establish a database to document past climate-related disasters or accidents that have affected the school. This data will be used to inform the development of the SRP and identify areas of vulnerability.
- iii. **Identification of Vulnerable Locations:** Schools will identify specific locations within the campus that are particularly vulnerable to climate-related risks. This may include classrooms, playgrounds, or administrative buildings.
- iv. **Development of School Resilience Plans:** Schools will develop tailored plans to address climate vulnerabilities based on the needs assessment and risk identification. These plans may include improving infrastructure, enhancing early warning systems, promoting climate-resilient teaching and learning practices, and developing emergency response plans.
- v. **Integration into School Development Plans:** The SRP will be integrated into existing School Development Plans (SDPs) to ensure coherence and alignment with overall school goals. This will facilitate the implementation of climate resilience measures within the broader context of school improvement.

- vi. **Annual Review and Updates:** The SRP will be reviewed and updated annually to reflect changes in climate conditions, school needs, and available resources. This ongoing process will ensure the plan remains relevant and effective in addressing emerging challenges.

Figure 1: An example of the data and information collected for one school as an illustration



Components of a School Resilience Plan

Objective:

To help participants understand the components of an SRP and how they contribute to a resilient school environment.

i. Safety and Emergency Preparedness

Schools must prepare for extreme weather events by developing disaster risk reduction (DRR) plans, including evacuation routes, emergency shelters, and first aid protocols. Regular safety drills should also be conducted so students and staff are prepared to act in the event of a climate-related disaster (e.g., floods, heat waves).

Example: In schools in Karachi, where heatwaves are common, modified school timings and first aid training for heatstroke have helped reduce risks for students and staff.

Key questions to be answered

a. Risk and Vulnerability Assessment

- i. Has the school conducted a risk assessment to identify potential climate-related hazards?

- ii. What are the most significant climate risks identified for the school's location?
 - iii. Impact of floods in the recent past: Please provide a detailed account of the damage to the school building and the number of days wasted in recovery.
 - iv. What was the impact of the cyclone or any windstorms in the recent past? If yes, please give a detailed account of the damage caused to the school building and the number of days wasted in recovery.
 - v. Has the school experienced any damage to its water supply system or any other damage that could be mentioned?
 - vi. School witnesses any other climate-induced event causing any significant damage to the school infrastructure
- b. Emergency Plans – Standard Operating Procedures**
- i. Has the school been used to shelter flood-affected populations in the past? Was the school administration involved?
 - ii. Does the school have an emergency response plan for climate-related events (e.g., floods, heatwaves)?
 - iii. Has the school conducted a risk assessment to identify potential climate-related hazards?
 - iv. Does the school's Union Council have a functional DRM Committee? If yes, whether trained or not?
 - v. Does the school have any Disaster Management tool kit?
 - vi. Does the school have any volunteers? If yes, are you trained in emergency management or otherwise?
 - vii. Does the school keep a list of important cell numbers for emergency response amongst the school and non-school community?
- c) Communication Systems**
- i. How does the school communicate emergency information to students, staff, and parents?
 - ii. Are emergency supplies (e.g., first aid kits, water, food) readily available?

ii. Resilient Infrastructure

Climate-resilient infrastructure ensures that school buildings and facilities can withstand the impacts of extreme weather. This includes flood-proofing buildings, installing solar panels to reduce energy dependence, and implementing heat-reflective materials to maintain cooler classrooms during heat waves.

Example: Schools built on elevated platforms in Bangladesh have avoided flood damage, allowing them to continue functioning during the rainy season. In Punjab, solar-powered schools in drought-prone areas now have a sustainable energy supply and remain operational during power outages.

Key questions to be answered

- a. Building Condition**
 - i. What is the current state of the school buildings and facilities?

- ii. When was the school's building initially constructed and subsequently upgraded? Is it stone masonry, brick masonry, column structure or frame structure? Are the buildings built with materials that can withstand extreme weather conditions?
- iii. Are there any existing structural vulnerabilities in the school's infrastructure that must be addressed? (e.g., cracks, damage)?

b. Geography

- i. Does the school fall inside or near any natural waterway? If yes, please mention the distance.
- ii. Vulnerable land location for natural hazards, floods, etc.
- iii. Shops, commercial or housing vicinities nearby?
- iv. Are there functional gutters, downspouts, and drainage system issues?

c. Ventilation and Cooling

- i. Is the school designed with natural ventilation?
- ii. Are there functional windows, vents, and shading devices

d. Waste Management

- i. Are there recycling programs and composting facilities on site?
- ii. Is waste properly segregated, stored, and disposed of?

iii. Water and Energy Management

Efficient water management is critical in areas prone to drought and flooding. Installing rainwater harvesting systems can help reduce the risk of surface water flooding and provide an alternative water source during droughts. Similarly, energy-efficient systems like solar panels can ensure schools have uninterrupted power supplies, even during disasters.

Example: Schools in arid regions of Punjab, such as Cholistan, have introduced rainwater harvesting and installed solar energy systems, reducing water shortages and ensuring reliable electricity during extreme weather events.

Key questions to be answered

a) Energy Efficiency and Lighting

- i. What is the school's energy source? Does the school suffer from frequent power outages?
- ii. Is the school connected to the grid, and are there backup power sources?
- iii. Are there any renewable energy installations (e.g., solar panels) on the school premises?

b) Water Management

- i. How is water managed (sources) within the school premises? Drinking and drainage?
- ii. Students and staff have clean drinking water available >

- iii. Does the school have a water storage reservoir system? (Yes/No)
- iv. Does the school own an unfaultable drainage system or require significant maintenance work?
- v. Are there measures to prevent water damage (e.g., flood barriers)?
- vi. Any rainwater storage reservoirs?

iv. Climate Education and Sustainability Initiatives

Integrating climate change education into the curriculum empowers students to understand the causes and consequences of climate change. Students should be involved in environmental activities such as tree planting, water conservation, and recycling programs, fostering a culture of sustainability.

Example: In Kenya, climate-resilient schools have developed eco-friendly curriculums that involve students in activities such as planting trees and maintaining school gardens. This hands-on approach helps students take ownership of environmental issues.

Key questions to be answered: Curriculum Integration

- i. Is climate change education integrated into the school curriculum
- ii. Are there specific courses or modules focusing on sustainability and environmental science?

a) Co-curricular Activities

- i. Are there clubs or groups dedicated to environmental issues and climate resilience?
- ii. Does the school participate in local or national environmental programs or competitions?
- iii. Are national and international climate days observed?

b) Policy and Financing

- i. Are there existing policies that support climate resilience and sustainability within the school?
- ii. What funding sources are available for climate resilience projects?
- iii. Is the school capable of mobilising local-level resources? What are the potential sources of funding which can help the school become resilient to the impacts of climate change?

v. Community Engagement and Awareness

Community engagement involves parents, local authorities, NGOs, and other stakeholders in developing and implementing a School Resilience Plan (SRP). It ensures that schools are protected and act as centres of awareness and action within their communities. By organising awareness walks and campaigns on climate change adaptation, schools help build broader community resilience.

Example: Schools in South Punjab that engaged parents and local authorities during flood preparedness efforts were more successful in evacuating students safely and ensuring continuity of education during and after extreme weather events. Similarly, the Green Schools Programme in India involved local communities in tree planting and environmental campaigns, fostering a culture of sustainability beyond the school.

Key questions to be answered

a) **Stakeholder Involvement**

- i. Are any existing partnerships with local government, NGOs, or community groups focused on climate resilience?
- ii. Did the school have a functional and active PTC (only yes or no)?
- iii. Are parents and community members involved in climate resilience activities and planning? (Yes/No)
- iv. Does the local health facility staff visit the school to screen students for health? If yes, please give details of the last session held

b) **Awareness and Training Programs**

- i. Does the school conduct regular workshops or seminars on climate change and resilience?
- ii. Are students and staff aware of climate-related risks and resilience measures?
- iii. Does the school engage with the local community on climate resilience initiatives (plantations, etc.)

vi. **Building Capacity for Climate Resilient Schools**

Building capacity focuses on equipping school staff, teachers, and students with the necessary knowledge and skills to manage climate risks. This includes training in emergency preparedness, infrastructure adaptation, and sustainability practices. Schools also involve students in leadership roles, making them active participants in climate resilience initiatives through eco-clubs or school gardens.

Example: In Kenya, schools empower students to lead sustainability projects like water conservation and tree planting, demonstrating the value of student involvement in building resilience.

Key questions to be answered

- i. Nomination of a School Climate and Disaster Risk Focal Point (A Teacher)
- ii. Identify and train a team of teachers to effectively disseminate climate-related information, including safety procedures and protocols, to all school students.
- iii. Train school safety focal points and teachers on climate resilience, safety protocols, and ensuring uninterrupted education during emergencies
- iv. Providing teachers with training in psychosocial support for children affected by emergencies
- v. Training of PTCs on climate resilience and climate-related disasters.
- vi. Conduct awareness programmes/sessions for students using various methods, such as walks, speech competitions, drawing competitions, and Arts competitions, to educate them about climate change, local hazards, and risk reduction.

Group Activity: School Vulnerability Assessment

Objective: To guide participants through assessing their school's vulnerability to climate impacts and identifying areas for improvement.

Activity: Divide participants into small groups and provide them with a Climate Risk Assessment Checklist. Groups will:

- Identify critical vulnerabilities specific to their school's location (e.g., flood risks, exposure to extreme heat).
- Assess the school's current infrastructure and emergency preparedness (e.g., drainage systems, emergency plans).
- Assess the school's activities to engage communities and awareness-building campaigns.
- **Group Discussion:** Each group presents its findings and identifies potential solutions to address these vulnerabilities.

Developing Action Plans for Climate Resilience

Objective: To assist participants in formulating actionable steps to create and implement a School Resilience Plan.

- **Activity:** Based on the vulnerability assessments, each group will draft a School Resilience Plan for their school. The plan should include:
 - o Short-term actions (e.g., organising safety drills, securing emergency kits).
 - o Long-term goals (e.g., securing funding for infrastructure upgrades, installing solar panels).

Key Elements to Include:

- Safety protocols for emergencies.
- Infrastructure upgrades to handle climate extremes.
- Student involvement in sustainability initiatives.

Group Presentations: Groups briefly present their action plans, discussing key focus areas and potential challenges.

Conclusion and Q&A

Summarise the importance of SRPs and how they help schools mitigate and adapt to climate change.

Key Points:

- o An SRP ensures that schools remain operational and safe during climate-related disruptions.
- o Teachers and head teachers play a critical role in leading climate resilience efforts in their communities.

Q&A: The floor will be open for questions and clarifications, addressing participants' concerns or challenges in implementing SRPs.



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