



EVALUATION OF THE TEACHERS' EDUCATION LANDSCAPE FOR CLIMATE CHANGE EDUCATION IN INDIA

A research report developed by the Centre for Environment Education under the aegis of the Asia-level research collaboration, led by Okayama University and Asia-pacific Cultural Centre for UNESCO (ACCU) in cooperation with UNESCO Bangkok



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Cultural Organization



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Research and Education for
Sustainable Development
Japan



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Disclaimer

The study document has been prepared by the Centre for Environment Education (CEE) as part of the partnership under the research collaboration between Asian Centres of Excellence on ESD. It has attempted to represent the needs and gaps in the teachers' education pertaining to climate change based on qualitative research and consultations, and the same should not be construed as accurate information for the entire target population for any purposes whatsoever. The authenticity of the secondary research presented and information gathered as part of the study lies with the respective agencies.

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KEY MESSAGES

The secondary research, policy analysis and consultations with teachers conducted with an aim to evaluate the situation of climate change education for teachers in India as part of the current research study, uncovers the following key messages

- **Climate change education is a key adaptation measure to combat the climate crisis.** The national and sub-national policy frameworks need to recognise climate change education as a tool to drive climate action and acknowledge its prospective contribution to adaptation and mitigation measures. The potential of climate change education to address the underlying gaps between climate policy and its implementation, is yet to penetrate in the mainstream developmental thought processes.
- **Climate change education needs a focused attention in the formal education sector, where environmental education forms a core component.** Establishing inter-linkages of climate change with various environmental education aspects and pedagogies could prove to be a starting point for mainstreaming climate change education.
- **Teachers are the key agents for an educational response to climate change.** Younger generations are at the forefront of the climate emergency and their effective education in a diverse and rapidly changing world is paramount. This fundamentally relies on how climate change knowledge is disseminated in various settings.
- **Acknowledging the role of teachers and students in building community resilience.** Imparting solution-based climate change education has the potential to reinvigorate efforts to accelerate climate change action as well as bring awareness to the climate crisis at a societal level, through a cascading mechanism.
- **Teachers understand the climate crisis and realize the need to impart climate change education.** This calls for creation of opportunities and platforms to harness the interest of teachers and through institutional and policy mechanisms engage them in achieving national climate objectives with a solution-based approach.
- **Teachers have significant capacity building needs to teach climate change.** Inclusion of climate change education in the teacher curriculum as well as training programmes and resources to develop conceptual knowledge and pedagogical skills on climate change is required.
- **Creation of climate change curriculum for teachers and students.** Owing to the climate urgency, integrating and/ or creating a climate-focused curriculum is the need of the hour, which will result in increased stakeholder participation in climate change response and effective engagement in climate decision-making processes.

INTRODUCTION

Climate Change is decisively the greatest environmental challenge of the 21st century, and transcends scientific, economic and political realms. With every Intergovernmental Panel on Climate Change (IPCC) report, the science of climate change ‘changes’ making it difficult for contemporary climate change education to be made accessible for all. However, “It is unequivocal that human influence has warmed the atmosphere, ocean and land” (IPCC, 2021). As a society, we are slowly experiencing a warmer planet and establishing its linkages to climate change as well as approaching a coherent understanding of the gravitas of climate change is largely unrelatable to the general public.

Understanding the complex workings of the climate system and predicting the responses to increased emissions makes climate science a difficult subject to decipher for many. Younger generations, by virtue of their age, are the most vulnerable to the ongoing impacts of the climate crisis. Conversely, they can become the agents of change by adopting behavioural change through sustainable choices and creating a significant impact against the climate crisis. Thus, it is imperative that today’s youth is empowered to act against climate change and it needs to be reflected in the education provided to them. As observed in the review by Hart and Nolan (1999), there is also a growing interest in environmental education, climate politics, teacher training programmes, curriculum development that contains both conceptual and methodological diversity, and are all signs of a progressive climate education future. In spite of this, only half of the national curricula in the world have a reference to climate change (UNESCO, 2021). Climate change is also set to significantly impact the education sector, and education in its broadest sense has a critical role to play in response (UNICEF, 2012).

Access to environmental and climate education at a young age helps youth acquire content-specific knowledge, cognitive skills, motivational patterns, and personal value orientations. A theory of change with a focus on youth as change agents could be depicted as follows:

- Youth, well-versed with the science and impacts of climate change, will gain deeper understanding of the crisis and lead climate action in the form of changes in personal lifestyle, devising technological solutions, and influencing policies.
- A climate-empowered youth would possess motivation for action towards climate change, and have hopes and visions for a climate-resilient future.
- Climate education of youth would make them aware of their influence on the policies and its significance, therefore, would be actively engaged in climate-related issues with a belief that climate-compatible development is fundamental to building resilience.

Thus, educating young populations on climate change, especially through integration of climate curriculum in mainstream education and via supporting informal learning mechanisms is significant in fighting the negative impacts of climate change.

While awareness of younger generations is crucial to addressing the climate crisis, climate change education fundamentally relies on how it is taught in various settings. The concept, pedagogy and approach through which climate education is integrated, mainly in the formal education system, is key for large scale adaptation of climate change curriculum.

The role of teachers is, thus, paramount. Teachers are one of the most influential and powerful forces for equity, access and quality in education and hold the key to sustainable global development (UNESCO, 2021). Furthermore, in order to make a younger generation cognizant of socio-scientific issues, teachers must have a deeper understanding of science to help navigate the assumptions, potential reasoning patterns, and moral developments held by students (Sadler, Chambers, and Zeidler, 2004).

“The status of the teacher reflects the socio-cultural ethos of the society; it is said that no people can rise above the level of its teachers.”
- *National Policy on Education, India, 1986*

The climate crisis has exacerbated pre-existing setbacks faced by teachers to increase their knowledge and skills for imparting effective climate change pedagogy. Hence, there is a need to create spaces for climate empowerment of teachers which has the potential to create a multiplier effect. Climate change education amongst teachers, will help create capabilities among students to know about climate change, as well as bring forth potential solutions, from a cross-curricular and interdisciplinary standpoint. Access to such education for teachers also draws attention to the linkages between use and consumption habits among children and to manifest responsible behaviours. Teachers, therefore, are an irreplaceable element of the education system and are instrumental in inculcating these values thereby changing the narrative of a new generation. Hence, it is imperative to embolden teachers to lead change in climate action education and this calls for building the capacity of teachers, in order to build knowledge amongst children and youth and help translate the developed knowledge into action.

In addition to this, the COVID19 pandemic poses challenges that have changed the education landscape forever. Both students and teachers are no longer restricted to gaining knowledge only via educational institutions, but have access to a plethora of resources and platforms. The climate change curriculum for teachers, thus needs to be progressive in order to reflect these social changes and focus on their empowerment so that they could apply their competencies and education in their own ways.

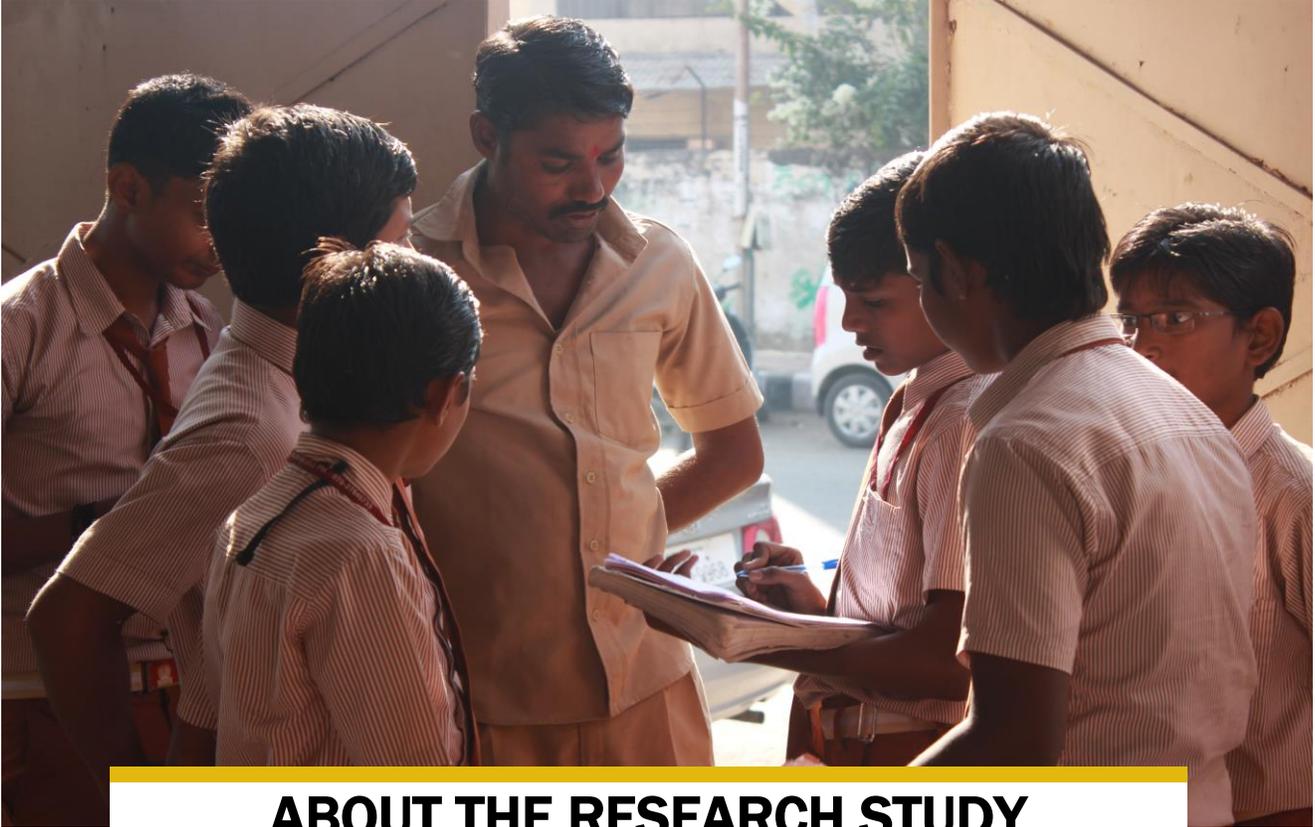
ABOUT THE COLLABORATION WITH ATECCE

Okayama University and Asia-Pacific Cultural Centre for UNESCO (ACCU) in cooperation with UNESCO Bangkok has launched a novel international research initiative to promote Teacher Education for Climate Change Education through Collaboration between Asian Centres of Excellence on Education for Sustainable Development (ATECCE) over a course of four years. Participating countries include China, India, Indonesia, Japan, Kazakhstan, Malaysia, Mongolia, Philippines, and Thailand. SDG 4.7 stipulates Education for Sustainable Development (ESD) which pursues the sustainability of life and society on earth through education, with an emphasis on themes such as climate change, renewable energy, biodiversity, disaster risk reduction and sustainable consumption and production.

An appropriate education process of planning, implementation and monitoring/ evaluation/ reporting is imperative to promote climate change as emphasized in the Action for Climate Empowerment: Guideline for Accelerating Solutions through Education, Training and Public Awareness (2016), a guide jointly edited by UNESCO and United Nations Framework Convention on Climate Change (UNFCCC). This international joint research will focus on climate change in relation to all of these themes, and will develop the “Asian Framework of Teacher Education Programme for Climate Change Education” and a guide for its dissemination through the collaboration of Asian Centres of excellence on ESD.

Climate change education in teacher education is limited to the development of teaching materials and classes, and the competencies required for teachers practicing climate change education have not yet been adequately addressed. This research will demonstrate a leadership role in promoting ESD for climate change through teacher education, by creating significant teacher education programmes which could be disseminated from Asia to other regions.

Moreover, the developed framework will be informed and distributed to teacher education institutions in Asian countries, UNESCO regional offices and/or national commissions for UNESCO and the Ministries of Education, for mainstreaming climate change education in the existing teacher education programmes. The novelty of this research lies in its mode of promotion of climate change education by a cascading mechanism.



ABOUT THE RESEARCH STUDY

A research project on *Evaluating teachers' education landscape for climate change education in India* is being undertaken by the Centre for Environment Education (CEE) on a national level, under the aegis of the collaboration between Asian Centres of Excellence on ESD to assess the present scenario of climate change education in India from a teacher's perspective. Analysis of existing documentation and policies as well as multiple teachers' consultations at a national level were carried out to understand the conceptual gaps and hindrances faced to disseminate CCE in classrooms.

Appropriate recommendations with suggestive mechanisms to empower teachers to effectively teach climate action education is discussed. The project intends to chart out resources and capacity-building needs for teachers on climate change education in order to effectively teach climate change concepts in the formal education sphere.

KEY RESEARCH QUESTIONS

Though UNESCO and UNFCCC have promoted the importance of climate change education, the current situation indicates that climate change education in teacher education is limited to the development of teaching material for students, and an overall development of educational programmes specifically for teachers has shown minimal progress in response to global calls for climate change education. An initial meeting with the in-house ESD experts at CEE confirmed the same and emphasized the lack of competency faced by teachers in climate change education as well as the absence of educational directions in climate pedagogy at an institutional level. The consultation also identified a need to maintain the balance between teaching key scientific concepts from an educational perspective (e.g., air, water cycle, atmosphere etc.) and create linkages with larger climate change concepts through both theory and practice in schools (e.g., sustainable development, greenhouse emissions, carbon footprint, etc.). The panel firmly believed that empowering teachers with the correct pedagogical knowledge of climate change will help shape the narrative of an entire generation who will face (and are facing) the consequences of climate change in the future. Moreover, this research would help derive solutions from Asia through collaboration between Asian centres of excellence on ESD. Based on this discussion, it was decided that a situational analysis needs to be conducted which includes some elements and findings from primary research.

The key research questions developed for this research study are as follows:

- To what extent is the current educational landscape favorable for teaching climate change education in India for teachers?
- What is the mechanism and policy framework required to effectively equip teachers in imparting climate change pedagogy?
- What are the gaps and capacity building opportunities to facilitate mainstream climate change education?

One of the aims of this research is also to identify specific areas of intervention on climate change for teachers in India, and as a Centre of Excellence, design customized educational resources and training programs to deliver theoretical as well as action-based resources based on the outcomes of the study.

Research Methodology

This research study aims to review and analyses the scope of climate change education in teacher education programmes in India from a multidimensional perspective. The methodology of this research study was developed based on the “Asia-Pacific ESD Teacher Competency Framework” and a combination of primary and secondary research methods.

Adopting this methodology will help reveal the present scenario of climate change education in formal education which will contribute in developing a framework for teachers in the later stages of the research.

An action plan was proposed with an eight-month timeline to conduct the research study at the commencement of the first phase of the research project. The methodology of this study involved four components.



LANDSCAPE ANALYSIS

Assessing inclusion of climate change concepts in curriculum at a national level



POLICY MAPPING

Mapping national policies around CCE for teachers in India



CURRICULUM OVERVIEW

Reviewing existing climate change trainings and resources for enhancing teachers' education on CCE



TEACHERS CONSULTATION ON CLIMATE CHANGE

Conducting consultations to gather teachers' inputs on the state of climate change education in India

The further sections of the report will discuss the existing scenario of climate change education in the teacher education programmes in India based on the outcomes of the primary and secondary research conducted as part of the research study.



CEE AS A CENTRE OF EXCELLENCE

Centre for Environment Education (CEE) was established in 1984 as a Centre of Excellence of the Ministry of Environment and Forests, Government of India. As a national institution, CEE's mandate is to promote environmental awareness nationwide. CEE develops innovative programmes and educational material and builds capacity in the field of Education for Sustainable Development (ESD). It is committed to ensure that Environmental Education (EE) leads to action for sustainable development. It undertakes field projects that demonstrate and validate the role education can play in sustainable development.

Centre's Approach towards EE in Schools

Environmental Education (EE) for children, both in school and out of school, has been a major thrust area of the programmes developed by CEE since its inception. The programme includes curricular as well as co-curricular learning in formal as well as non-formal modes. Emphasis is placed on learning-by-doing and on development of locale-specific material involving participation of local stakeholders familiar with the environment and development issues in the local context. In recent years, Education for Sustainable Development (ESD) has become an increasingly important dimension of this effort.

Starting in 1984 with a focus on children of primary school age, the scope of these programmes has considerably expanded to pervade the entire school system. While most of the major programmes complement the educational concerns of the Government of India (GoI), especially its ministries of Environment, Forests and Climate Change (MoEF&CC) and the Ministry of Education, formerly the Ministry of Human Resource Development (MHRD), CEE also works in partnership with a number of other entities. These include state governments, bilateral and multilateral international programmes, governmental and NGO agencies outside India, and funding agencies whose agenda includes education in general, and EE in particular, as important focus areas.

Teacher Education on EE

CEE's approach and experience of school programmes has developed over a period of three decades. Active learning has been the major pedagogical approach that CEE had introduced with *Joy of Learning*, a handbook for teachers developed in partnership with NCERT in 1986 as part of the New Policy on Education thrust for Science Education (Sarabhai et al, 1998). In its communication strategy, CEE recognizes that the teacher is the key to the whole education system and through the initiative and innovativeness of the teacher can such programmes be carried out. CEE works to build the capacity of teachers as primary agents for introducing and sustaining EE in schools. This is because a single teacher can reach out to at least 100 to 200 children every year over a period of 15-20 years of his/her teaching career.

Over the years, CEE has collaborated with various stakeholders in developing locale specific materials and reaching out to schools in different parts of the country. In the initial years, as part of an umbrella programme called National Programme for Environment Education in Schools (NEEPS), CEE worked with a large number of NGOs on EE related initiatives focusing on development of local specific material, intensive training to teachers and monitoring of activities on EE.

CEE took leadership in supporting the National Council of Educational Research and Training (NCERT) for implementation of the directive of the Supreme Court on compulsory Environmental Education. This included training of textbook writers, training of master trainers and development of prototype materials on various issues. CEE has also provided support to NCERT in the implementation of judgement in the field of pre-service teacher education by developing three EE resource books for use by Teacher Educators at Diploma in Education, Bachelor of Education and Master of Education.

After the Supreme Court directive in 2003, CEE focused more on programmes that improve the transaction of EE in the classroom. It was aligned with the dawn of the Decade of Education for Sustainable Development (DESD).

Initiatives with Schools

While CEE works from preprimary stage to higher secondary stage of schooling, major focus of its initiatives has been on the middle schools (Std. V to VIII) working with the students in the age group of 10-14 years. The EE initiatives of the centre are focused on enhancing the capacity of schools to nurture and empower young green leaders across the country with the awareness, knowledge, commitment and potential to take positive action to meet the challenges of environmental sustainability.

Paryavaran Mitra (Friends of Environment) is a national school initiative of CEE which encourages Handprint actions by schools. The concept of Handprint was launched in 2007 by CEE at UNESCO's 4th International Conference on Environmental Education held at Ahmedabad, India. The Handprint analyses positive impacts on three interrelated aspects of action towards sustainability; viz.; environment, society and the economy. The symbol of Handprint represents the belief that we can make a difference through individual and collective actions to solve environmental problems. Under this initiative, CEE has been innovating programmes for all kinds of schools made for Pre Schools to primary up to higher secondary level. CEE implements a large number of EE initiatives addressing local environment and sustainability concerns in association with several stakeholders and institutions across India.

CEE and ESD

CEE was appointed the nodal agency for the implementation of the UN Decade of Education for Sustainable Development (UNDESD) in India by the Indian National Commission for Cooperation with UNESCO (INCCU) and the former Ministry of Human Resource Development (MHRD), Government of India. CEE, in its role as the nodal agency for implementing DESD in India, provided inputs for the UNESCO General Assembly meetings and Executive Board meetings held between 2005-2014. CEE developed the India report on behalf of the INCCU for the Mid-term DESD conference in 2009.

As nodal agency for DESD in India, CEE also developed a website (www.desd.in) on DESD initiatives nationally and globally.

CEE was a member of the DESD Reference Group as well as the GAP Lead agency for Policy Advocacy from 2014-2019. CEE has been instrumental in bringing ESD focused discussion in the country by organizing global conferences and workshops. MHRD and CEE, supported by UNESCO and UNEP, organized a series of international conferences in India during the decade. The conferences helped strengthen networks and partnerships, explored synergies with EE and the Earth Charter, and initiated mainstreaming of ESD into the three UN Conventions highlighting the important role of education.

In response to the call of the United Nations University (UNU) - Institute of Advanced Studies (IAS), for the development of regional networks to promote ESD through research and capacity building, CEE initiated Regional Centres of Expertise (RCEs) with varied focus areas such as biodiversity, urban sustainable development and others. Initial 6 RCE's in India were recognized in leadership of CEE where various offices of CEE partnered with different formal and non-formal institutions for planning and implementation of ESD initiatives on selected thematic areas.

Contribution in national and international initiatives

CEE has developed various environment education and education for sustainable development publications for teachers and educators at national and international level.

- CEE contributed to research and collaborative projects with UNESCO, UNEP and international partner organizations. CEE conducted the Situational Analysis of ESD in South Asia as a part of the Asia Pacific regional study undertaken by the UNESCO Asia Pacific office. CEE colleagues have contributed to and are editors of a key Springer publication focusing on ESD in South Asia.
- CEE has been a partner organization of ExpertNet, a four-country network consisting of Germany, Mexico, South Africa and India since its inception. CEE, as a part of the Network, conducted a Training of Trainers course to prepare ESD multipliers with a focus on Whole School Approach and organized an event, *A Dialogue on School Education for Sustainable Development in India*.
- CEE is a collaborating partner of Asia-Pacific Cultural Centre for UNESCO (ACCU), Japan for various exchange programmes being conducted for school teachers and students as part of its national school initiative of Paryavaran Mitra. CEE has worked closely with ACCU on a number

of ESD initiatives involving development of teaching materials, research on community-based learning and evolving pedagogy and frameworks for ESD in Asia-Pacific region.

- The Green Teacher: Diploma in Environmental Education is a distance education programme established by CEE and Commonwealth of Learning (COL) Vancouver, Canada. The programme addresses the rapidly growing need for continuing education and professional development in the field of Environmental Education (EE), and is geared to build the capacity of middle school in-service teachers and educators.
- CEE in partnership with the Environment Agency Abu Dhabi (EAD) developed capacity building programmes and material to support the programmes of EAD. CEE partnered with the Swedish Institute of Education for Sustainable Development (SWEDESD) to facilitate the Collaborative Learning Programme, Supporting Urban Sustainability in six cities in Asia, Europe and South Africa. The initiative explored frameworks for collaborative and action-based learning through multi-stakeholder engagement.

Within the climate change theme, CEE has undertaken large-scale climate education projects like The Science Express Climate Action Special (SECAS)- a science exhibition (designed and conceptualized by CEE) mounted on a train, a unique collaborative initiative of the Government of India to spread awareness about climate change. SECAS is considered one of the largest public awareness campaigns on climate change in the country and was especially designed for students and teachers as a primary target audience. Teachers training for improving conceptual understanding of climate change, addressing misconceptions about the science of climate change, were organized at every one of the over 60 railway stations it halted. These programmes were an important part of the SECAS journey.

Over the years, CEE's initiatives have followed the organization's mandate of promoting environmental education and sustainability, with climate change present as one of the thematic areas. Climate change has been a subset of most of the CEE's interventions with teachers and students across the country, through activity-based learning mechanisms to enhance their involvement in addressing the issue of climate change. There is a scope to sharpen the focus on providing conceptual and theoretical climate change related knowledge through targeted programmes to strengthen the overall understanding on the issue. This research is thus pivotal in identifying the focused interventions for CEE to educate teachers on climate change.



NEED FOR CLIMATE CHANGE EDUCATION IN INDIA

In addition to becoming the world's most populous country, with a rapid rate of industrialization and a high level of exposure to climate change, India is in the front line of managing the complex landscape of climate-environmental development challenges. The seminal Stern report states that climate change can be addressed in three fundamental domains: carbon pricing, technological transfer/innovation, and behavioral change. Education plays a central role in developing and sharing technological transfer as well as promoting behavioral change through school and community education. The biggest contribution of education will come through its influence on both individual and societal behavior change. (Rose and Dyer, 2008; Hanushek and WoBmann 2007; Altinok, 2007).

According to the scenarios of the IPCC AR6 report of 2021, a temperature increase of 2.5°C to 5°C by the end of the century, increase in precipitation levels and droughts as well as a sea-level rise of 0.5 m by 2100 are likely in India (IPCC, 2021). Such a scenario would have a perceptible consequence for the livelihood and survival of rural communities dependent on agriculture and allied sectors - even for cities. Projected trends in climate change pose a looming threat for an ecologically sensitive, developing, and largely agrarian country like India.

Moreover, climate change will have a significant impact on the education infrastructure in India. The Indian Education System is one of the largest in the world with more than 1.5 million schools, 8.5 million teachers and 250 million children (UNICEF, 2021). Weather extremities such as floods, droughts as well as the COVID-19 pandemic have already disrupted the education infrastructure and schooling all over the country. Large-scale population displacement due to extreme weather events is a likely consequence of climate change which will likely result in obstruction of formal education systems. This would pose challenges around the language of instruction, certification, mode of examination and would require extensive planning to cope with the rapid increase in the student population. (Bangay, 2016)

In addition, an increase in climate extremities would likely reduce household incomes further affecting the attendance rates in schools. An estimated 6.1 million children out of school in 2014 reduced from 13.46 million in 2006. Out of 100 students, 29 percent of girls and boys drop out of school before completing the full cycle of elementary education, around 50 percent of adolescents do not complete secondary education and often they are the most marginalized children. (UNICEF, 2021)

The above empirical evidence makes it clear that the impact of climate change is going to feature prominently in the lives of India's upcoming generations. A World Bank report quotes, 'Considering the importance of child health and education for long-term prospects, productivity, and income, even a moderate impact of climate change on health and educational achievement could affect poverty visibly over the long term. Hence, it is imperative that the delivery of education is climate change 'resilient' and it offers both awareness of environmental degradation and mechanisms to address climate change.' (NEP, 2020)

Environmental & Climate Change Education in India

Environmental education in India has always been a part of India as awareness and connection with nature is an integral part of traditional Indian culture. Worship of flora, fauna, rivers, oceans, etc. i.e., anything which is life-sustaining is considered part of religious/social activities making ecological awareness a distinctive feature of India's spiritual life (Shiva, 2005). Protection of the environment and its connections with the community have been an integral part of Indian social life (Ravindranath, 2007).

The pivotal attempt at incorporating environmental education was initiated by Mahatma Gandhi in a movement called "Nai Taleem" of Basic Education in 1937 (Almeida et. al., 2011). It aspired to create a new generation of free-thinking individuals with relevant skills to make them changemakers in their communities and the nation as a whole (Haigh, 2008). India has continued its strong tradition of incorporating environmental issues within policy documents and official documentation defining educational content and delivery post-independence. Article 48A and 51G of The Constitution of India states that protecting and improving the natural environment and living harmoniously with the environment is a fundamental duty of every Indian citizen (Government of India, 2008).

The first National Policy on Education came into effect in 1968 with a mandate to increase access and quality to education. Environmental education in the formal schooling system was identified as a tool for promoting this ethos post-independence which was manifested by the Kothari Commission's recommendation during 1964-1966. Another major initiative was establishing the Centre for Environment Education in 1984 as a Centre of Excellence in Environmental Education of the Ministry of Environment and Forests, to spearhead environmental education and movements for introduction and integration of environmental education at all grade levels within the school system. Environmental Education is mandatory at all levels of education in India as a result of the Supreme Court mandates of 1991 and 2003. The National Curriculum Framework (NCF) drafted in 2005 has made a huge attempt in bridging the gap in environmental education by shifting from a textbook centric to a more holistic curriculum (NEP, 2020). Protection of the environment is also listed as a priority point for curriculum framework development of 2009. India has also committed to the achievement of the UN Sustainable Development Goals, which further promote large-scale and ambitious programmes promoting sustainability in the education sector on a national level. (Anderson, Jason & Lightfoot, Amy, 2019).

The National Action Plan for Climate Change (NAPCC) was launched by the Government of India in 2008 to mitigate and adapt to the adverse effects of climate change. Based on the missions identified in the NAPCC, all states were asked to draft and submit a State Action Plan to implement mitigation and adaptation measures specific to their regional context. These climate action plans are further highlighted in India's Nationally Determined Contributions (NDCs) submitted to the United Nations Framework Convention on Climate Change (UNFCCC) in March 2015. However, there is a distinct lack of inclusion and mainstreaming of climate change education as a key adaptation measure in these climate policies. The same is reflected in the SDG India Index 2020-21 published by NITI Aayog as it does not mention Education for Sustainable Development (ESD) or climate change education as pedagogical mechanisms for climate action in SDG 4 (Quality Education).

The National Education Policy, 2020 promotes a more holistic and multidisciplinary education to equip students with contemporary climate change concepts as well as establishing a New Research Foundation (NFR) to set up a robust ecosystem of research in the realm of climate change at a higher education level. It aims to revive agricultural education and allied disciplines and inclusion of Artificial Intelligence (AI) to broaden relevant climate change concepts across the formal education sphere at the university level. However, it does not include any timeline or framework for implementing and establishing these educational initiatives. Additionally, as a member party to the UNFCCC, India submitted its Third Biennial Update Report in 2021, however climate change education does not feature as a key adaptation measure in India's climate action initiatives.

The national plans of India recognize that climate change is a critical issue and propose ambitious objectives for mitigation and adaptation, yet challenges remain in utilizing the effectiveness of education, awareness-raising and capacity building in addressing the issue. As climate plans and educational frameworks are updated in coming years, a distinct focus on climate change education in formal and informal sectors is required.

India is a party to several international treaties and commitments related to environment and sustainable development such as the Montreal Protocol, the Millennium Development Goals (MDGs), the United Nations Framework Convention on Climate Change (UNFCCC), Kyoto Protocol, Convention on Biodiversity (CBD) as well as the Paris Agreement. It is also a major recipient of climate-related financial and technological support. India is a Non-Annex I (non-industrialized) country and signed the UNFCCC in 1992, ratifying it in 1993 and further, ratified the Paris Agreement in 2016. India has also cooperated with the United Nations Educational, Scientific, Cultural Organization (UNESCO) since 1946.

A permanent Commission-Indian National Commission for Cooperation with UNESCO (INCCU), was established in 1951 through the Government of India, Ministry of Education to promote education, science and culture. The commission looks after a range of activities including the interventions related to Education for Sustainable Development (ESD) (Gorana et. al., 2016).

A BRIEF HISTORY OF ENVIRONMENTAL EDUCATION IN INDIA

Currently, in most states, environmental studies is taught as a separate subject from classes one to five and later becomes 'threaded', 'optional', 'grade-based' through the higher education curriculum. (Bangay, 2016). An analysis of Indian school textbooks revealed comprehensive content coverage of environment topics but no links to actual action (Ravindranath, 2007). However, The Ministry of Environment, Forests and Climate Change, the Ministry of Human Resource Development, The Department of Science and Technology, and NGOs such as Centre for Environment Education (CEE) continue to contribute towards the spread of Environmental Education in India.

Climate change 'education' has not been provided adequate recognition and required weightage in the policies and programs that aim to address the climate concerns in the country. This is evident from the voluntary international commitments, policy positions and reports submitted by India at the intergovernmental platforms.

1966

The Kothari Commission provided an entry point for EE in the formal school system

1986

The National Policy on Education included EE in schools

2003

The Supreme Court mandate made EE compulsory across all formal educational institutions

2008

The National Plan on Climate Change does not mention CCE as a priority theme

2020

National Education Policy launched; CCE not given due emphasis

2021

CCE not listed as a key adaptation measure in the Third Biennial Update Report to UNFCCC

"I will call for a change in lifestyles, so that we reduce the burden on our planet...the enduring success of our efforts will depend on the way we live and think."

- *Shri Narendra Modi Hon'ble Prime Minister of India Inauguration of the India Pavilion, COP21*

However, India has a pivotal position in terms of bringing sustainable lifestyles, traditional knowledge and behavioural change at the forefront of international climate dialogues, which became a significant contribution towards policies and treaties in the domain of climate change, such as the 2015 Paris Agreement.

"... Also recognizing that sustainable lifestyles and sustainable patterns of consumption and production, with developed country Parties taking the lead, play an important role in addressing climate change..."

- *Paris Agreement, 2015*

Instrumental actors

Given India's rich history and tradition in promoting environmentalism, it is no surprise that various agencies across the country are involved in promoting sustainable development through environmental education. These agencies include:

Government organizations: The Ministry of Environment, Forest and Climate Change (MoEFCC) is the nodal agency to develop India's climate change agenda, formulating policies and implementation at the sub-national level. To promote environmental awareness at the school level, the MoEFCC coordinates two national programs, the National Environment Awareness Campaign (NEAC) and the National Green Corps (NGC) by organizing seminars, campaigns, setting up eco-clubs, and publishing awareness materials in a non-formal mode. Under this initiative, the Centre for Environment Education (CEE) and the C.P Ramaswamy Environmental Education Centre (CPREEC) were established as 'Centres of Excellence' to play a crucial role in spreading awareness about environmental education in the country. The Ministry of Environment, Forests and Climate Change facilitates activities related to India's commitment to the UNFCCC.

The Ministry's Climate Change Division looks after issues related to global climate change negotiations, including discussions on the Action for Climate Empowerment (ACE) agenda, and related domestic policies and actions. The Division is also responsible for the submission of periodical National Communications and Biennial Update Reports as part of the reporting mechanism under the UNFCCC.

Meanwhile the Ministry of Education, functions as a major funder for implementing environmental education programmes on a national level and plays a very active role in promoting UNESCO's ideals and objectives. 58 schools and Teacher Training Institutions from India have been enlisted with UNESCO under its ASP-Net Programme. The ministry is in charge of planning, implementation, and monitoring of education in the country with support from the State Education Departments.

Non-governmental organizations: Over 10,000 NGOs and think tanks such as The Resources and Energy Institute (TERI), Centre for Science and Education (CSE), Centre for Policy Research (CPR), Council on Energy, Environment and Water (CEEW), Centre for Environment Education (CEE), The Climate Reality project etc. as well as various community-based organizations are actively involved in improving awareness of climate change, environmental and developmental issues at a national, regional, and state level.

Academic Institutions, Research Centres, and Universities: There are various academic and research institutions actively involved in spreading environmental awareness in the country. These include the Bombay Natural History Society (BNHS), Mumbai; the Centre for Ecological Sciences (CES) at the Indian Institute of Science (IISc), Bengaluru; the National Environmental Engineering Research Institute (NEERI), Nagpur; the National Institute of Oceanography (NIO), Goa; National Institute of Ocean Technology (NIOT), Chennai; Forest Research Institute (FRI) Dehradun; and various local university departments.

Communities, Individuals, the corporate sector, and mass media: They promote environmental conservation and climate action at the community level by organizing grass-root campaigns, conscious consumption, behavioural change, fund allocation for environmental projects, promoting environmental awareness etc. Additionally, ministries and government departments at the Central and State levels also include environmental awareness and education as an imperative step towards achieving sustainable development.

Challenges to climate education

Building a climate-friendly curriculum for children as well as teachers is a challenge in most countries. The fundamental difficulties in drafting an effective climate change curriculum in India include:

- Global climate change science is a complex issue and is an emerging dynamic field with constant developments.
- Climate change is a transversal issue which needs both theoretical as well as action-oriented knowledge with a solution-based approach.

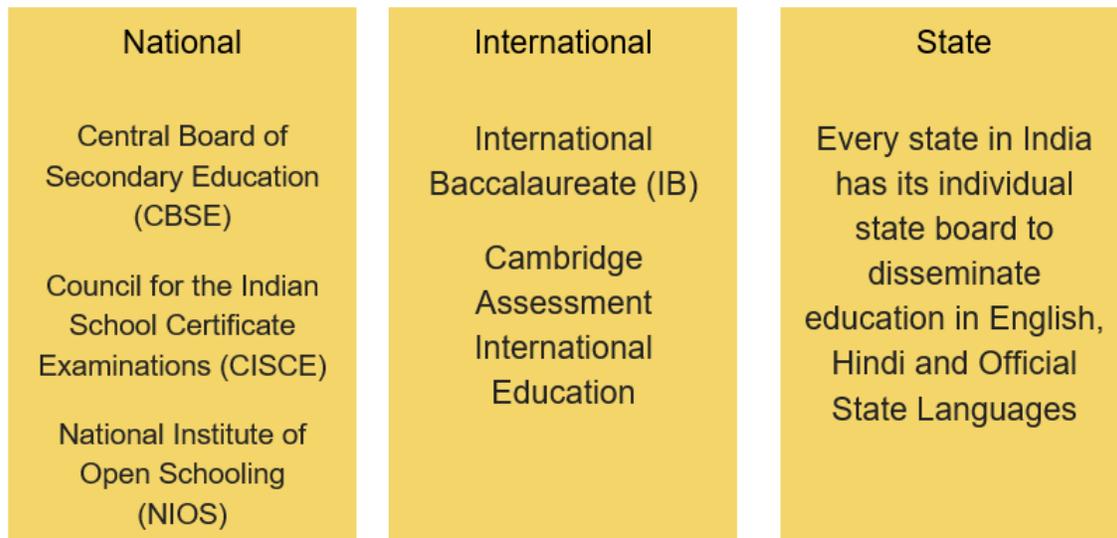
- Developing a comprehensive CCE curriculum is difficult due to numerous educational systems both at national and sub-national levels.

Furthermore, climate change as a whole remains largely invisible, unlike the environmental extremities such as earthquakes, floods, oil spills, acid rain, etc. which are visible. This is the major reason that global warming has historically remained an abstract concept, which has proven to be difficult to translate, especially in a formal education format. However, recurring weather extremities and the latest IPCC report have now scientifically established a connection that global warming is a direct consequence of climate change. Yet, the urgency of the issue still remains unfocused in the contemporary curriculum and its revised frameworks (Schreiner et. al., 2005).

On the policy front, competing interests have always been prevalent when climate change is discussed. Majorly, reducing emissions are largely seen as the straightforward policy solution to global warming and whereas adapting to the climate impacts is also being promoted through various instruments. However, climate change education has not been seen as a mechanism to address the issues of climate change through behaviour change, promotion of sustainable lifestyles and disaster preparedness. As a result, climate education and communication are not prioritized in the national policies and country's international commitments. On the other hand, if climate change education is strengthened across informal and formal education, in urban and rural settings and channelized through multiple stakeholders, it will prove to be a major driver to achieve the mitigation and adaptation targets at local, regional, national and international levels. This sentiment is further reinforced by the UN Framework Convention on Climate Change, the Paris Agreement and the associated Action for Climate Empowerment (ACE) agenda as it calls on governments to educate, empower and engage all stakeholders and major groups on policies and actions relating to climate change.

Education in India is offered through numerous educational boards that have existed for many years. Each board has its unique pedagogy, curriculum, learning methodology, and examination procedure. Educational boards are classified into three categories: international board, national board, and state board.

An overview of the educational boards is given in the table below:



Source: leverageedu.com

Additionally, there has been a debate about the appropriate terminology to describe environmental learning (Shalcross and Wals 2006; Scott and Gough, 2004). The contention primarily arises from the issue around the relative efficacy of pedagogical approaches to promote concepts of traditional knowledge of the environment given the post-colonial effects on modern society. The Centre for Environment Education (CEE) uses the term Education for Sustainable Development (ESD) which was later adopted as a key target for achieving Quality Education (SDG 4) in the Sustainable Development Goals (SDGs). The use of this term projects that the expected outcome of learning would go beyond knowledge acquisition and inspire behaviour change in individuals. It does this by going beyond the vocabulary of resilience and including greater concepts of mitigation and adaptation. However, the use of ESD as well as climate change education is generally manifested as a generic descriptor and is thereby more 'aspirational' in its pedagogy than theoretical/empirical in the Indian education system.

Teachers often lack the expertise needed to teach their students about climate change due to anachronistic framework and limited resources as well as capacity building opportunities. A 2021 UNESCO study mentioned that fewer than 40% of surveyed teachers were confident in teaching about the severity of climate change and only about one-third felt able to explain the effects of climate change on their region or locality.

This clearly reflects that teachers' capacity needs to be built to enhance their understanding of the complex dimensions of the climate crisis as well as to translate the knowledge of climate change amongst their pupils.

Role of Teachers in the Indian Education System

Great nations and communities are led by teachers who are learned, wise and independent. Such teachers impart their students the tools to attain higher values in life and possess empathy for fellow creatures. Teachers have the indispensable role of generating and imparting knowledge over lifetimes. Assimilating the role of education throughout society is a teacher's greatest responsibility and contribution. Hence, no nation should detain the pursuit of providing essential resources and due status to its teachers for the success of its society. (Gorana et. al., 2016)

A teacher plays a central role in the overall foundation of the Indian education system. They are intimately involved in the curricula, materials, processes, goals, and projections of the school. The teacher plays a central role in the learning process by actively engaging in queries about the school as well as addressing the needs and demands of the school. The pedagogical ability of a teacher has wide implications on the social, economic, and political landscape of society.

A teacher's pedagogical competence, motivation, and consideration are the driving force for the quality and extent of a student's achievement. This includes the quality of subject matter knowledge, the extent of pedagogical skills, and time invested in academic preparation. There is an ever-present need for keeping these skills contemporary, diverse, and relevant as required over a course of time. Such factors confirm the importance of competent teachers to a country's schooling system.

However, a teacher's competency is influenced by a number of factors such as remuneration, workplace conditions, worker status in addition to their academic and professional qualifications. According to the SDG Index 2020-21 published by NITI Aayog, approximately 83 percent of teachers in secondary schools are formally trained under institutional mechanisms while the all-India pupil teacher ratio at secondary level stands at 21. The conception and implementation of a robust curriculum for teacher education will ensure a quality fleet of educators to facilitate the country's schooling system. A contemporary climate change curriculum should be implemented at the earliest stage of a teacher's career as it would empower novice teachers with the ambition, knowledge, pedagogical skills, and sensitivity required to foster students empowered to undertake climate action. (NCTE, 2009, 1-2)

Teachers' Inclusion in the Policy Framework

Although the first National Education Policy came into effect in 1968, a need to develop guidelines for teachers manifested much later in 1998 with the publication of 'Curriculum framework for quality teacher education.' With respect to environmental and climate education, The National Council of Teacher Education has stated that although environmental education is mainstream in the formal education system, 'it is yet to get its rightful place in education, much more so, in teacher education' (NCTE, 2005).

In the revised 2005 teacher curriculum framework, the NCTE asserts the need for prescribing environmental education as a compulsory and integral component of teacher education. However, in the NCTE curriculum framework revised in 2009, environmental education is mentioned but not much emphasis is laid on it.

Teachers play an indispensable role in the Indian Education system as demonstrated by the National Educational Policy (NEP), 2020. The policy report has a special section dedicated to Teachers in School Education and envisions ambitious targets and explores opportunities for teachers, especially in the School Education sector. (NEP, 2020)

The primary reform proposed by NEP addresses the recruitment and deployment of teachers. It proposes awarding a large number of merit-based scholarships for teacher training to ensure the high quality of teachers and provide access to candidates in rural areas. It aims to eliminate the harmful practice of excessive teacher transfers and allow teachers to serve as local-area role models in addition to teaching. Moreover, the policy proposes avenues for Continuous Professional Development (CPD), Career Management and Progression (CMP), and an increase in Professional Standards for Teachers. (NEP, 2020)

The NEP 2020 also places emphasis on Teacher Education as a vital tool for shaping the next generation of India. The scope of teacher education will evolve within composite multidisciplinary institutions as per NEP, 2020. It will also ensure the availability of a range of experts in education, related disciplines, and specialized subjects. It will provide a network of government and private schools for potential teachers to have hands-on experience as well as participate in other activities such as community services, vocational training, adult education, etc. (NEP, 2020).

However, the national climate change policies as well as the education policy tends to overlook opportunities for teachers in mainstreaming climate education in the formal education sphere. Climate education is not emphasized as a key adaptation measure against the climate crisis in the national policy framework. There is a serious lack of representation of teachers and students as key stakeholders in discussions about climate change processes and formal education in the country.

Resources for Teachers in Climate Change Education

Governments and many stakeholders working in the field of education acknowledge the importance of climate change education, especially in the face of increasing climate extremities. Act 6 of the United Nations Framework Convention on Climate Change (UNFCCC) seeks to reduce the impact of climate change by enabling society to be part of the solution. Education and training are the two cornerstones of achieving climate action through climate change education.

Various organizations and government entities are actively engaged in developing training programmes and resources which will help teachers become the frontliners of contemporary climate education.

However, these training programmes are largely carried out in the urban areas on a relatively small scale considering the overall area and diversity of the country. Hence there is an acute demand for persistent efforts in mainstreaming climate education for teachers by continuous development and implementation of resources and training programmes.

Following are some of the agencies which have persistently helped teachers build their climate change knowledge as of late:

Trans-disciplinary Research Oriented Pedagogy for Improving Climate Studies and Understanding (TROP ICSU) is an international project funded by the International Council of Science to provide comprehensive resources and tools for teachers to effectively teach climate education across the world. In 2021, an online workshop cum faculty development program on, '*Digital Pedagogy & Climate Change Education*' was conducted in collaboration for teachers of Delhi University. Such programs help provide interdisciplinary training that is critical for climate change research while also improving conceptual understanding of themes in the Sciences, Mathematics, Social Sciences, and other disciplines.

The Climate Reality Project- The Climate Reality Project's Teachers Training Program (TTP) is a flagship program that aims to provide teachers with the right tools and techniques to help young people and community members understand the causes and consequences of climate change, ultimately bringing about changes in attitudes and behaviours. The program has trained over 7000 teachers from 500-plus schools to discuss climate change with students and their communities. They also conduct online teachers training certificate programs by collaborating with local NGOs in both English as well as Hindi for added accessibility. Teachers can access instructional resources such as posters, lesson plans, quizzes, activity workbooks, and comics through a dedicated website and mobile app.

The Mahatma Gandhi Institute of Education for Peace and Sustainable Development (MGIEP), in New Delhi, India is an integral part of UNESCO. It is the first and the only research institute in Asia Pacific which focuses on achieving the Sustainable Development Goal (SDG) 4.7 towards education to foster peaceful and sustainable societies. They offer a variety of interactive, self-paced courses intended for middle school students and teachers for developing a variety of social and emotional skills in order to deal with climate change and work toward a more sustainable future. *Learning through Issue-Based Reverse Embedding (LIBRE)* is a pilot portal which was launched by MGIEP UNESCO in July, 2015 to enhance climate change education. It worked on encouraging teachers from all around the world to collaborate on lesson plans to educate climate change through their respective topics.

The Indian Institute of Science Education and Research (IISER), Pune- IISER has developed a 16 weeks online course was developed by titled 'Climate Change: A Guide for Teachers of All Disciplines under the Annual Refresher Programme in Teaching (ARPIT) programme on the Swayam Portal of the PM e-Vidya platform developed by the Ministry of Education, India. The course offered video lectures, associated presentations, educational resources including lesson plans and digital pedagogical tools, and assessment material on both the science of climate change and on discipline specific climate change education.

Centre for Science and Environment (CSE) conducts a four-week online course on Climate Change specifically targeted towards teachers. It aims to build upon pre-existing understanding of climate change from a science, policy, and action perspective and help bolster their confidence in effectively imparting climate change pedagogy. It aims to create a cohort of teachers and professionals confident about climate change education by offering them ideas, tools and methodologies for more effective teaching of climate change in the classroom.

Green Teacher Program (A diploma course in Environment Education)- It is a distance education program offered by the Centre for Environment Education (CEE). Over 700 instructors have graduated from the programme, which was delivered through six study centres across the country. The curriculum improves the teachers' professional standing and widens their horizons as a subject expert in the rapidly growing field of EE. It paves a way for undertaking research programmes and further courses on Environmental Education.

Paryavaran Mitra Programme- It is a nationwide initiative to create a network of young leaders from schools across the country, who have the awareness, knowledge, commitment, and potential to meet the challenges of sustainable development in their own spheres of influence. The Paryavaran Mitra programme primarily seeks to reach students from class 6 - 8 (age group 11-15) through teachers. The programme demonstrates transformative education for environmental leadership for teachers and via them, for students through curriculum-linked activities and action projects for positive change in behaviour and action, taken at individual, family, school and community levels. Paryavaran Mitra has reached out to about 219, 888 schools in India, and has created strong networks among teachers and schools which facilitate peer learning and local problem solving.

Earthian- Since 2013, CEE has been implementing the Earthian Program in India in conjunction with Wipro. It is aims at assisting schools through involvement and training of teachers in comprehending and incorporating sustainability into their educational operations.

Eco-Schools India- It is an International Programme for promoting Environment Education and awareness about sustainable development issues in schools, particularly by engaging students from classes 1-5. Eco-Schools India is part of the larger global Eco-Schools programme implemented

through the Foundation for Environmental Education network in over 70 countries. Eco-Schools India is offered by the Centre for Environment Education. The programme provides an excellent opportunity to students to learn to identify environmental issues of concern to their schools and the immediate community. It provides teachers and students a structured methodology, to put into place an action plan. It provides schools with a certification and international benchmarking.

An institutional endeavour worth mentioning would be the **Teachers' Training Programme on Climate Change organized by the Department of Environment, Madhya Pradesh** which helped train 20 teachers in all districts of Madhya Pradesh as well as disseminate climate change workbooks among 100000 school students across the state. Such training programs should be mainstreamed by the local governments to make climate change education accessible to the lowest appropriate level.

Additionally, many NGOs around the country are contributing actively by conducting workshops, training, and discussions on the subject of climate change specifically targeted towards teachers. Teachers can build their climate change knowledge through self-paced online courses offered on portals such as UN:CC Learn, UNESCO, The Climate Project Foundation, FutureLearn, Coursera, etc.



TEACHERS' CONSULTATIONS ON CLIMATE CHANGE

The next part of the methodology involves conducting primary data research by organizing online discussion forums where teachers from all over India attended to contribute their insights on the state of climate change curriculum and its transaction in India. In order to ensure maximum representation, the online consultations were conducted in English and three Indian regional languages namely, Hindi, Gujarati, and Bangla. The consultations were developed based on a questionnaire (see annexure) which included detailed questions regarding inclusion and gravity given to climate change topics based on themes identified in secondary research. The consultations were held in a productive online meeting format where facilitators showcased the questionnaire via presentation and the subsequent answers were recorded electronically and later transcribed into text.

Teachers' Consultations on Climate Change

4

Consultations in English and regional languages (Hindi, Gujarati, Bangla) with a total of 54 participants



Online discussion based on an open-ended questionnaire on the themes identified in the secondary research

13

Most teachers across all consultations expressed that climate change education needs to be incorporated into the curriculum as a separate compulsory subject. Teachers acknowledged that environmental education is primarily an elective subject and hence less effort and attention is imparted in its pedagogy. However, with the rising threat of climate change all around the world, teachers strongly believe that the coherence of climate change concepts is essential for all parties in the education system and society.

Teachers across all consultations expressed that a major emphasis is given on rote learning and scoring metrics, as a result, students lack a deeper understanding and implementation of core principles discussed in the syllabus. This deters both teachers and students from making a real impact based on the concepts in the syllabus both in the classroom and community.

Climate change concepts are often infused across a range of science subjects such as geography, biology, general science, etc. which further makes it difficult for teachers to teach such critical concepts in-depth amidst a vast, rigid curriculum.

As previously stated, Environmental Education is primarily taught as an elective or grade-based subject in India. During classes 1-2, EE is taught through activities integrated into core subjects of reading, writing, and mathematics. From classes 3-8, EE is taught in an integrated manner infused into subjects such as science, social studies, and languages. For classes 9-12, EE is primarily taught through project-based learning. Thus, there is a scope for establishing a theoretical foundation of climate change education across the formal education sphere.

The teachers stated that as a part of their EE teaching, they try to incorporate EE by conducting activities such as cracker less Diwali, eco-friendly Ganesha, etc. By including themes related to the local culture, it becomes easier for students to relate to EE and for teachers to drive behavioural change by promoting sustainable activities. Additionally, teachers also try to engage students in sustainability practices by participating in cleanliness drives, tree plantations, repurposing books, etc. A remarkable initiative presented by a teacher was 'Green School Bag', where students were asked to forgo all plastic school supplies and bring an eco-friendly school bag. Teachers believed such activities drive long-lasting behavioural change and help promote values of sustainable development and conscious consumerism.

In addition, these consultations reflected that teachers face a dearth of resources and training to enhance their knowledge about climate change education. A few teachers expressed having attended environmental education training organized by non-governmental organizations (NGOs) and environmental think tanks. However, these training programs focus on teaching evidence-based changes based on rudimentary knowledge (e.g., switching from CFL bulbs to LED lights to reduce emissions). It has been observed that evidence-based learning makes climate change education acceptable across the spectrum of society and can help change consumer patterns. However, linkages to climate change impacts of sustainable behaviour are not necessarily made from a theoretical perspective which hinders expansion of cognitive dimensions.

A way of promoting climate change education in schools is by engaging students in discussions regarding climate change. Teachers stated that they try to organize such discussion sessions with students on topics such as climate extremities, greenhouse gas emissions, sustainable lifestyles, etc. They also use resources such as YouTube videos, presentations, and other technological tools to make environmental education dynamic and interactive. However, teachers expressed they do not feel confident enough to discuss theoretical aspects of climate change education and hence believe such sessions often end up being superficial. They expressed a desire to enhance their knowledge in order to confidently impart climate change pedagogy since students (youth) would be a priority stakeholder in tackling the climate urgency in the future.

When asked about obstacles in successfully imparting climate change education, teachers expressed few overarching concerns. They unanimously stated that institutional pressure is the biggest obstacle in climate change education effectively. Teachers stated they are often pressed for time as they are expected to complete extracurricular tasks (census data recording, election duty, etc.) in their work hours which prevents them from wholly contributing to pedagogy. The vast, rigid syllabus also makes it difficult to engage students in a dynamic way and create linkages beyond textbooks. Shortage of funds from the institutions deters educators to regularly engage students in workshops, field trips, and webinars which would encourage them to view climate change from a holistic perspective.

Across all consultations, teachers implored the government agencies to create specialized modules in climate change education in pre-teacher training programmes (e.g.: B.Ed.) and other professional development programs throughout their pedagogical careers to make them proficient in contemporary climate change education curriculum. Most of the participants who attended these consultations were previously affiliated with CEE and hence had a heightened sense of understanding about the climate crisis. Hence, it is imperative to increase overall awareness of climate change across all teachers in the formal education system. With proper guidance and efficient workload balance, teachers believed they could wholeheartedly dedicate themselves to climate change pedagogy.

Forum on State of climate change education for teachers in India: Preliminary Reflections

An online discussion forum was organized to discuss preliminary reflections from the first six months of the research study via zoom. The participants in the online discussion included in-house ESD experts from CEE, CEE Climate Change Program team, teachers from the Teachers' consultations, and Mr. Kiichi Oyasu, UNESCO Bangkok (India Focal Point). The discussion commenced by setting the context where the overall methodology of the research was discussed, followed by an overview of the Indian education system as well as the preliminary findings of primary and secondary research. The latter part of the discussion consisted of recommendations from the participants for implementation of climate change pedagogy in teacher education.

After discussing the preliminary findings, the session moved on to expert opinions, questions, and recommendations. Mr. Kiichi Oyasu reflected on the similarities and differences in the environmental education curriculum in India and Japan. He emphasized the multidisciplinary nature of environmental education in Japan which includes experiential learning as well as theoretical understanding of climate change concepts and disaster risk management as Japan is prone to climate extremities. However, he commented that teachers often have a generic understanding of ESD and SDGs and a robust teacher curriculum needs to be developed to enhance teachers' understanding of climate change education.

The experts in the forum reflected on the difficulties for incorporating climate change curriculum and pedagogy in the formal education sphere. They acknowledged that vast improvements needed to be made in the environmental education curriculum in India, with respect to climate change. It was observed that developing an exclusive climate change curriculum would be incredibly laborious given the complexity of the education system in India. However, as CCE is an overarching issue, all opportunities for teaching CCE in a local context should be harnessed.

Moreover, an issue of how and when climate change concepts should be taught to students was also raised as presently the curriculum involves teaching core theoretical environmental concepts to students from a scientific perspective in their formative years. Hence, environmental education as a subject is often taught as an activity-based curriculum to encourage first-hand learning thereby encouraging the development of a personal connection with nature and the environment. The discussions in the forum revealed a need to incorporate value-based climate change education in the formal curriculum. The experts also suggested teaching disaster risk management with the help of examples as teachers might face difficulty in teaching about theoretical climate change concepts and climate extremities to younger students. Climate change education should be made more accessible by incorporating visual mediums and storytelling devices. Both teachers and students can relate and retain climate change pedagogy beyond schooling by using visual mediums.

Given the diversity of India and the complexity of the education system, conceptual learning can be ensured when complemented with localized exposure to create a strong foundation for inclusive learning of climate change education. The new framework should be holistic and multidisciplinary as climate change is a cross-cutting theme across various science subjects being taught in schools today. Encouraging the development of the metacognitive skills of students in their formative years is key to raising a new generation with an innate empathy towards the environment.



ANALYSIS AND DISCUSSION

It is apparent that a lot of interest and effort has been devoted to making environmental education mandatory and mainstream in the Indian formal education system. However, the same cannot be said about the evolution of formal climate change education in India. The New Education Policy, 2020 has put forth ambitious objectives for spreading climate change education to make the upcoming generation climate resilient. The challenges that India might face in executing CCE in the coming years can be clearly indicated by the strengths and weaknesses arising from the secondary data analysis.

India has a rich archive of environmentally friendly and sustainable traditional practices that are still relevant today and are incorporated by teachers in their pedagogy and the same sentiment is reflected in governance as the Constitution of India has declared environmental conservation a duty of every citizen and state. The National Education Policy, 2020 has emphasized the need for a holistic and multidisciplinary environmental and climate education in the formal school curriculum to help future generations become climate resilient. The central government provides financial aid and technical assistance to all states for mainstreaming environmental education.

Given the topographical and linguistic diversity of India, the State Governments allocate budgets to develop environmental education resources in regional languages to promote environmental conservation and sustainability. As mentioned earlier, environmental education is further promoted by non-governmental organizations, academic, and research institutions to increase the capacity building of teachers and students by conducting training programmes, workshops, and activities. India has a long history of incorporating environmental education and hence there is hope for shifting the paradigm from environmental education to climate change education to drive change in achieving climate resilience in the future.

The scope for climate change education has not been critically defined thus far. There is a need for a deeper understanding and implementation of Education for Sustainable Development (ESD) and climate change education to achieve the SDG target of Quality Education by 2030 (Tikly et al., 2020). Climate Change is still a peripheral topic in both educational research and practice and mostly restricted to science education (UNESCO, 2012).

Responses from the online teachers' consultation revealed that environmental education is more ornamental in the application, limited to the syllabus coupled with tree plantation and cleanliness drives, competitions, etc. and not taught in an interdisciplinary manner. It is left to the teachers' initiative and the schools' own interest where environmental education gets into action. Teachers feel the need for space, knowledge and enhancement of skills for effective environmental education.

While the urgency of climate change is understood on a policy level, there is a lack of clear articulation of the scope, processes, and implications of climate change education. Implementation of climate change education is hindered due to factors such as poor infrastructure facilities in schools, teacher-student ratio, rigid syllabi, time constraints, etc. as observed in the consultations and also in the report published by the Transforming Education for Sustainable Futures project (Tikly et al., 2020). There is a great scope for the incorporation of regional and target-specific themes in climate change education to connect people and encourage them in engaging in environmental education processes, as the textbooks are developed at the level of state government.

However, the cycle of curriculum reform occurs every 4-5 years, contributing to a lack of monitoring, evaluation, and revision of environmental education content that makes it less contemporary (NITI Aayog, 2021).

While assessing the inclusion of climate education in the formal curriculum, it was observed that environmental education is made compulsory across all levels in the school system. Additionally, as formal education in India is imparted through English and varied regional languages, there is a scope for variation in theoretical concepts when translated which could result in inconsistencies. This was specifically flagged by the teachers who participated in the consultations.

Lastly, there is a dire need for acknowledgment of students and teachers as important stakeholders as well as increased participation by the community, NGOs, corporate sector, and other academic institutions for proper utilization of such entities in promoting climate change education.

The increased gravity of the climate urgency has put the spotlight on the state of environmental education and climate change curriculum in India where there is a massive scope for rejuvenating CCE and bringing it into the mainstream. Climate change education is not a separate subject but is practiced only through cross-curriculum methods (Scoffham, 2000). Teachers receive inadequate knowledge and skills in infusing theoretical knowledge of climate change to their students. After analyzing the responses from teachers during climate change consultations, the following findings were the most prominent:

Lack of qualified teachers: Teachers are instrumental in creating students who will lead climate action in the future, however, they need to possess environmental knowledge, an optimistic attitude as well empathy towards the environment (Gorana et. al., 2016). The linguistic diversity, poverty as well as low literacy rates in women are some of the pre-existing challenges for imparting contemporary CCE in India. However, currently it is still being offered as an optional subject in pre-service teacher training programmes, like the Bachelor of Education (B.Ed.) and could be made mandatory. The teachers' consultations revealed that participants felt largely underconfident to impart such knowledge due to a lack of expertise in the subject.

They expressed that due to increasing pressure to prepare students for examinations, their pedagogy is largely utilized for the transfer of content knowledge in prescribed subject areas, rather than promoting essential skills such as critical thinking, problem-solving, intellectual curiosity, and holistic learning.

Diversity: The teachers' consultations disclosed a difference in perceiving climate change education depending on their area of residence. Teachers living in urban areas such as Delhi generally had a positive attitude towards incorporating climate change education and requested the inclusion of topics promoting sustainable development and behaviour change whereas teachers from rural areas during the Bangla consultation expressed a strong need of emphasizing climate disasters in climate change curriculum as it was the most pressing issue in their day-to-day life.

Variation in environmental literacy: The Mentimeter activity during the consultation revealed vast knowledge gaps amongst teachers about theoretical concepts related to climate change and environmental education. Although they try to incorporate environmental education through action-based learning, there is a definite lack of climate literacy amongst teachers. Teachers expressed a need for compulsory climate change education in pre-service teacher training programs.

Pedagogical methods: The online consultations revealed that teachers try to practice innovative methods such as activity and project-based learning approach for environmental education on their own volition. However, the prescribed way of environmental education through institutional mechanisms is through lectures and rote-based learning as observed in the secondary research. This deters students from gaining an interest in the subject on a large scale.

Lack of training and resources: While Environmental Education has been mainstreamed in the formal education system, training in the fundamentals of climate change has not reached its full potential leaving teachers largely unprepared for infusing such topics in the course curriculum. Although they try to infuse EE through activity-based learning, there is a need for both pre-service and in-service training for teachers to help them infuse contemporary climate change topics in their classrooms. Due to the changing nature of the schooling system (online schools) teachers should also be trained in technological adaptation for the collection and use of relevant climate change education content from the internet.

Additionally, lack of resources and support from institutional management deters teachers from accessing training opportunities, resources, and reference material as well as ongoing support in the implementation of CCE methodologies and activities in their curriculum. As a result, the entire education ecosystem is facing deficiencies in imparting climate change education.

Lack of scope and work pressure: Environmental Education is manifested as an elective/grade-based subject both in student curriculum as well as in pre-service teacher training. As a result, other subjects such as Mathematics, Science, Computer Education, etc. are given precedence over climate change education.

This is further exacerbated by pressure placed on teachers by the school administration to modify instructions and activities which would ensure better results in competitive examinations. Teachers expressed that such a rigid school environment has put a lot of pressure on their decisions regarding instructional choices and are merely reduced to being mediums of content transfer rather than knowledge transfer.

Recommendations

This research study was conducted to analyse the current scenario of climate change education in the teachers' curriculum in India. After extensive secondary research, it was apparent that there is a need to incorporate climate change education in the formal education sphere for teachers as well as students. The primary research in the form of teachers' consultations further reinforced this finding as well as revealed a demand for training programs and resources for teachers to effectively impart climate change pedagogy. Given below are proposed recommendations from a policy, science and pedagogical perspective.

Climate change education needs to be a core component of the formal education sector: Although environmental education is mandatory in the Indian formal education sector, the curriculum focuses primarily on environmental conservation. Currently, climate change is a part of Environmental Education (EE) and ESD, and has not emerged as an independent field. The growing interest in climate change education and the emergent need to focus on core concepts, is significant to address the detrimental anthropogenic effects as well as to provide knowledge and skills for effective mitigation and adaptation to the climate emergency. The 2012 UNESCO report says that it is also important to anticipate the possible scenarios under which climate change could develop into a central focus of education, and become an independent concept and focus area, labelled as 'climate education' or 'climate change education'.

Climate-proofing education systems: India ranks seventh in the Global Climate Risk Index, 2021 (Eckstein et. al., 2021). There is a limited focus on SDG 4 (Quality Education) and Target 13.3 (Education for Climate Action) in the policy instrumentation for climate change mitigation and adaptation. The brunt of the climate crisis will be faced by the younger generations in the country. There is a need to develop a holistic policy framework which would prioritise mainstreaming climate change education to achieve widespread climate action.

The immediate task is to climate proof education systems (adaptation), through a holistic, solution-based climate education curriculum will elevate the cognitive dimensions and actions to deal with future challenges.

Teachers have significant capacity building needs to teach climate change: The online teachers' climate change consultations revealed that few teachers were confident in teaching about the severity of climate change and desired resources to effectively teach climate change education from a local perspective. Climate change education should be integrated into pre-service and in-service teacher training across all subjects and at all levels of education. Knowledge, effective pedagogies and tools should be provided to encourage a whole-school approach to climate education (UNESCO, 2021). The climate-relevant resources need to be also made available in local languages to help teachers teach climate change education from a local perspective. Additionally, the proposed climate change education cannot be constrained to traditional structures of education and instead, must draw inspiration from informal and hybrid approaches (i.e., online learning) to provide alternative learning and action opportunities.

Climate change education should be made forefront into various aspects of policies and programmes: An in-depth policy review suggested that instrumental changes have been taking place in India on building environmental awareness and education. However, climate change education needs a focused attention and needs to be recognized as an effective mechanism to address the climate emergency. This has proven to be a problem in India thus far, as India is a developing country and is still focusing on prioritizing and providing education to everyone. It is significant that the drive from climate change policies is fed into the development of a climate change curriculum, with an emphasis on Education for Sustainable Development (ESD). Climate change concepts should be integrated across national and sub-national education policies and programmes, including legislation, policies and strategies as well as curriculum content to bring about meaningful transformation in education systems.

Straightened collaboration between the Ministries of Education and Environment to boost climate change education: The ministries of education and environment have always been in synergy for spreading environmental awareness and education in the formal education sphere. A bigger impact will be created when government agencies responsible for education, environment and sustainable development collaborate to promote climate change education. This can be achieved by introducing and implementing training programmes to teachers via pre-existing education networks such as the National Green Corps (NGC) and the National Environment Awareness Campaign (NEAC) to drive large-scale climate action. By harnessing such institution-led networks, there is an opportunity to achieve mainstream climate change education at a rapid rate by virtue of a cascading mechanism. With no time to lose, we must break down barriers and make every effort possible to ensure all stakeholders in the society are prepared to face the greatest crisis of our time.

Climate change education should be inclusive, accessible and holistic - and teachers are the agents of dissemination: Teachers and experts who participated in the primary research emphasized the crucial importance of solution-based learning. However, few teachers demonstrated the confidence in teaching the theoretical concepts of climate change and its subsequent action-based response. There is a need to make climate change education compulsory in teacher training programmes, especially government-led, which will contribute in mainstreaming climate change education across the country from a futuristic perspective. Teachers, however, also need to be competent to address climate change from a multidimensional perspective through holistic curricula and pedagogies to ensure learners are knowledgeable, competent, optimistic and engaged.

Conclusion

Environmental education has been the fundamental doctrine of the national government for promoting environmental conservation, building on the underlying principle to live in harmony with nature. Hence, most of the existing country-level frameworks and policies focus on environmental education as a mandate to promote environmental conservation amongst the citizens. On the other hand, the current climate and education policies do not recognise climate change education as a key adaptation measure for combating the climate crisis. There is a limited focus on SDG 4 (Quality Education) as well as Target 13.3 (Education for Climate Action) in the policy instrumentation for climate change mitigation and adaptation. There is a need to develop a holistic policy framework which could priorities mainstreaming climate change education while adhering to the ESD and ACE goals set by the UNESCO as well as UNFCCC.

The Indian Government has proposed a New Education Policy, 2020 as well as a new National Curriculum Framework for Teacher Education in 2021 in an effort to revamp the formal education system. However, climate change education needs to be at the forefront in the policy framework to ensure implementation of mainstream climate change education, especially in the formal education sphere. The ministries have been instrumental in funding and mainstreaming environmental education across the formal education sector, thus there is hope for mainstreaming climate change education in the future.

In order to integrate a multidisciplinary approach, the national climate policy framework needs to be connected with the educational policies as well as required to be translated into effective national action plans, curriculum frameworks, and recommendations. Policy framework should include both socio-economic as well as socio-political perspectives for efficient implementation and periodic amendments of contemporary climate change education. Promoting meta governance and encouraging state governments to draft a climate change education framework as part of the state-level action plans on climate change, is essential for promoting local climate resilience.

It is significant that the drive from climate change policies is fed into the development of a climate change curriculum, with an emphasis on sustainable development, disaster risk reduction and climate action, at national, state and regional level. Additionally, there is a need to build awareness, encourage public participation and increase policymakers' understanding of climate change effects and the significance of various stakeholders, especially teachers and young people, to help build resilience against the ongoing climate urgency.

Although the policy and institutional framework is undergoing a much-needed overhaul, the same cannot be claimed for climate change pedagogical techniques and resources available today. The online consultations with teachers revealed a lack of theoretical understanding and institutional support for understanding the fundamentals and gravity of key climate change concepts.

However, the teachers showcased determination to enhance their knowledge on climate change concepts and practice climate action. They expressed a desire for a holistic multidisciplinary curriculum which would enable inter-department collaboration and knowledge sharing among teachers and students as climate change is a cross cutting issue.

The online consultations as part of the research study make an important first step in understanding enabling factors and the level of inclusion of climate change concepts in the education system. Currently, the resources and training programmes for teachers on climate change are limited and mostly exist in the form of informal education mechanisms offered by a few civil society organizations. Development and access to resources such as workshops, courses as well as training programmes providing contemporary knowledge about the climate crisis should be readily available for capacity building of teachers. Revamping existing national and state level climate change policies will pave the way for inclusion of new mechanisms and innovative approaches to drive local climate action through formal channels. There is a vast potential as well as significance for defining appropriate strategies and mechanisms to expand knowledge, effective pedagogies and tools for teachers to teach climate change.

Consequently, the immense role and contribution of teachers need to be focused upon, recognized and strengthened overtime, to achieve the national climate change priorities and to encourage transition towards a climate-resilient future, through the means of climate education.

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ANNEXURE

Focus Group Discussion Questionnaire

1. What does climate change mean to you? Do you think climate change education is important? Why?
2. What approaches do you follow to explain the concept to your students?
3. What are your views on the Importance of Environment Education in a student's curriculum? Do you think Climate Change is well focused in the student's curriculum? Why? What do you think are the gaps?
4. Are you confident enough to teach the subject on your own or do you think a special training is required?
5. What are the challenges you face in teaching climate change?
6. Have you ever attended any training on climate change education?
 - a. If yes, who provided the training? What concepts were included?
7. Do you think there are ample workshops and training programs for teachers with regards to climate change? Why do you think so?
8. According to you, what reasons could prove to be a hindrance for teachers in accepting/adopting CC themes in their education?
9. What kind of CC resources/ materials do you refer to? Are there enough resources on climate change education for teachers?
10. What according to you are the ways to improve engagement and capacity building among teachers for better implementation of climate change education in the teacher's curriculum?
11. What do you think are the challenges faced by other teachers in India when it comes to climate change education?

LIST OF PARTICIPANTS FOR TEACHERS' CONSULTATION ON CLIMATE CHANGE

The research team would like to thank all participants for their contributions in the national and regional consultations. Their inputs have helped us understand the deficiencies in the formal education sector and the gravitas for developing a climate change framework to address the climate urgency. We are grateful for their presence and invaluable contributions in the consultations.

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The research team would like to thank all our facilitators and experts for their support in organizing the regional and national consultations as well as bringing in teachers from their local networks to deliberate on the topic. We are grateful for their inputs from time to time.

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PICTURES AND RECORDING OF THE TEACHERS' CONSULTATIONS

English Consultation



Hindi Consultation

CEE
Centre for Environment Education

ATECCE
SUSTAINABLE DEVELOPMENT GOALS

Question 3

What **approaches** do you follow to explain the concept to your students?

S

Gujarati Consultation

CEE
Centre for Environment Education

ATECCE
SUSTAINABLE DEVELOPMENT GOALS

Question 1

What are your views on the **Importance of Environment Education** in school curriculum?

Do you think **Climate Change** is given due focus in the school curriculum? If not, what do you think are the **gaps**?

Bangla Consultation

CEE
Centre for Environment Education

ATECCE
SUSTAINABLE DEVELOPMENT GOALS

Question 4

Are you confident enough to teach the climate change concept on your own or do you think special training is required?

আপনি কি নিজের থেকে জলবায়ু পরিবর্তনের ধারণা শেখানোর জন্য যথেষ্ট আত্মবিশ্বাসী বা বিশেষ প্রশিক্ষণের প্রয়োজন বলে মনে করেন?
যদি হ্যাঁ হয়,কি ধরনের প্রশিক্ষণ?

Recordings of all consultations could be accessed in the drive folder link below:

<https://drive.google.com/drive/folders/1RPn5nC4LyU6lDfChLhWJLqC7leVk4jUi?usp=sharing>



ACCU

Asia-Pacific Cultural Centre for UNESCO



United Nations
Educational, Scientific and
Cultural Organization



uniTwin



OKAYAMA UNIV.

UNESCO Chair on
Research and Education for
Sustainable Development
Japan



ATECCE

CEE

Centre for Environment Education