



A BASELINE REPORT ON CLIMATE LITERACY IN TAMILNADU



Tamil Nadu Climate Change Mission



CAG

Citizen consumer and civic Action Group



Baseline Study on Climate Literacy Among Students, Youth and Policy Makers in Tamil Nadu

Study Report

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STUDY CONDUCTED BY:



Citizen consumer and civic Action Group (CAG)

No.103 (First Floor), Eldams Road, Teynampet,
Chennai 600 018
T: +91(44) 2435 4458 | 2435 0387

STUDY FUNDED BY:



Tamil Nadu Climate Change Mission,

Department of Environment and Climate
Change,
Ground Floor, Panagal Building,
Saidapet, Chennai 600015

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About CAG

CAG is a 37-year-old non-profit and non-political organisation that works towards protecting citizens' rights in consumer, civic and environmental issues and promoting good governance processes including transparency, accountability and participatory decision-making.

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Abbreviations

Sl. No.	Abbreviation	Expansion
1	APP	Asia-Pacific Partnership on Clean Development and Climate
2	APA	Ad Hoc Working Group on the Paris Agreement
3	BCC	Behavioural Change Communication
4	CAG	Citizen consumer and civic Action Group
5	CEE	Centre for Environment Education
6	COL	Commonwealth of Learning
7	CRP	Climate Reality Project
8	CSE	Centre for Science and Environment
9	CSO	Civil Society Organization
10	CSR	Corporate Social Responsibility
11	DoE & CC	Department of Environment and Climate Change
12	EETSD	Environmental Education & Training for Sustainable Development
13	EVS	Environmental Studies
14	GCE	Global Citizenship Education
15	GDP	Gross Domestic Product
16	GLOBE	Global Learning and Observations to Benefit the Environment
17	GoI	Government of India
18	GoTN	Government of Tamil Nadu
19	IEC	Information, Education, Communication
20	IES	Indian Environmental Society
21	KP	Kyoto Protocol
22	LCOY	Local Conference of Youth
23	MOEF&CC	Ministry of Environment, Forest & Climate Change
24	NAPCC	National Action Plan on Climate Change
25	NASA	National Aeronautics and Space Administration

Sl. No.	Abbreviation	Expansion
26	NCERT	National Council of Educational Research and Training
27	NDC	Nationally Determined Contribution
28	NEP	National Education Policy
29	NEP	National Environmental Policy
30	NGO	Non-Government Organization
31	NICRA	National Innovations in Climate Resilient Agriculture
32	NIDM	National Institute of Disaster Management
33	NOAA	National Oceanic and Atmospheric Administration
34	NPCCHH	National Programme on Climate Change and Human Health
35	NSF	National Science Foundation
36	PA	Paris Agreement
37	PMCC	Prime Minister's Council on Climate Change
38	SAPCC	State Action Plan on Climate Change
39	SAYEN	South Asia Youth Environment Network
40	SBM	Swachh Bharat Mission
41	SDGs	Sustainable Development Goals
42	TCPF	The Climate Project Foundation
43	TERI	The Energy and Resources Institute
44	TNSCCC	Tamil Nadu State Climate Change Cell
45	TOFI	Trees Outside Forests in India
46	UN	United Nations
47	UNFCCC	United Nations Framework Convention on Climate Change
48	USAID	US Agency for International Development

Executive Summary

Context and Background

Concerted efforts are being made at global to local levels to deal with climate change. One of the critical components of the multi-pronged strategy is awareness and education. The Tamil Nadu government has therefore been proactively taking steps to tackle climate change via education and awareness. Accordingly, the Department of Environment and Climate Change through Tamil Nadu Climate Change Mission has entrusted the responsibility of conducting a baseline study on climate literacy in Tamil Nadu to Citizen consumer and civic Action Group (CAG), a not-for-profit organization engaged in consumer and environmental research and development activities across Tamil Nadu.

Objectives & Methodology of Baseline Study

The main objective of the study is to assess the understanding of school and college students, community youth and policymakers in Tamil Nadu on the issues around climate change, impacts and vulnerability. Through a thorough review of literature, the study aims to document knowledge products on the subject. Finally, the study will also generate recommendations to enhance climate literacy in the state.

The study was carried out through structured interviews with 2430 primary respondents (school and college students, and community youth) sampled across nine districts in Tamil Nadu. Besides quantitative samples, Focus Group Discussions (FGD) with teaching faculty and in-depth interviews with government officials were conducted in each district. The sampling methodology ensured proper representation of samples across various key variables such as gender, socio-economic status of districts (urban, semi-urban and rural), medium of instruction (Tamil and English), management of institution (Government, Aided, Private), curriculum (State board, CBSC) etc.

Review of Literature

As a prelude to the baseline study, a review of literature was conducted. Besides documenting knowledge products generated by various government and non-government agencies, the survey mapped the state of environmental curriculum in the country. One key finding was that the integration of environmental education into mainstream school curriculum has laid the foundation for environmental awareness in the country.

However, it was read and reported by students, teachers and parents that they did not give the subject due importance as it was treated as a “supplementary” subject and not a “core subject”. The subject was quite theoretical and lacked adequate practical and participatory and engaging exercises and field visits.

As a result, the knowledge has been limited to exams and much more needs to be done to translate it into practice in day-to-day life. Secondly, environmental education lacks a prompt to action which is critical to climate literacy. Therefore, to bring environmental education closer to climate literacy, it needs to be enhanced with additional inputs and some changes in objectives, content, pedagogy, and delivery.

Findings of Baseline Study

(a) Knowledge of basic concepts and cause and effect of climate change:

School and college students showed varying levels of awareness regarding basic ideas and concepts of climate change. 51% of respondents were aware of the term climate change. There were negligible variations between male and female and urban and rural students.

School curriculum and co-curricular and non-curricular activities were the dominant sources of knowledge and awareness among 81% of students. Of the subjects, environmental science/studies and social science subjects were cited as the main sources of information.

While it was positive to see the extent of basic awareness of the issues, the flip side was the shallow understanding and confusion and misunderstanding over critical issues related to climate change, for instance a wrong understanding among 47% of respondents that climate change is about change of seasons in a year. Similarly, only 20.3% could explain the difference between weather and climate, whereas about 58.5% of respondents believing that climate change is about changing seasons. 73.4% of respondents did not have a scientific understanding of climate change and its processes. More than 50% didn't know the origins of greenhouse gas emissions, and whether these were through human-caused or nature-caused ways.

The following were important findings about cause and effects of climate change:

When asked about ozone layer depletion being caused by human actions, only 5.2% of the 2430 respondents knew about it.

However, regarding use of plastics and cutting of trees being causes of ozone layer depletion, the numbers were encouraging - with awareness at 44.5% and 40.7% respectively.

Only 13.2% knew that the energy sector is one of the main sources of greenhouse gas emissions. 34.7% identified direct industrial processes as the main reason which is an incorrect answer. Overall, 47.2% mentioned 'don't know'.

37.4% were not aware of any impact of climate change.

There is only limited awareness, mostly hearsay, regarding climate action initiatives from global to national/state levels. Respondents could recognize the names of initiatives but not their actual implementation.

Only 11.9% were aware of the Paris Agreement, while less than 10% of respondents were aware of each of the other global initiatives on climate change, such as IPCC, Kyoto Protocol, UNFCCC and COP 27.

Only 3.5% of respondents could explain correctly about the Paris agreement. About 88.1% were totally unaware of the agreement.

Only less than 6% of respondents demonstrated any awareness on one or more of the TN state climate change initiatives such as Tamil Nadu State Action Plan for Climate Change (TNSAPCC), Tamil Nadu

Climate Change Cell (TNSCCC), Tamil Nadu Green Climate Company, Tamil Nadu Governing Council on Climate Change, Tamil Nadu Climate Change Mission.

Only 2% of the 2430 respondents were aware of the target year the Government of India set for achieving Net Zero Emission at the COP27.

(b) Observations of climate change

73.7% of respondents reported noticing drastic changes in weather patterns in their locality.

About 58.7% could link temperature changes with climate change. This is a positive sign of awareness.

At least 51% reported that they are not aware of how knowledge on climate change can help an individual.

Only 23% of the respondents could understand that climate change will affect people from all communities/countries, while the rest opined that only a particular region/country (such as coastal, rural, island nations, developing countries etc.) would be affected.

One encouraging observation was that 94% of the respondents felt it was 'important' to enhance their knowledge on climate literacy.

To conclude, while many could notice changes in the environment and manifestations of the climate crisis, their observations were very basic and rudimentary.

(c) Practice

The study explored the various steps respondents were taking or intending to take in their daily lives towards reducing greenhouse gas emission. Over 90% of respondents cited tree plantation as their main preferred activity. Despite lacking a sharper focus on practice, environmental literacy did make people aware of the need to act in their personal lives. The top answers given by respondents regarding their personal behaviours that could impact climate change include: planting trees, reducing use of plastics, appropriate solid waste management and energy-saving practices at household level.

Conclusion and Recommendations

The integration of environmental education in school syllabus was a good move; however, it lacked a few things such as stronger practical component and a prompt to action, which is central to climate literacy as against knowledge of environmental science.

The emphasis has been on creating environmental awareness – that is, making students aware of the concepts and problems relating to environment. Climate literacy, on the other hand, emphasizes follow-up action in terms of identifying problems and coming up with solutions to tackle them.

Central to the climate literacy approach is inculcating critical thinking, and equipping students with knowledge and skills which are applied to problem-solving.

At this point of time, the idea is to “enhance climate literacy”, which in simple words would mean building on the present base of environmental science knowledge by adding critical components of climate change literacy through supplementary efforts both in formal and informal settings.

For both the formal and informal education, there needs to be a well thought through curriculum prepared with wide consultation and participation of stakeholders, especially the teachers, and consolidation and development of learning resources or instructional materials including textbooks, digital, multimedia presentations, visual aids, etc. The recommendations are classified into two categories:

- Formal education
- Informal education

Recommendations for formal category respondents – in schools and colleges

Knowledge and Awareness

- **Training of Trainer (ToT) programme for teachers/professors:** Minimum one EVS/social science/science teacher in each school /college can be given ToT training and he/she in turn can conduct periodic trainings and refresher sessions to fellow teachers and students.

He/she can be called as School/College-Climate Change Champion (CCC) of that school/college in that year. There can be one block and district level teacher-trainer (CCC) for conducting periodic refresher training to teachers.

- **Training curriculum development:** For the trainings of various groups of teachers (class, medium etc) different level of curriculum modules can be developed to achieve the twin-objectives of: (1) Developing knowledge thorough basic/ fundamental concepts on climate change and ongoing initiatives / programmes at state & central level, and (2) Equipping individual to be able to apply the knowledge in daily life.
- **Mode of dissemination:** Participative/interaction /activity based, using various audio-visual, games, exercises and self-review and self-assessment format. Specific videos of successful climate change practitioner / activist can be created.

The content can cover a wide range of issues in climate change, such as fundamental concepts, causes, effects, preventive strategies, roles and responsibilities of students in day-to-day life, etc.

- **Regular update of curriculum:** Updating curriculum to make it more climate literate friendly, from the present environment science orientation, is a medium-term project that needs wider consultation and approval of appropriate authorities.
- **Identify Gaps in Curriculum:** Review the present environment science curriculum across boards and classes and identify the climate literacy gaps in it.
- **Guest lectures as part of co-curricular activities:** The Government, together with environmental NGOs and academic institutions, should identify climate literacy topics and subject matter experts who will be able to deliver them using online (YouTube, Zoom etc) / offline modes.

Attitude and Practice

Field visits / trips: Field visits or trips to connect theory with ground realities and prompt students to look for innovative solutions which could be practiced in one's life and by the community.

- **Climate Change Fair/Day:** Every school/college can be provided with required funds and templates to hold a one-day event on climate change after their field visits. The students should be asked to generate original IEC materials (posters, etc.) on climate change which will be displayed in the school. The students would be awarded marks for their work and given incentives in terms of prizes and awards.

- **Institution of awards / recognitions:** Institution of annual awards and recognitions for students who have made significant contributions towards climate literacy and action in the school/college. This will motivate fellow students.

Recommendations for Informal Category respondents – Community Youth

Knowledge & Practice

- **Strengthening the Role of Panchayat Raj institutions:** The local administration bodies – village panchayats, municipality, and corporation etc – shall be entrusted with the responsibility of mobilizing youth who are not a part of the formal educational system into small Community Climate Change Clubs or reach out to them if they are already organized into small clubs or groups (sports clubs, SHGs, youth clubs, etc).

Attitude and Practice

- At the end of the outreach, under the guidance and supervision of the elected representatives, the youth are encouraged to hold a one-day Climate Change Fair/Day (as proposed for the schools and colleges). The government could provide financial assistance for conducting the event.
- Wherever possible, the local youth could be made to participate in the Climate Change Fair/Day organized in schools and likewise school/college students should be encouraged to participate in the Climate Change Fair/Day organized by community youth.
- Institution of annual awards and recognitions for individuals who have made significant contributions towards climate literacy and action in the community. This will motivate fellow community members.

Recommendations for Government Officials

Knowledge and Awareness

- **Inclusion of climate literacy in regular training:** Climate literacy can be part of regular training sessions organized for government officials. The curriculum should have both fundamental concepts, knowledge on currently ongoing initiatives/programmes, and application of knowledge in daily life.

A list of climate-friendly practices in government offices can be designed and displayed in key government offices (like, avoiding plastic usage, minimum use of electricity and water, use of rooftop solar, tree plantation, etc).

- **Orientation on existing programmes:** It is important to create awareness on existing programmes and schemes on climate change (state, national and global level) and individual roles, as about 90% of the respondents were not aware of the ongoing programmes/policies regarding climate change.
- **Short online certificate course on climate change:** Certificate course (online / short period i.e., one month etc.) on climate change can be framed by DoE & CC to help the interested government officials / school & college teachers to enrol and do the course.

1. Introduction and Background

Introduction and Overview

In recent years, concerted efforts have been made to study India's vulnerability to climate change. Since climate change is inextricably interconnected with people's livelihood and economic development, India is treading carefully regarding its environmental policy and pledges and commitments to the global community to reduce emissions and approaches towards net zero.

Put simply, it means that the government is considering the country's energy needs for economic and infrastructure development and poverty eradication. Simultaneously, the government is undertaking and expanding initiatives relating to renewable and alternative energy sources and use of non-fossil fuels in areas such as mobility and power generation and optimum utilization of fossil fuels until alternatives are developed. Both policies inform each other.

India has a slew of initiatives in the pipeline and under implementation to counter climate change and fulfil its commitments to the global community. Besides updating its Nationally Determined Contributions (NDCs) in August 2022, India submitted to UNFCCC another framework document – namely, 'India's Long-term Low Carbon Development Strategy' - with the vision to reach net-zero by 2070.

The overarching, flagship initiative is the National Action Plan on Climate Change (NAPCC) which comprises missions in specific areas such as solar energy, energy efficiency, water conservation, sustainable agriculture, Himalayan ecosystem, sustainable habitat, green India, health and strategic knowledge for climate change. Under the NAPCC is the National Mission on Strategic Knowledge for Climate Change (NMSKCC), implemented by the Department of Science and Technology. NMSKCC focuses on research, knowledge generation and capacity building. The Mission targets different stakeholders, especially policymakers and bureaucrats to communities, children and youth.

Three relevant ministries – namely, Ministry of Science & Technology (MoST), Ministry of Environment, Forest and Climate Change (MoEFCC) and the Ministry of Earth Sciences (MoES) - have in the past set up platforms and mechanisms for outreach and information dissemination to diverse communities and audiences.

The Ministry of Education has been actively promoting the concept of Sustainable Schools. "A sustainable school adopts a "whole school" approach; one that extends beyond the curriculum and addresses the entire planning, operation and management of the school facility. School sustainability policies and practices can strengthen what is taught about sustainability in the classroom, improve the school's own carbon footprint and strengthen public relations with the surrounding community. A sustainable school prepares young people for a lifetime of sustainable living through its teaching and day-to-day practices."¹

The thrust towards quality and sustainable schools is a whole school approach where all aspects including curriculum design, transaction, pedagogy, learning environment, school environment and

¹<https://www.teriin.org/opinion/sustainable-schools>

teacher capacities are aligned towards optimum use of available resources.² Sustainable schools require “strategic partnership encompassing schools, non-governmental organizations and industries that will enable schools to become models of best sustainable practices” and such schools equip both the youth and the local communities with the capability to protect the environment and safeguard the future.

To promote environmental education and awareness programmes, the Ministry of Environment, Forest and Climate Change (MoEFCC) has three initiatives:

- National Environment Awareness Campaign (NEAC),
- Environmental Appreciation Forces,
- Publications and Global Learning and Observations to Benefit the Environment (GLOBE)

The Department of Science and Technology (DST) too has awareness and educational programmes which include initiatives by National Council for Science & Technology Communication (NCSTC) and Vigyan Prasar, including the Science Express (train).

The Knowledge Mission plans to leverage the above platforms and initiatives to create awareness and understanding regarding climate science issues, particularly amongst the students and youth which could also stimulate further entry of talented young scholars into this field³.

Climate Change Initiatives at the Tamil Nadu State Level

The Tamil Nadu government has been at the forefront in implementing various new and innovative measures to deal with climate change issues. Realizing the importance of the role of State government initiatives on climate change and in par with NAPCC, the Tamil Nadu government has established a **Tamil Nadu State Climate Change Cell** (TNSCCC) to respond to global climate change by building capacity and creating awareness at the local level. The TNSCCC will establish a platform to collect, collate and disseminate climate change information pertaining to the state, to various stakeholders to enable effective climate change governance and climate change services⁴.

“During the budget for 2021-2022, the state government announced the launch of the **Tamil Nadu Climate Change Mission** for an outlay of Rs 500 crore to undertake climate change management and mitigation activities. Following this, the government established India's first '**Tamil Nadu Green Climate Company**⁵ – a special purpose vehicle - to implement three major nature conservation projects namely Green Tamil Nadu Mission, Tamil Nadu Wetlands and Tamil Nadu Climate Change,” according to a PTI report⁶.

²https://www.education.gov.in/shikshakparv/docs/background_note_Promoting_Quality_Sustainable_Schools.pdf

³ [Mission Document of National Mission on Strategic Knowledge for Climate Change - https://dst.gov.in/sites/default/files/NMSKCC_mission%20document%201.pdf](https://dst.gov.in/sites/default/files/NMSKCC_mission%20document%201.pdf)

⁴<https://www.environment.tn.gov.in/climate-change-cell>

⁵<https://tngreencompany.com/home>

⁶<https://www.outlookindia.com/national/stalin-launches-tn-climate-change-mission-news-243759>

The Forest Department and USAID will jointly implement the “Trees Outside Forests in India (TOFI)” program in Tamil Nadu, which will bring together farmers, companies, and other private institutions to rapidly expand tree coverage outside of traditional forests in the state.⁷

Attending the launch of TOFI, Additional Chief Secretary, Department of Forests, Environment and Climate Change, Government of Tamil Nadu, Ms. Supriya Sahu said, “The government of Tamil Nadu is giving huge impetus to agroforestry and plantations on areas outside of the notified forest areas. With the state government’s target to increase the forest and tree cover to 33 percent as per Vision 2023, the TOFI program will support the state in achieving its goals while also aiding the creation of a balanced ecosystem to advance the socio-economic development of the state. Under the Green Tamil Nadu Mission, we will add more mangroves than the total mangrove cover in the State now. About 67.8 sq km of mangroves will be cultivated in the next five years”.⁸

Strategic Knowledge & Climate Literacy and Children and Youth for Climate Action figure prominently among the focus areas for climate action identified by TNSAPCC 2.0. Under the proposed activities for the year 2022-2023, Tamil Nadu Climate Change Mission has allocated funds for climate literacy and an international Climate Summit. Using audio-video platforms, and outreach and awareness campaigns via radio and television advertisements, outdoor hoardings, IEC materials such as pamphlets, posters, etc. the campaign will target government functionaries, students, schools & colleges, farmers, fisher folk, industries, Self Help Groups, etc. The campaign will create awareness on climate change impact, and ways and means to mitigate it. It will educate students on climate science, adaptation, and mitigation activities. Best practices and practical solutions to mitigate climate change will be disseminated through print media & digital communication systems such as small videos, apps etc. It will also facilitate the creation of a platform for engaging students in climate change awareness campaigns to actively involve students in group discussions, digital posters making, street plays, skits, podcasts, public campaigns etc.⁹

⁷<https://www.usaid.gov/india/press-releases/feb-09-2023-government-tamil-nadu-and-usaid-launch-new-initiative-increase-tree-coverage-tamil-nadu>

⁸<https://www.thehindu.com/news/national/tamil-nadu/tn-plans-to-increase-the-existing-mangrove-cover-in-five-years/article66524956.ece>

⁹https://cms.tn.gov.in/sites/default/files/documents/TN_Climate_Change_Mission_Document.pdf

Baseline Study on Climate Literacy

Environmental education and climate literacy are often used interchangeably and synonymously. However, there is a difference between the two. Climate literacy is a critical component of environmental education and sharply focuses on addressing the challenges of climate change.

The definition of Environmental education that evolved from the meeting in Tbilisi is a learning process that increases people's knowledge and awareness about the environment and its associated challenges, develops the necessary skills and expertise to address the challenges, and fosters attitudes, motivations, and commitments to make informed decisions and take responsible actions¹⁰.

A climate-literate person understands the essential principles of Earth system governing climate patterns; knows how to gather information about climate and weather, and how to distinguish credible from non-credible sources on the subject; communicates about climate and climate change in a meaningful way¹¹.

Environmental education taught in schools is different from the climate literacy curriculum, even though both share some common elements. The difference is especially in emphasis and orientation. In generic environmental education, the emphasis is on creating awareness, while in climate literacy the emphasis is on knowledge and awareness which prompts action. Therefore, the present environmental education provides the foundation for climate literacy.

For the past several decades, the UN and its member nations have been trying to implement environmental education as they believe that it will act as “the primary agent for social change towards sustainable development”. UN Environment's vision for Environmental Education & Training for Sustainable Development (EETSD) identified some key parameters:

- holistic approach to the protection of the environment and the improvement of people's quality of life
- developing and strengthening environmental initiatives which are responsive, locally relevant, and
- transforming people's visions and aspirations into reality for the present and future generations¹².

Environmental education should not be seen in narrow terms – as in, just a subject to be taught in schools and often perceived to be learned in a particular year and more often than not retained beyond the academic year, leave alone internalized for lifelong practice. Instead, it should be acknowledged that it involves “continuous, lifelong learning”.

Secondly, given the complexity of the subject, there is a strong need for “the use of different and innovative educational approaches to teaching and learning”.

¹⁰<https://www.earthday.org/wp-content/uploads/2020/07/World-Bank-Environmental-and-Climate-Literacy-Final-Report.pdf>

¹¹<https://oceanservice.noaa.gov/education/literacy.html>

¹²<https://www.unep.org/about-un-environment/policies-and-strategies/un-environment-strategy-environmental-education-and>

Also, environmental education cannot be limited to the formal school education system. It concerns everyone and it should encompass formal, non-formal and informal sectors of education. It should reach all sections of society, irrespective of their age, class, gender, etc.

Lastly, the whole process should be participatory, inter-disciplinary, and empowering so that the participants and beneficiaries are able to apply it in real life through behavioural change, correcting their lifestyles and playing their role as an individual, a responsible citizen, in macro programmes aimed at addressing environmental and developmental problems. Thus, environmental education that is being imparted in educational institutions can be modified to incorporate climate literacy and action content and initiatives.

The climate change issue has multiple stakeholders. Besides citizens as a category, which includes children, youth, and the common citizen, there are other stakeholder groups such as business and industry, the policy makers and the lawmakers and the science and technology community.

In this context, the Department of Environment and Climate Change, Government of Tamil Nadu, has proposed various activities to be carried out under the Tamil Nadu Climate Change Mission for the year 2021-2022 and 2022-2023. One among the activities under the Tamil Nadu Climate Change Mission has been to conduct a baseline study on climate literacy in Tamil Nadu. During the Month of February 2023, TNCCM engaged Citizen consumer and civic Action Group (CAG), a non-profit, non-political, and professional organization that works towards protecting citizens' rights in consumer and environmental issues and promoting good governance processes including transparency, accountability, and participatory decision-making, in conducting a baseline study on climate literacy in Tamil Nadu. CAG has already been working with the government in climate literacy. CAG has also been working on a pilot project to include climate literacy in school curriculum¹³.

This baseline study will assess the extent of awareness regarding climate change issues among students, youth and policymakers. .

¹³<https://www.dtnext.in/city/2023/02/01/now-climate-change-as-a-subject-in-chennai-schools>

2. Literature Review and Research Methodology

2.1 Review of Literature on Climate Literacy

As a part of the present baseline study among students, youth and policy makers, CAG conducted a detailed review of literature on climate literacy and its related concepts such as climate change, climate action, environmental education and knowledge products developed as part of various initiatives and awareness campaigns – both in Indian as well as international perspectives.

The review of literature faced the daunting challenge of sifting and curating a representative slice of work available across print and online resources as in certain instances there was abundant choice and in other instances there was a scarcity of material.

The abundance in particular posed certain challenges for the research team in narrowing down the focus of the review on the given topic of the study, i.e., climate literacy.

For this, the CAG research team had to restrict the scope of review primarily to the topic of the study, i.e., climate literacy in India and Tamil Nadu context, while the other related concepts were reviewed and presented only to a minimal level that is required to support the primary purpose.

Similarly, the programmes, interventions, policy measures and review of study findings were also mostly limited to environmental education and climate literacy. It is hoped that this review of secondary literature would be useful to practitioners, training agencies, educational institutions, researchers, etc. who work in the space of climate literacy.

The Government of India (GoI) is committed to addressing the challenges of climate change and has been a part of global collection action. The GoI is a party to a series of global initiatives, namely the United Nations Framework Convention on Climate Change (UNFCCC), and its Kyoto Protocol (KP), and the Paris Agreement (PA).

Despite being one of the most populous countries of the world, India's share of global greenhouse gas emissions has been low when seen from a historical perspective – "India with more than 17% of the global population has contributed only about 4% of the global cumulative greenhouse gas emissions between 1850 and 2019," according to an Indian government press release¹⁴.

Yet, India has come up with several initiatives to deal with climate change issue and most prominent among them is the National Action Plan on Climate Change (NAPCC). The NAPCC, released on 30th June 2008 aims to enable the country to adapt to climate change and enhance the ecological sustainability of India's development path. It strikes a balance between India's need to maintain a high growth rate which is necessary for improving people's living standards and reducing their vulnerability to the impacts of climate change¹⁵.

¹⁴ <https://pib.gov.in/PressReleasePage.aspx?PRID=1809123>

¹⁵ <https://static.pib.gov.in/WriteReadData/specificdocs/documents/2021/dec/doc202112101.pdf>

The core of the NAPCC comprises of eight National Missions, which focus on promoting understanding of climate change, adaptation and mitigation, energy efficiency and natural resource conservation. They are:

1. National Solar Mission
2. National Mission for Enhanced Energy Efficiency
3. National Mission on Sustainable Habitat
4. National Water Mission
5. National Mission for Sustaining the Himalayan Eco-system
6. National Mission for a Green India
7. National Mission for Sustainable Agriculture
8. National Mission on Strategic Knowledge for Climate Change

Under the Paris Agreement and subsequently, India has been adopting a long-term low carbon development strategy. It updated its intended Nationally Determined Contribution (NDC) as “India now stands committed to reduce Emissions Intensity of its Gross Domestic Product (GDP) by 45 percent by 2030, from 2005 level and achieve about 50 percent cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030”¹⁶.

One of the sectors which is being impacted by climate change is agriculture. Thus, the government has initiated a network project titled National Innovations in Climate Resilient Agriculture (NICRA) in 2011 to study and address the impact of climate change on Indian agriculture.¹⁷

The Tamil Nadu government, on its part, has been implementing various measures to deal with climate change issues. Realizing the importance of the role of State government initiatives on climate change and in par with NAPCC, the Tamil Nadu government has established a Tamil Nadu State Climate Change Cell (TNSCCC) to respond to global climate change by building capacity and create awareness at the local level. The TNSCCC will establish a platform to collect, collate and disseminate climate change information pertaining to the state to various stakeholders in order to enable effective climate change governance and climate change services¹⁸.

“During the budget for 2021-2022, the state government announced the launch of the **Tamil Nadu Climate Change Mission** for an outlay of Rs 500 crore to undertake climate change management and mitigation activities. Following this, the government established India's first '**Tamil Nadu Green Climate Company**'¹⁹ – a special purpose vehicle – to implement three major nature conservation projects namely Green Tamil Nadu Mission²⁰, Tamil Nadu Climate Change Mission²¹ and Tamil Nadu Wetlands Mission²².

¹⁶ <https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1847812>

¹⁷ <http://www.nicra-icar.in/nicrarevised/index.php/home1>

¹⁸ <https://www.environment.tn.gov.in/climate-change-cell>

¹⁹ <https://tngreencompany.com/home>

²⁰ <https://tngreencompany.com/documents/Green%20Tamil%20Nadu%20Mission.pdf>

²¹ <https://tngreencompany.com/documents/TN%20Climate%20Change%20Mission.pdf>

²² <https://tngreencompany.com/documents/TN%20Wetland%20Mission.pdf>

The Forest Department and USAID will jointly implement the “Trees Outside Forests in India (TOFI)” program in Tamil Nadu, which will bring together farmers, companies, and other private institutions to rapidly expand tree coverage outside of forested area in the state.²³

Attending the launch, the Additional Chief Secretary, Department of Forests, Environment and Climate Change, Government of Tamil Nadu, said, “The government of Tamil Nadu is giving huge impetus to agroforestry and plantations on areas outside of the notified forest areas. With the state government’s target to increase the forest and tree cover to 33 percent as per Vision 2023, the TOFI program will support the state in achieving its goals while also aiding the creation of a balanced ecosystem to advance the socio-economic development of the state.”²⁴ Another initiative was the plan to increase the cover of mangroves in Pichavaram, Cuddalore district. Under the Green Tamil Nadu Mission, it has been planned to add more mangroves than the total mangrove cover in the State at present i.e., about 67.8 sq. km of mangroves would be cultivated in the next five years i.e., by the 2028.²⁵

Strategic Knowledge & Climate Literacy and Children and Youth for Climate Action figure prominently among the focus areas for climate action identified by the draft TNSAPCC 2.0²⁶. And the Tamil Nadu Climate Change Mission has earmarked funds for a baseline study on climate literacy.

Under the proposed activities for the year 2022-2023, Tamil Nadu Climate Change Mission has allocated funds for Climate literacy and international Climate Summit. Through the use of audio-video platforms, and outreach and awareness campaigns using radio and television advertisements, outdoor hoardings, IEC materials such as pamphlets, posters, etc., the campaign would target Government functionaries, Students, Schools & Colleges, Farmers, Fisher folk, industries, Self Help Groups, etc. The campaign would create awareness on Climate Change impact, ways and means to mitigate it. It would educate students on climate science, adaptation and mitigation activities. Best practices and practical solutions to mitigate Climate Change would be disseminated through media & digital communication platforms like small videos, Apps etc., It would also facilitate creation of a platform for engaging students in Climate Change awareness campaigns on green days to actively involve them in group discussions, digital poster making, street plays, skits, podcast, public campaigns etc.²⁷

In this context, the Citizen consumer and civic Action Group (CAG), a Chennai based non-profit organization working in environmental and climate change issues, has been engaged by the Tamil Nadu Climate Change Mission, Department of Environment and Climate Change, to conduct a baseline study on Climate Literacy in Tamil Nadu. The study would assess the extent of awareness regarding climate change issues among students, community youth and policymakers across the Tamil Nadu state. This survey of literature which is a part of the baseline study and it aims to document the

²³ <https://www.usaid.gov/india/press-releases/feb-09-2023-government-tamil-nadu-and-usaid-launch-new-initiative-increase-tree-coverage-tamil-nadu>

²⁴ Ms. Supriya Sahu, Additional Chief Secretary, Department of Forests, Environment and Climate Change, Government of Tamil Nadu

²⁵ <https://www.thehindu.com/news/national/tamil-nadu/tn-plans-to-increase-the-existing-mangrove-cover-in-five-years/article66524956.ece>

²⁶ Page 2 of The Tamil Nadu State Action Plan on Climate Change (TNSAPCC) published at <https://www.environment.tn.gov.in/Document/go/tamil%20nadu%20climate%20change%20mission%20g.o.pdf>

²⁷ <https://www.environment.tn.gov.in/Document/go/tamil%20nadu%20climate%20change%20mission%20g.o.pdf>

evolution of environmental education and climate literacy in the country and document a representative sample of knowledge products generated and used by various stakeholders.

In this Survey of Literature, the following topics would be explored:

1. Environmental education and climate literacy – the concepts and stakeholders
2. Environmental education in India – its integration in school curriculum
3. Environmental education in India – at college level
4. Impact of environmental education in India – Studies and Surveys
5. Environmental education – Need for reforms and models for reforms
6. Environmental education & Awareness - Programmes, Projects & Campaigns and their knowledge products
 - a. Some Government Agencies and Environmental Education/Awareness
 - b. Some CSOs/NGOs/Think tanks in Environmental Education/Awareness
7. Conclusion

Environmental Education & Climate Literacy

Environmental education and climate literacy is often used interchangeably and synonymously. However, there is a difference between the two. Climate literacy is a critical component of environmental education and sharply focuses on addressing the challenges of climate change.

Environmental Education is a learning process that increases people’s knowledge and awareness about the environment and its associated challenges, develops the necessary skills and expertise to address the challenges, and fosters attitudes, motivations, and commitments to make informed decisions and take responsible actions²⁸.

A climate-literate person understands the essential principles of Earth system governing climate patterns; knows how to gather information about climate and weather, and how to distinguish credible from non-credible sources on the subject; communicates about climate and climate change in a meaningful way; communicates about climate and climate change in a meaningful way²⁹.

For the past several decades, the UN and its member nations have been trying to implement environmental education as they believe that it will act as “the primary agent for social change towards sustainable development”. UN Environment’s vision for Environmental Education & Training for Sustainable Development (EETSD) identified some key parameters:

- holistic approach to the protection of the environment and the improvement of people's quality of life
- by developing and strengthening initiatives which are responsive, locally relevant, and
- aimed at transforming people's visions and aspirations into reality for the present and future generations³⁰.

²⁸ <https://www.earthday.org/wp-content/uploads/2020/07/World-Bank-Environmental-and-Climate-Literacy-Final-Report.pdf>

²⁹ <https://oceanservice.noaa.gov/education/literacy.html>

³⁰ <https://www.unep.org/about-un-environment/policies-and-strategies/un-environment-strategy-environmental-education-and>

There is a realization that environmental education should be seen in narrow terms and it should be acknowledged that it involves “continuous, lifelong learning”. Secondly, given the complexity of the subject, there is a strong need for “the use of different and innovative educational approaches to teaching and learning”.

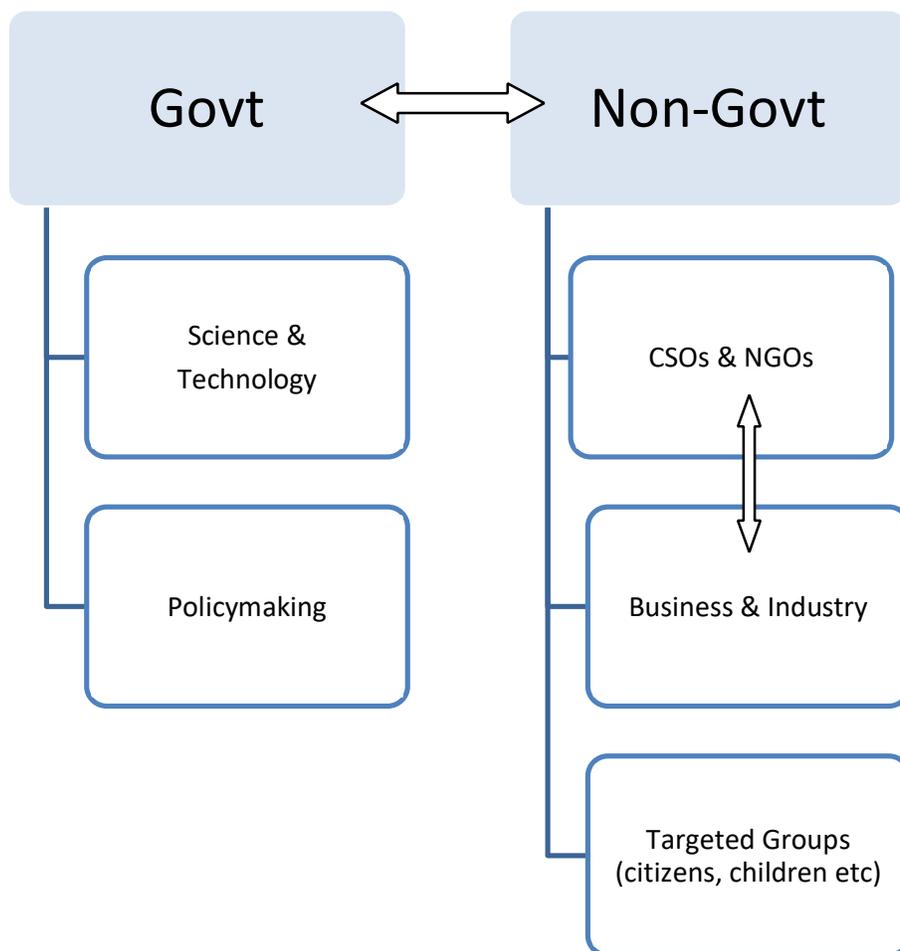
Also, environmental education cannot be limited to the formal school education system. It concerns everyone and it should encompass formal, non-formal and informal sectors of education. It should reach out to all sections of the society, irrespective of their age, class, gender, etc.

Lastly, the whole process should be participatory, inter-disciplinary, and empowering so that the participants and beneficiaries are able to apply it in real life through behavioural change, correcting their lifestyles and also play their role as an individual, a responsible citizen, in macro programmes aimed at addressing environmental and developmental problems.

The climate change issue has multiple stakeholders. Besides citizens as a category, which includes children, youth and women, there are other stakeholder groups such as business and industry, the policy makers and the lawmakers, the science and technology community, and the policymakers and lawmakers. There is a strong interrelationship between the stakeholders and there’s a need to find convergence of interests³¹.

³¹ <https://www.unep.org/civil-society-engagement/why-civil-society-matters/major-groups-stakeholders>

Figure 1: Multiple stakeholders and convergence of interest in climate literacy



At the international level, there is a need for partnerships between nations.

At the national level, government bodies or agencies play a crucial role.

Both national and international alliances need inputs from the Science & Technology community.

An important stakeholder is business and industry. The strategies and choices of business organizations have an impact on climate change. Likewise, at the national and international level, business organizations are expected to adopt “green technologies and manufacturing”.³²

A host of civil society organizations, which includes NGOs, informal groups, etc., play an important role in promoting debate and discussion, make multiple voices heard, and lastly shape the public opinion and policy making³³.

Individuals are, on the other hand, could wear multiple hats. They make up the other stakeholder groups. “Each individual is also a voter, a professional, a colleague, a member of all these previous

³² <https://www.un.org/en/chronicle/article/business-and-climate-change-rising-public-awareness-creates-significant-opportunity>

³³ <https://plana.earth/academy/the-stakeholders-of-climate-change>

bodies and arenas. In the end, all social structures - from board game appreciation groups to family to company to governments - are made up of individuals, and only exist because enough individuals believe in them. All in all, it falls on the shoulders of each citizen-individual-boss.”³⁴

It is important to bring together all the stakeholders. Climate literacy is critical for successful stakeholder engagement and action.

One of the key principles of climate literacy, advocacy and action is encapsulated succinctly in the slogan “Think Globally and Act Locally”. The micro actions taken at individual and local levels need to be in sync with global goals³⁵. This analysis indicates the need for a strong and effective public-private partnership and collaboration would be critical for the success of climate literacy strategy.

2.2 Climate Literacy in School Education in India

The concept of environmental literacy dates back to the 1960s, coinciding with the emergence of the concept of the first Earth Day and the modern environmental movement. Charles Roth first used the term in a 1968 article in an American publication, Massachusetts Audubon³⁶.

It took a couple of decades for the concept to be incorporated into school education. In the mid-1980s, the New Education Policy of 1986, National Curriculum Framework of 1986 and 1992 recognized Protection of Environment as one of the core areas of curriculum and spoke about integrating environmental education at different levels of education. Consequently, it became a part of school curriculum which stressed the need to highlight issues concerning protection and care of environment, prevention of pollution and conservation of energy³⁷.

The **National Council of Educational Research and Training** (NCERT) played an instrumental role in developing content, preparing textbooks, training manuals on the nascent field of study called environmental studies and conducting training and orientation workshops for school teachers. The state boards of education too played their part in this mammoth exercise.

Environmental Studies thus became a subject right from primary (upto class V) and upper primary education (class V to VIII). At the primary stage, the objective is to sensitize the child about environment. Soon students are made to see connections between environment and society, culture, etc. Initially, it would be a part of a subject and for later classes it would be a standalone subject with separate textbook.³⁸

³⁴ <https://plana.earth/academy/the-stakeholders-of-climate-change>

³⁵ <https://riskcenter.wharton.upenn.edu/climate-risk-solutions-2/think-globally-act-locally-think-globally-again/>

³⁶ <https://www.earthday.org/wp-content/uploads/2020/07/World-Bank-Environmental-and-Climate-Literacy-Final-Report.pdf>

³⁷ http://www.educationindiajournal.org/home_art_avl.php?path=&id=424

³⁸ https://wgbis.ces.iisc.ernet.in/biodiversity/sahyadri_ews/newsletter/issue22/art5.htm & https://paryavaranmitra.in/Praveen-Nasreen%20-%20Status%20of%20EE_4.1.pdf

Environmental Education Programmes for Different Levels of Education

Classes	Mode of Transaction
1 and II	Through Activities
III & IV	Environmental Studies (EVS)
VI to X	Infusion Model
XI to XII	Project Based Study

Environmental Education Curriculum plan in Schools in India

- Classes I and II (ages 6-7):** EE is taught through activities integrated into the core subjects of reading, writing, and mathematics. For example, students may study shapes in mathematics by identifying shapes in the natural environment.
- Classes III to V (ages 8-11):** EE is taught as a standalone subject, called Environmental Studies (EVS), with a textbook called My Environment that aims for students to learn about the environment in the context of their own lives and communities.
- Classes VI to X (ages 12-16):** EE is taught by the infusion approach primarily in science and social sciences. For example, students studying decomposition in science might complete an EE-related project as part of the learning unit. In all subjects, EE-based questions comprise ten percent of the total marks for both formative and summative assessments.
- Classes XI and XII (ages 17-18):** EE is part of students' Interdisciplinary Projects in electives and General Studies as students choose their own disciplines. These classes focus on project-based learning. For example, a student studying commerce might complete a project that focuses on the concept of green economy. NCERT also published project books for students of Classes VI to X (Age 12 to 16 years) for use as part of the project-based learning infusion approach. The goal of the project books is to build capacity for critical and multidisciplinary thinking, as well as to develop a positive and problem-solving attitude among students. The projects were also encouraged through Jawaharlal Nehru National Science, Mathematics, and Environment Exhibition (JNNSMEE) for Children, an organization that aims to develop critical thinking about global issues to maintain healthy and sustainable societies in today's environment³⁹.

Environmental studies in secondary and higher secondary classes (class IX to XII), depending on their choice of streams/specialization, environmental studies get multidisciplinary in approach and discipline-oriented. Students are exposed to problems and solutions so that they could relate them to their day-to-day life.⁴⁰

³⁹ <https://thegeep.org/learn/case-studies/compulsory-environmental-education-india>

⁴⁰ <https://kkhsou.ac.in/eslm/E-SLM-for-Learner/6th%20Sem/Bachelor%20Degree/Education/Education%20Major/Education%20E.M%20M-2%20B-1/75-91.pdf>

Building on the experiences of decades of implementation of environmental education in schools and the colleges, the NEP 2020 envisions an integrated approach to environmental education which emphasizes continuity and scope for practical relevance and application.

What NEP-2022 says about environmental education?

Towards the attainment of such a holistic and multidisciplinary education, the flexible and innovative curricula of all HEIs shall include credit-based courses and projects in the areas of community engagement and service, environmental education, and value-based education. Environment education will include areas such as climate change, pollution, waste management, sanitation, conservation of biological diversity, management of biological resources and biodiversity, forest and wildlife conservation, and sustainable development and living.

Value-based education will include the development of humanistic, ethical, Constitutional, and universal human values of truth, righteous conduct, peace, love, nonviolence, scientific temper, citizenship values, and also life-skills; lessons in seva/service and participation in community service programmes will be considered an integral part of a holistic education. As the world is becoming increasingly interconnected, Global Citizenship Education (GCED), a response to contemporary global challenges, will be provided to empower learners to become aware of and understand global issues and to become active promoters of more peaceful, tolerant, inclusive, secure, and sustainable societies⁴¹.

Other disruptive technologies that are expected to change the way we live, and, therefore, change the way we educate students, include those relating to clean and renewable energy, water conservation, sustainable farming, environmental preservation, and other green initiatives; these will also receive prioritized attention in education⁴².

It will also appropriately integrate environmental awareness and sensitivity towards its conservation and sustainable development, so that environment education becomes an integral part of school curricula.⁴³

2.3 Climate Literacy in College Education in India

The University Grants Commission in 2016 made environmental education compulsory for college students and developed a syllabus for 6-month course on Environmental Education for under graduation students

(Refer for the syllabus plan: https://www.ugc.ac.in/pdfnews/2269552_environmentalstudies.pdf).

Similarly, UGC has developed textbook curriculum for under graduation students on Environment studies (Refer for the curriculum:- <https://www.ugc.ac.in/oldpdf/modelcurriculum/env.pdf>)

⁴¹ P. 37, https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf

⁴² P 58 https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf

⁴³ P. 23 https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf

The revised framework is in line with the new National Education Policy (NEP) 2020 and will be covering additional topics to sensitize students about the country's commitment towards achieving sustainable development goals⁴⁴.

Explaining the rationale for introducing a compulsory course for college students across courses, Prof. Kumar said, *“Continuing problems of pollution, loss of forests, solid waste disposal, degradation of the environment, issues like economic productivity and national security, global warming, the depletion of the ozone layer and loss of biodiversity have made everyone aware of environmental issues. Out of the 17 Sustainable Development Goals (SDGs), six goals are directly linked to environmental protection and resource conservation and hence the need for students to study these subjects while pursuing higher education.”*⁴⁵

2.4 Climate Literacy – Prevalence and Insights from past studies

The units introduced to the revised course included ‘Climate Change: Impacts, Adaptation and Mitigation’; ‘Environmental Management’; and ‘Environmental Treaties and Legislation’. The core module syllabus for environmental studies includes classroom teaching and fieldwork. The syllabus is divided into eight units covering 50 lectures. The first seven units will cover 45 lectures that are classroom-based to enhance knowledge skills and attitude towards the environment. The eighth unit will be based on field activities, the draft stated.⁴⁶

According to a media report, an online survey (2021) on the level of environmental awareness among school children in India conducted by online education platform Brainly, received 1781 responses. The findings were:

- 79% of Indian students agreed that studying climate change is crucial
- 74% of students stated that they study environmental science at school.
- 86% said their school encouraged them to plant more trees or reduce the use of plastic
- 55% of students planned to plant more trees in the neighbourhood to commemorate World Environment Day⁴⁷

According to a 2020 study on “Environmental literacy among college students” in India, compared to 61.5% of respondents showing overall awareness, 50% of the respondents displayed an attitude towards environmental protection. One of the inferences drawn by the study related to the need for environmental literacy initiatives at the university level so that college students could appreciate better the climate change issues, take steps towards involving themselves in various initiatives with optimistic ideas required to contribute to the quality of environment⁴⁸.

⁴⁴ M Jagadesh Kumar, UGC chairperson.

⁴⁵ <https://www.deccanherald.com/national/ugc-to-unveil-norms-for-environment-education-1188975.html>
<https://www.aninews.in/news/national/general-news/ugc-releases-draft-guidelines-and-curriculum-framework-for-environment-education-at-undergraduate-level20230207190833/>

⁴⁶ Indian Express report - <https://indianexpress.com/article/cities/delhi/ugc-guidelines-environment-education-8430932/>

⁴⁷ <https://www.indiatoday.in/education-today/latest-studies/story/79-of-indian-students-feel-that-it-s-important-to-study-climate-change-and-environmental-conservation-survey-1814708-2021-06-14>

⁴⁸ <https://ijoem.com/article.asp?issn=0973-2284;year=2021;volume=25;issue=3;epage=128;epage=132;aulast=Shri;type=3>

In a paper titled “How Climate Literacy and Public Opinion Are the Driving Forces Behind Climate-Based Policy: A Student Perspective on COP27”⁴⁹, the authors argue how public opinion and support is critical for giving an impetus to policy making and implementation by governments. The paper identifies misinformation as a major obstacle and challenge and suggests implementation of climate literacy campaigns, especially through establishing credible educational resources and climate science curriculum within school systems, to counter misinformation. “The best approach to gain public support is to create a climate literate citizenry through establishing credible educational resources and climate science curriculum within school systems. A climate literate population will lead to a ripple effect initiated by people taking ownership of their individual contributions, propagating national mitigation practices, expanding adaptation policies, and instigating global action. As student delegates at COP27, we were able to catalyse credible information sharing as we became the connection between the scientific community and our own social network,” according to the above cited study.

When it comes to innovative teaching and creative educational techniques and resources, there has been an argument in favour of “Digital game-based learning (DGBL)” which is being used increasingly as an alternative learning tool. This is critical in the context of developing educational resources relating to climate literacy aimed at school children and young adults. A recent study, “Current Climate for Digital Game-Based Learning of Science in Further and Higher Education”⁵⁰ points out the potential for and gaps in using mobile phones games for science education. “Despite the ubiquitous use of mobile and touchscreen devices, there is a dearth of science-based mobile games developed specifically for F&H education. Mobile games represent an ideal platform for science learning due to the high uptake of ‘apps’ in the daily lives of current F&H (further and higher) education students,” notes the paper which provides a broad summary of the field by discussing the current platforms for DGBL and examples of games played on them.

Merely providing necessary information relating to climate change to students and youth is not enough. Climate literacy aims at prompting the target audience to take action so that they are a part of the larger climate change movement. In an important paper, “What Triggers Climate Action: The Impact of a Climate Change Education Program on Students’ Climate Literacy and Their Willingness to Act”⁵¹, the authors did a study using a combination of quantitative and qualitative methods to analyse triggers for climate action. Confirming other studies, the paper inferred that the willingness to act resulting in engagement in personal climate action by children and youth depends on the “learning about the concept of carbon footprint and the process of calculating and decreasing it”. When designing curriculum and developing knowledge products, this aspect needs to be considered.

Designing curriculum and knowledge products have to draw from scientific studies that establish the efficacy of methods and techniques. An important study in this context is “The Impacts of a Climate Change SSI-STEAM Program on Junior High School Students' Climate Literacy”.⁵² The study, which had a sample of 31 eighth grade students in Seoul, Korea, found that “Participants' climate literacy was

⁴⁹ <https://pubs.acs.org/doi/10.1021/acsomega.2c07674>

⁵⁰ <https://www.researchgate.net/publication/327941570> Current Climate for Digital Game-Based Learning of Science in Further and Higher Edu provide a broad summary of the field by discussing the current platforms for DGBL and examples of games played on them. cation

⁵¹ <https://www.researchgate.net/publication/362845483> What Triggers Climate Action The Impact of a Climate Change Education Program on Students' Climate Literacy and Their Willingness to Act

⁵² https://brill.com/view/journals/apse/7/1/article-p96_5.xml?language=en

shown to improve substantially after attending the program, especially in the domains of perception and action.”. For a programme to be effective in knowledge, perception and action domain it needs to have the following characteristics:

- more concrete ideas instead of abstract ideas,
- extension of the scope of thinking to include aspects that make understanding holistic,
- positive responsibility (the need to act not only at a personal level but also at community, national and international levels), and
- relevance recognition (how the ideas are relevant to the student and their immediate reality).

Lastly, to investigate how well-informed students are on the issue of climate change, M.C. Oliver of University of Nottingham and M.J. Adkins have used secondary data to investigate how well-informed students are on the issue of climate change. The secondary data came from the Programme of International Student Assessment (PISA), a cross-national study involving 540,000 students in 72 OECD and partner countries. The study, “Hot-headed students? Scientific literacy, perceptions and awareness of climate change in 15-year-olds across 54 countries”⁵³, emphasizes the importance of the overall “enjoyment of and interest in science” besides specific awareness of climate change issues such as greenhouse gas emissions. Schools and curriculum designers need to factor in this insight so that they can foster interest in and enjoyment of science in general and climate literacy in particular “to build positive attitudes, awareness and responsibility towards the environment alongside the development of scientific literacy.”

A study⁵⁴ relating to India, has similar findings regarding concrete ideas and relevance recognition. It said: “It seems that the students would require precise information on their locality so that they can see matters from a better scientific perspective and that would stimulate their interest.”

The above study, ‘Factors shaping students’ perception of climate change in the western Himalayas, Jammu & Kashmir, India’, captures the differences in responses among different categories of students as follows:

- More girls than boys, more students from private schools than public schools, more higher-secondary students than secondary school students and more urban students than those from rural schools were found involved in participatory activities relating to climate change.
- Regarding advocacy concerning the environment, more boys than girls, more private school students than public school students, higher-secondary students than secondary students, urban students than those from rural schools were found to be proactive to be involved.
- Interestingly under general activities concerning the environment, more girls and rural students were found to be willing for proactive involvement.

⁵³ https://www.researchgate.net/publication/343138808_Hot-headed_students_Scientific_literacy_perceptions_and_awareness_of_climate_change_in_15-year_olds_across_54_countries

⁵⁴ <https://www.sciencedirect.com/science/article/pii/S2666049021000116>

2.5 International Models of Climate Literacy Programme for students

The two important examples of innovative educational models for making environmental education for students are presented below:

- 1) The GLOBE Programme
- 2) Earthday.org's digital publication "Climate Literacy: Beyond the Written Word"

These models are useful in designing new programmes and making existing curriculum on environmental education more practical with an emphasis on learning and applying knowledge to solve problems.

The GLOBE Programme

The **Global Learning and Observations to Benefit the Environment (GLOBE)** program is a worldwide, hands-on, primary and secondary school-based science and education program which has tremendous relevance to climate literacy. The GLOBE program is made possible through the support of various U.S. governmental agencies including:

- 1) The U.S. National Aeronautics and Space Administration (NASA)
- 2) The National Oceanic and Atmospheric Administration (NOAA)
- 3) The U.S. Department of State
- 4) The National Science Foundation (NSF)

The fundamental idea of GLOBE was to engage students in science through participation in scientific activities in their local environments⁵⁵.

Founded on Earth Day 1994, the Global Learning and Observations to Benefit the Environment (GLOBE) Program has been providing students and the public worldwide with the opportunity to meaningfully contribute to our understanding of the Earth system and global environment.

Through interdisciplinary activities and inquiries into the various Earth spheres, GLOBE gives students a hands-on approach to the scientific method. These GLOBE protocols are developed by the scientific community and validated by teachers, so the lesson objectives are scientifically verified.⁵⁶

At present, India does not have a country coordinator for the GLOBE programme. The Ministry of Environment, Forest and Climate Change is the government point of contact for the GLOBE programme.

For Students, GLOBE provides the opportunity to learn by:

- Taking scientifically valid measurements in the fields of atmosphere, hydrology, soils, and land cover/phenology
- Reporting their data through the Internet to the student data archive
- Creating maps and graphs on the free interactive website to analyze data sets
- Collaborating with scientists and other GLOBE students around the world

⁵⁵ <https://files.eric.ed.gov/fulltext/ED527259.pdf>

⁵⁶ <https://www.globe.gov/about>

For Teachers, GLOBE provides assistance through:

- Professional development workshops
- Downloadable teacher's guides, "how-to" videos, and other materials
- Continuing support from a Help Desk, scientists, and partners
- Contact with other teachers, students, and scientists worldwide in web chats and other services.

GLOBE developed a detailed curriculum and training module for school students:

<https://www.globe.gov/do-globe/classroom-ready-activities/learning-activities>

Education Modules by GLOBE

Air Quality

Students will investigate why aerosols and other types of air pollution affect the colour of the sky. They will also learn how to describe the sky colour and the underlying conditions in the atmosphere. (<https://www.globe.gov/web/elementary-globe/overview/air-quality>)

Climate

Students will learn about regional climate variations and how climate change is affecting our world. Then, they will brainstorm ways to solve climate change. [Visit the Climate Module.](#)

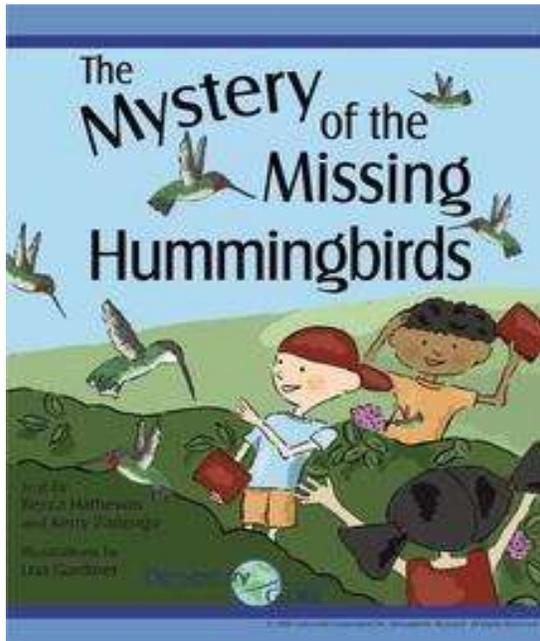
Seasons

Students will discover how hummingbirds deal with seasonal changes. To broaden their scope, they will use science journals to describe the changes in their own local environment as it cycles through the different seasons⁵⁷. (Refer: <https://www.globe.gov/web/elementary-globe/overview/seasons>)

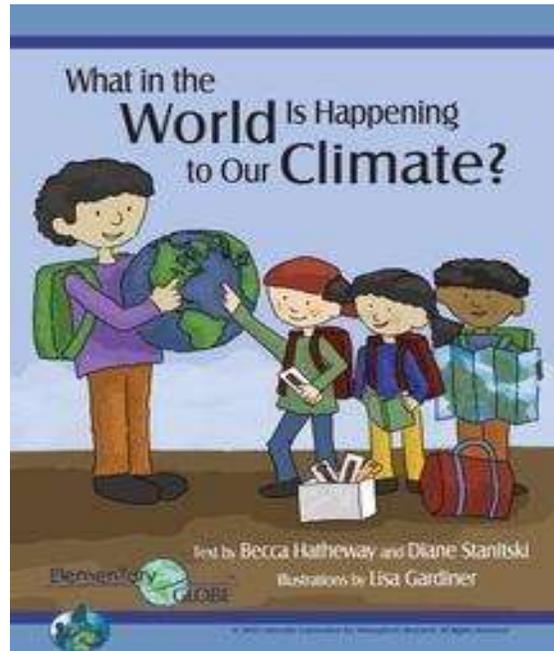
(Other modules are: Water, Soils, Earth System, Clouds, etc. can be accessed through: <https://www.globe.gov/web/elementary-globe>)

⁵⁷ Refer: <https://www.globe.gov/web/elementary-globe/overview/seasons>

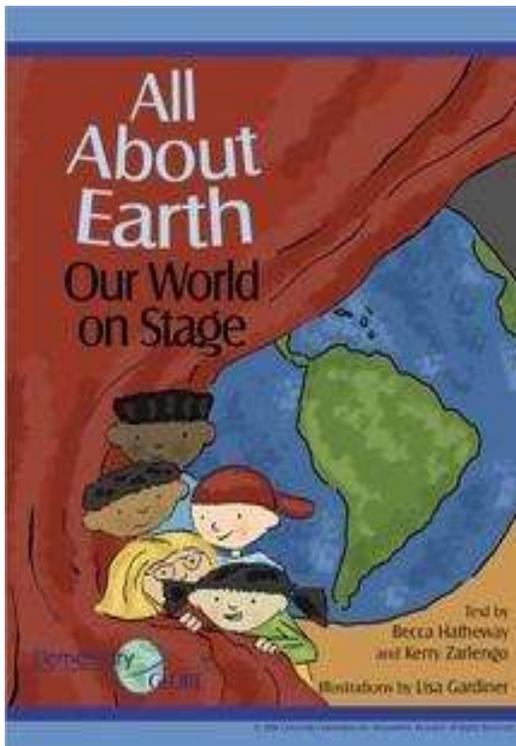
Images of Training Modules on Climate Literacy for Children



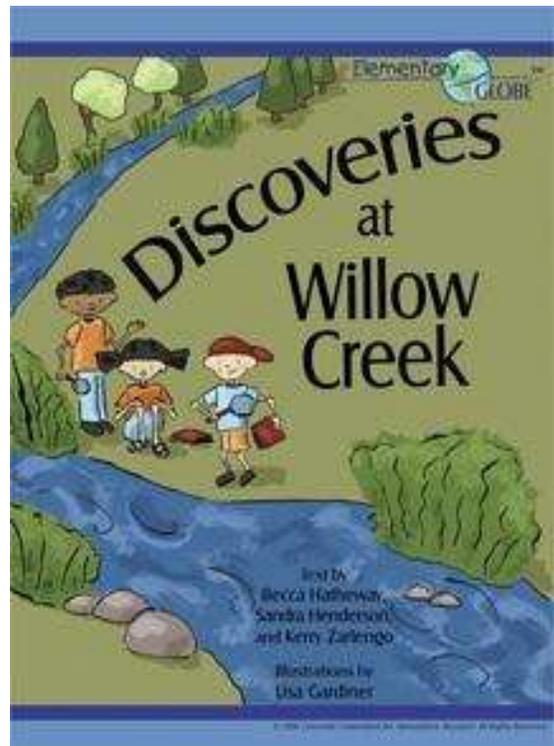
Module on Seasons



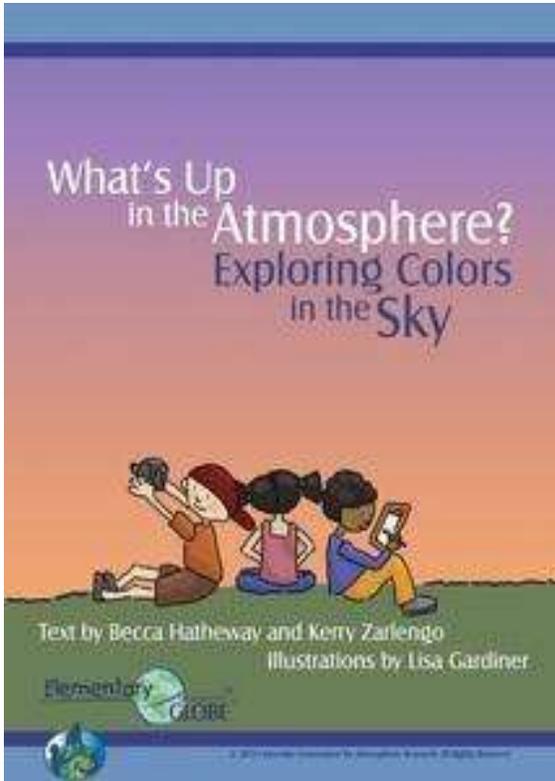
Module on Climate



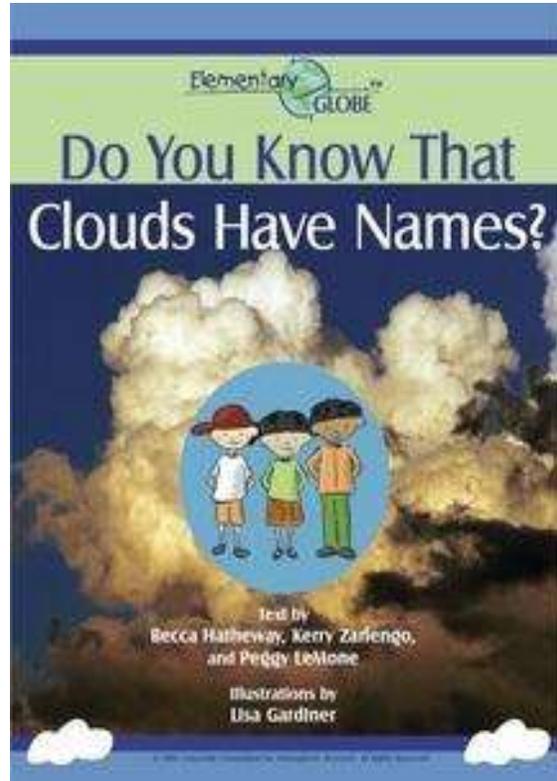
Module on Earth



Module on Water



Module on Air Quality



Module on Clouds

Climate Literacy: Beyond the Written Word” by Earthday.org

EARTHDAY.ORG firmly believes that the key to Earth’s future lies in climate and environmental education opportunities for youths of all ages and backgrounds to develop them into informed and engaged environmental stewards.

On November 5, 2021, earthday.org released a digital publication titled, “Climate Literacy: Beyond the Written Word”⁵⁸ that includes contributions from twenty academic institutions that have defined effective methodologies to generate concern for our planet amongst their students.

These approaches also help build awareness of how anthropogenic activity has harmed our planet, in particular, by increasing the carbon footprint and pollution, reducing green cover, and mismanaging waste. Some innovative methods described in this e-book are replicable. (The full document can be accessed here: https://www.earthday.org/wp-content/uploads/2021/11/EDN_eBook-Climate-Literacy-Beyond-the-Written-Word.pdf)

⁵⁸ https://www.earthday.org/wp-content/uploads/2021/11/EDN_eBook-Climate-Literacy-Beyond-the-Written-Word.pdf

2.6 Challenges in Climate Literacy for students

Despite successful integration of environmental studies as part of school curriculum, educationists have been seeking changes to make it more effective and serve the larger objectives of making students a part of environmental action and sustainable living. A study by IJCRF (Feb. 2022)⁵⁹, several challenges in the environmental education in schools have been reported, as below:

1. It is highly theoretical.
2. The connection between theory and day to day life has to be established for it to be effective. This might prove challenging.
3. Students tend to learn the subject by memorizing (by rote) without understanding the subject properly. This prevents them from using the knowledge for action and behavioural change in real life.
4. It is often seen and perceived by students and sometimes teachers also as a secondary or supplementary, not-so-important subject.
5. When pressurized to make environmental education activity-based and experiential, schools struggle to be creative, resorting to poster, essay writing and oratorical competitions or tree plantation and campus or community cleaning drives. But these are not linked to what is taught in the classroom. They are also done in ad hoc way without any follow-up, etc.
6. While environmental awareness is incorporated in B.Ed. and followed up with orientation workshops, much more needs to be done.

The crux of the issue is that environmental education is not given due importance by students and even teachers and school managements. The emphasis is more on “other core” subjects, and it reflects in both teaching by teachers and learning by students. No matter what the government does, the results will not be good if parents, students and teachers do not give environmental education the priority and importance it rightly deserves.

2.7 Climate Literacy Initiatives by Government agencies

Ever since the Indian government became a part of global agreements relating to environment and climate change, a number of government agencies and CSOs have chalked out and implemented a number of programmes, projects and campaigns.

The government had adopted a two-pronged strategy in the realm of Education for Sustainable Development. On the one hand, as explained above, it focused on including environmental education in school and college curriculum. On the other hand, the government directed various departments to carry out environmental awareness programmes targeted at vulnerable groups and students and youth who could play the role of a catalyst.

The initiatives got an impetus after 1994 when the UNFCCC came into force and Indian government launched a strategy which included the following:

⁵⁹ <https://www.ijcrt.org/papers/IJCRT2202009.pdf>

- Making the Ministry of Environment, Forest & Climate Change (MOEF&CC) as a nodal ministry
- Formulation of National Environmental Policy 2006
- The setting up of Prime Minister's Council on Climate Change (PMCC) to guide policy and coordinate multiple ministries and agencies involved.
- Under the auspices of the PMCC, National Action Plan on Climate Change was formulated which had initially eight national missions and another four were added subsequently.⁶⁰

2.7.1 The Centre for Environment Education

Established as a Centre of Excellence under the Ministry of Environment, Forest and Climate Change, the Ahmedabad-based Centre for Environment Education (CEE) has been working in the field of Environmental Education and Education for Sustainable Development. CEE's primary objective is to spread awareness and enhance understanding among people of environmental issues to promote the conservation of nature and natural resources⁶¹.

Since its inception, CEE has been developing innovative programmes and educational materials.

Besides working with government departments, CEE has access to a network of over 2 lakh schools where many programmes have been conducted.

Education for Children

1. Paryavaran Mitra – Nationwide Education for Sustainable Development (ESD) School Network Programme
2. Eco Club Programmes
3. International Eco Schools Programme
4. Green Teacher Distance Education Diploma Course
5. Young Masters Programme
6. Nature and Bio-cultural Camping Programme
7. Ecosystem and species focused conservation education programmes
8. Environment Education Programme on Water, Health and Sanitation Curriculum focused programme
9. Sustainable School Campus Programme

Education for Youth

1. Local Conference of Youth (LCOY) India 2022
2. The Plastic Tide Turners
3. South Asia Youth Environment Network (SAYEN)
4. Swachhagraha Youth
5. Internships at CEE Offices

⁶⁰ <https://dst.gov.in/climate-change-programme>

⁶¹ <https://www.ceeindia.org/education-for-children>

Green Teacher: Teacher training in environment education

CEE and Commonwealth of Learning (COL) Vancouver, Canada have established the Green Teacher Diploma in Environmental Education (EE), a distance education programme.⁶²

Other Initiatives

1. EE in Higher Education
2. Nature Camps
3. Interpretation of Natural & Cultural Heritage
4. Coastal And Marine Programmes
5. Climate Change
6. Environment Management
7. Sustainable Rural Development
8. Sustainable Urban Development
9. Water and Sanitation
10. Waste management
11. Disaster Preparedness and Rehabilitation
12. Facilitating NGO and Community Initiatives
13. Materials Development and Publications
14. Biodiversity Conservation
15. Communicating through Media

(Refer: <https://www.ceeindia.org/iec-material-on-biodiversity-ndash-cee-north-publications-and-materials-development>)

2.7.2 Central Pollution Control Board

1. Exhibitions/Workshops/Mass Awareness Activities, NGO Activities, printing of pamphlets, booklets, collection and dissemination of information.
2. World Environment Day related events
3. Deepavali and Ganesh Visarjan related events
4. Science exhibition at Indian Science Congress

TNPCB Awareness Video (Meendum Manjapai – against plastic bags):

<https://www.youtube.com/watch?v=yHajO86ZF4U&t=3s>

2.7.3 National Programme on Climate Change and Human Health

Launched in 2019 by the Ministry of Health and Family Welfare, the National Programme on Climate Change and Human Health (NPCCH) has a broad mandate that includes creation of “awareness among the general population (vulnerable community), healthcare providers and policymakers regarding the impacts of climate change on human health.”⁶³

⁶² <http://greenteacher.org/>

⁶³ <https://ncdc.mohfw.gov.in/index1.php?lang=1&level=2&sublinkid=887&lid=430>

The aim is to create awareness among the general population (particularly vulnerable communities), health-care providers and policy makers regarding impacts of climate change on human health⁶⁴.

1. Posters on Air Pollution and Human Health
2. Posters on Nutritional Disorders due to Climate Change
3. Audio-video spots on Air Pollution and Human Health
4. GIFs on Air Pollution and Human Health

Beat the Heat - Sample Poster



2.7.4 Swachh Bharat Mission

Swachh Bharat Mission educates people on day-to-day practices that impact on climate change through the following programmes.

1. Biodegradable Waste Management
2. Menstrual Waste Management
3. Plastic Waste Management

2.7.5 National Institute of Disaster Management

A double-sided pamphlet, showing various awareness tools developed by National Institute of Disaster Management (NIDM) to generate information and awareness on various disasters and their management.

⁶⁴ <https://ncdc.gov.in/index1.php?lang=1&level=2&sublinkid=887&lid=430>

IEC Materials related to Environment Education

1. <https://nidm.gov.in/PDF/IEC/awareness.pdf> - Safeguard Environment for Disaster Risk Reduction : Poem & Slogan Book
2. <https://nidm.gov.in/PDF/pubs/Poem%20Book%202012.pdf> - New Year Greeting Cards based on the theme of Disaster Management.
3. https://nidm.gov.in/PDF/IEC/Greeting_2014.pdf - World Environment Day, an annual event observed by NIDM for creating awareness about our Environment among school children.
4. <https://nidm.gov.in/iec.asp> - IEC materials

2.8 CSOs, NGOs & Think-tanks on Environmental Education

The development sector has been actively engaged in environmental education and climate literacy programmes. The CSOs/NGOs outreach targets sections of society where levels of environmental awareness is low and there is a dire need to equip them with knowledge to implement certain projects and programmes.

The development sector's approach to environmental education is often sharply focused on giving knowledge inputs aimed at practical problem-solving and behavioural change.

At the school and college levels, environmental education is often criticized for being too theoretical and passive, while programmes by NGOs tend to be practical and active prompting people to act on the knowledge gained by them.⁶⁵

2.8.1 The Energy and Resources Institute – Youth Climate Conclave

The Energy and Resources Institute (TERI) conducts **Youth Climate Conclave** since 2019, to engage youth in a positive and proactive way in science based discussions on the most relevant climate change issues.

GREEN Olympiad, initiated in 1999, is another leading flagship programs of TERI. It is designed in an innovative manner to test knowledge levels of students about environment and sustainable development issues. GREEN Olympiad receives national and international participation from school and college students. The ultimate goal is to create an 'Environment Conscious Youth Network' facilitating achievement of the Global Agenda by 2030.

Resources of Youth Climate Conclave by TERI

Agenda https://wsds.teriin.org/ycc_v3/Agenda_YCC_2022_Attendee_v1.pdf

1. Pledge: https://wsds.teriin.org/ycc_v3/YCC_Youth_Pledge_2022_v1.pdf
2. **The links for the session's recordings are also available on TERI's YouTube channel:**
 - a. Youth Climate Conclave 2022 (Day 1) – <https://youtu.be/MAIGtATjMK8>
 - b. Youth Climate Conclave 2022 (Day 2) – <https://youtu.be/QsJaAkJmAfE>

⁶⁵ <https://www.sciencedirect.com/science/article/pii/S1877042812010579>

2.8.2 The Climate Reality Project (India & South Asia)

The Climate Project Foundation is an independent branch of The Climate Reality Project (International). In addition to spreading awareness about climate change through training sessions and presentations, The Climate Project Foundation (TCPF) is focused on creating future leaders through its meticulously designed programs like the Green Campus Program, which is spearheading educational institutes on the path of a sustainable future.

The India branch supports over 1500+ trained Climate Reality Leaders from India and South Asia region, who are taking climate actions at many levels, and approximately 1000 volunteers spread all over the country.

The organization is also developing informative and educational content to sensitize and trigger climate action. TCPF has been working closely with partners and like-minded organizations, intending to strengthen India's Paris commitments.

The key initiatives include:

- 1) Climate Reality Leaders - a diverse group of passionate individuals from different walks of life and who are committed to building a sustainable future together. The Climate Reality Project - India can boast of a network of 1000+ Leaders, who empower the communities to combat climate crisis. The Climate Reality Project, has created a large pool of skillsets and talents to boost possibilities. The aim is to develop leaders with a deep understanding of their locality, its richness, problems, and viable solutions. They prioritize national and local solutions and empower communities to take climate action and implement solutions.⁶⁶
- 2) Teacher's Training Programme: The program is designed to give teachers confidence in facilitating climate change and sustainability education inside and outside the classroom so that they can help **young people** understand the causes and consequences of climate change, bring about changes in attitudes and behaviours to reduce the severity of future climate. Teaching resources include a website and mobile app for teaching resources like posters, lesson plans, quizzes, activity workbooks, comics and much more is available for teachers and students.⁶⁷
- 3) Green Campus Programme: It enables schools and colleges to conserve natural resources like water and biodiversity, optimize energy efficiency, manage waste and educate about climate change and sustainability while addressing the well-being of the students as compared to conventional educational institutes.⁶⁸
- 4) Water conservation⁶⁹
- 5) Tree plantation⁷⁰
- 6) Youth For Earth is a collaborative initiative of both Mobius Foundation and The Climate Project Foundation. Youth For Earth Championship offers a platform to the youth to come forward

⁶⁶ <https://www.climatereality.org.in/climate-reality-leaders>

⁶⁷ <https://www.climatereality.org.in/teachers-training-program>

⁶⁸ <https://www.climatereality.org.in/green-campus>

⁶⁹ <https://www.climatereality.org.in/water-conservation>

⁷⁰ <https://www.climatereality.org.in/tree-plantation>

with their plan of action to mitigate the climate crisis. Indian youth are eligible to apply for the 'Champion for Earth and Change Maker' programme.⁷¹

Collection of e-books, videos and reading materials on climate change

- 1) [Your guide to climate action in 2020](#)
- 2) [Climate crisis 101](#)
- 3) [The 12 questions every climate activist hears and what to say](#)
- 4) [2017 handbook on carbon pricing instruments](#)
- 5) [Top solar energy myths](#)
- 6) [Right under your feet: soil health and the climate crisis](#)
- 7) [Facing the smog challenge](#)
- 8) [Extreme weather and climate change: what you need to know](#)
- 9) [Videos: https://www.climatereality.org.in/videos](https://www.climatereality.org.in/videos)
- 10) [Reading Material: https://www.climatereality.org.in/reading-material](https://www.climatereality.org.in/reading-material)

https://csrbox.org/India_organization_project_-Greening-young-minds-through-Environment-Education_8122

2.8.3 WWF India

WWF-India is creating environmental awareness among school children, school teachers and communities through posters, booklets, notebooks and workshops etc. highlighting the environmentally sensitivities of the region. "Wake up to Nature" camp for Teachers is an another initiative of WWF⁷².

2.8.4 Indian Environmental Society

Indian Environmental Society (IES), a non-profit development organization, has been promoting Environmental Improvement Initiatives in India since 1972. IES is active in Environmental Education, Biodiversity Conservation, Information Dissemination, Solid Waste Management, Eco-Technology & Heritage Conservation. Environmental Education has been the centre piece of all programs of the Society⁷³. IES has developed programmes on the following:

- Global Warming and Climate Change
- Biodiversity Conservation
- Waste Management
- Wildlife
- Energy Conservation
- Educational Exchange Program

⁷¹ <https://www.climatereality.org.in/youth-for-earth>

⁷² <https://www.wwfindia.org/>

(also found in: http://assets.worldwildlife.org/publications/830/files/original/Wildlife_and_Climate_Change_Education_Materials_Oct_13_2015.pdf and in

https://csrbox.org/India_organization_project_-Greening-young-minds-through-Environment-Education_8122

⁷³ <http://www.iesglobal.org.in/>

- Health
- Science Communication
- Community Participation Sustainable Development

2.8.5 Centre for Science and Environment

The Centre for Science and Environment (CSE) aims to come up with quality resource material and programmes for educational institutions, students and environmental educators to foster awareness and positive environmental action.⁷⁴

- Green Schools Programme

The programme guides schools, teachers and students to measure and improve their environmental footprint to help bring change on the ground.

- University Programme

The programme provides a platform for higher education institutions to build capacity of faculty, students and young environment professionals to promote an understanding of the environment.

- Gobar Times

The Gobar Times magazine is among India's most popular children's environment monthly and a Down to Earth supplement, published by the CSE. It aims to promote environmental awareness among the young and curious in an engaging and fun-filled manner.

- Young Environmentalist

The Young Environmentalist is a Down to Earth and Gobar Times initiative to promote environmental awareness among the young and curious. It is a digital avatar of the Gobar Times magazine.

Brief Summary of Review of Literature

Broadly, the review of literature had two important parts:

- How environmental literacy has been integrated in the school curriculum.
- A compendium of important programmes, projects and campaigns and the IEC material generated as part of such initiatives.

The review of literature explored the following questions:

- What is being taught (content)
- How is it being taught (method/pedagogy)
- What are the challenges/hurdles (problem analysis)
- How are the challenges being dealt with (innovation/creative problem-solving)

⁷⁴ <https://www.cseindia.org/about-environment-education-252>

2.9 Research Methodology

Objectives of the baseline study

1. To assess the understanding of policymakers, school and college students and less/uneducated youth from communities in Tamil Nadu on the issues around climate change, impacts and vulnerability.
2. To document knowledge products and delivery mechanisms available and assess the existing knowledge gaps across these stakeholders
3. To generate programme recommendations to enhance climate literacy among different stakeholders in Tamil Nadu.

Research and Sampling Methodology

As per the terms of reference (ToR), the methodology for the baseline comprises of two components as below:

(a) Literature review: This to document the available knowledge products, tools, training materials, institutions, and practices at the state level.

(b) Baseline survey: Baseline survey is conducted with the following three primary respondent groups.

- Students studying in class 5 – 9 in government schools.
- Students studying in UG and PG degrees in government arts and science colleges.
- Youth aged between 15 to 29 years⁷⁵ who were either uneducated or dropouts or currently out of any formal education systems.

One of the primary respondents for the baseline study are students studying in class 5 to 9 in government and private schools in Tamil Nadu. As this is a state-level study, it was ensured that the study draws samples that are representative of the students across the Tamil Nadu state. As per the data from the school education department⁷⁶, about 76 lakh students were studying in government primary and secondary schools in Tamil Nadu. This consists of students studying in both rural and urban locations.

The sample was drawn such that 95% of confidence level with 3.5% of margin of error is achieved for the targeted student population. Applying the formula⁷⁷ for calculating sample size with required margin of error, about 810 sample students (778 to be precise, but extended to 810 to have a buffer sample) were drawn from the sample schools. Similar sample sizes were drawn across college students and community youth, totalling 2430 sample respondents across the 9 sample districts in Tamil Nadu.

In order to ensure that the main findings and inferences of the study is truly representative of the whole state, the following parameters were included in the sampling selection: (1) Gender (male and

⁷⁵ As defined in the National Youth Policy 2014 by Government of India - <https://yas.nic.in/national-youth-policy>

⁷⁶ https://web.archive.org/web/20230321070016/http://wbgfiles.worldbank.org/documents/hdn/ed/saber/suporting_doc/SAR/Teachers/India_TamilNadu/Tamil%20Nadu%20School%20Education%20Data.pdf

⁷⁷ <https://www.research-advisors.com/tools/SampleSize.htm>

female students), (2) Geography of the school location (urban, semi-urban and rural), (3) Grades: Class 5 – 9 for schools students, and Graduation and Post-graduation for college students). This gives us the scope for achieving a wide representative sample.

While drawing the sample in each class/school, 50% participation from female students were ensured. It is also proposed that the school & college students be drawn equally from both government and private educational institutions. The selection of students was done using simple random selection method using computer generated numbers in each class for each gender category i.e., male and female. The steps followed are as follows:

- On the day of the visit to the school/college, the number of male and female students present in each class from 5th to 9th/ UG and PG were listed by referring to the attendance register.
- The total number of students was divided by sample size (i.e., three male and three female per class in our study). The result would be the Sample Interval. This same procedure was followed for all 5 classes to arrive at 30 students with 15 male and 15 female students.
- A random number was generated by a computer separately for both male and female lists of students for each class. The random number generated was the Random Start (RS)
- Students were selected from the list starting from RS and every student using Sample Interval was selected till the required sample size in each category arrived at.

A similar procedure was followed for selecting college students across UG and PG courses in each college.

Community youth aged 15 to 29 who were less / uneducated were selected based on stratified random sampling methods in each community. The total number of houses in the chosen community were listed and divided by the required sample size. The mid values obtained were used to choose households from the random start number. In case of any chosen household not having the targeted youth sample, then the next household was considered for the sample. In this way, all the households in the community were given equal chances of being selected for the study.

A structured interview schedule was developed and administered with sample students. For students between 5th and 6th standard, pictorial presentations for certain key questions were used in the tool to ensure that students understood the questions. Based on this premise, the classification of sample has been determined as under:

Table 1: Classification of primary sample groups by category of districts

Category of districts	No. of districts in each category	No. of units (schools/ colleges / communities) in each district	Sample size in each unit (school /college/ community)	Total no. of school students	Total no. of college students	Total no. of less/ uneducated youth from community	Total sample size
Urban	3	3	30	270	270	270	810
Semi-urban	3	3	30	270	270	270	810
Rural	3	3	30	270	270	270	810
Total	9	9		810	810	810	2430

Table 2: Number of schools, colleges and communities covered in the study

Sl. No.	Coverage of sample group	Sample size across 9 districts
1	Total number of schools	27
2	Total number of colleges	27
3	Total number of communities	27

Table 3: Classification of sample districts

Sl.No.	Name of the district	Category of district
1	Chennai	Urban
2	Coimbatore	
3	Madurai	
4	Salem	Semi-urban
5	Thanjavur	
6	Thoothukudi	
7	Dindigul	Rural
8	Tirupathur	
9	Tenkasi	

Figure 2: Field Photos of interviews with students conducted in schools

	
<p>Chennai – Lions Club School (Aided) Ambattur (Urban)</p>	<p>Coimbatore – Vaitheeswaran Vidyalaya (Matric) (Urban)</p>
	
<p>Madurai – Government High School (Urban)</p>	<p>Thanjavur – Government School – Pattukotai (Semi urban)</p>
	
<p>Thoothukudi – Government (Aided) High School (Semi urban)</p>	<p>Dindigul – RC Fatima (Aided) School, Virupatchi (Rural)</p>



Tenkasi – Annai Velankanni (Matric) School (Rural)



Tirupathur – Government (Aided) School (Rural)



Salem – Government School (Semi urban)

(b) Secondary Respondent Group

The study involved interviewing the following secondary sample groups

Table 4: Classification of secondary sample groups

Sl.No.	Secondary Sample Group	Type of interview	No. of FGDs	No. of interviews per district	Total no. of interviews from all 9 districts
1	Group of school / college teaching faculty (minimum 8 to 12 members)	Focus Group Discussion (FGD)	1	2	18
2	District level officials across various departments	Semi-structured Interviews (SI)	NA	5	45
3	Community Leaders (Elected members / SHG leaders / Informal leaders etc.)	Key Informant Interview (KII)	1	2	18
4	State level officials / policy makers across various departments (Rural development, Water, Agriculture, Renewable Energy, Revenue, Forest, Transport etc.)	Key Informant Interview (KII)	NA	NA	5
5	State level NGOs working on climate literacy and action	Key Informant Interview (KII)	NA	NA	5

Figure 3: Field Photos of FGDs conducted with teaching faculties in Schools and College

	
<p>Madurai – Kappalur School FGD (Urban)</p>	<p>Tanjavur – Collage FGD (Semi urban)</p>
	
<p>Coimbatore – Collage FGD (Urban)</p>	<p>Tenkasi – Collage FGD (Rural)</p>
	
<p>Dindigul – School FGD (Rural)</p>	<p>Chennai – School FGD (Urban)</p>



Thoothukudi – School FGD (Semi urban)



Tirupathur – School FGD (Rural)



Salem – School FGD (Semi urban)

Development of tools for data collection

The research team developed the following quantitative and qualitative tools for data collection:

- a) Quantitative tool – Questionnaire for interviewing the primary respondents of the study – Students studying in schools (Class 5 – 9) and colleges (UG and PG), community youth.
- b) Qualitative tool – Focus Group Discussion (FGD) checklist for teacher faculty members in schools and colleges.
- c) Qualitative tool – Semi-structured interview tool for interviewing government officials at the district level.

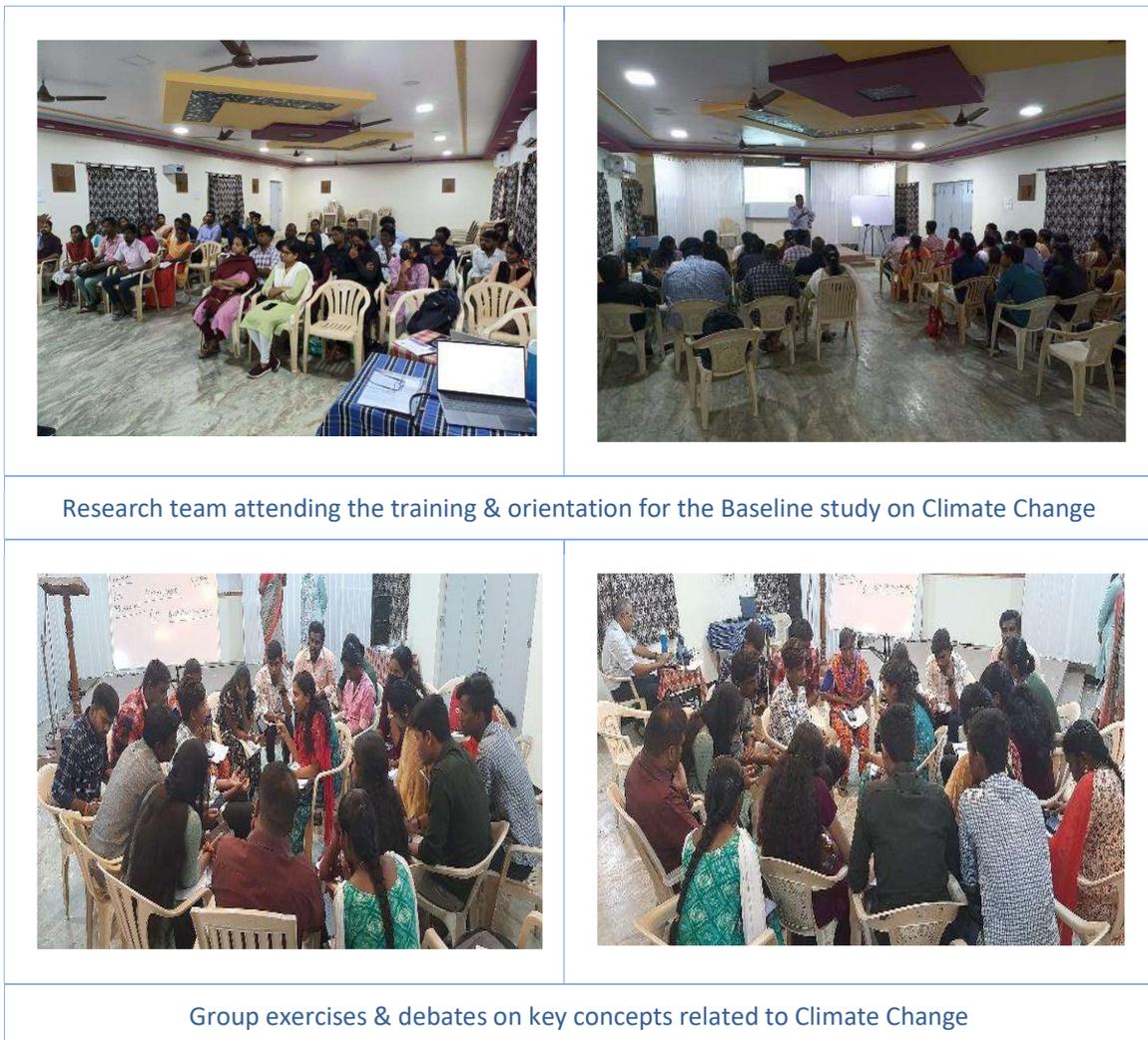
The tools were reviewed by the team from TNCCM and the feedback received was duly incorporated. As per the feedback received from TNCCM, the questions were simplified to suit school students, particularly students studying in class 5 – 8. During the pre-test and pilot-test of the tools, the research team found the need to use narratives and picture cards for explaining certain questions related to

causes and impacts of climate change to such students. The same method was adopted during the main data collection by the research team and ensured that the students in class 5 – 8 were able to easily understand all the questions.

Training of the research team

A team of 36 researchers who had required qualifications and experience in conducting similar surveys was recruited by CAG and conducted a 2-day training on study methodology, tools and fieldwork plan during the 18th and 19th March 2023.

Figure 4: Photos of Trainings





Research team practicing mock and real interviews with school students invited for the training

Data Collection

The data collection was carried out in all the nine sample districts as planned during the month of March 2023. The required samples as per the agreed sample size were duly achieved by the research team.

Figure 5: Field Photos - interviews with students conducted in colleges



Chennai – Loyola College (Urban)



Coimbatore – STC College (Urban)



Madurai – Government Arts College (Urban)



Thanjavur – Maruthupandiyar Arts & Science college (Semi urban)



Thoothukudi – Don Bosco College (Semi urban)



Salem – Arts College (Semi urban)



Tenkasi – JP Engineering College (Rural)



Tirupathur – Pothigai Engineering College (Rural)



Dindigul – Anugraha Arts & Science College (Rural)

Figure 6: Field Photos of Interviews with Community Youth

 A photograph showing an interview taking place indoors. A man in a dark shirt is seated on the left, holding a smartphone. A woman wearing a black hijab and a black top is seated on the right, also holding a smartphone. They appear to be engaged in a conversation. In the background, there is a white electric fan on a small table.	 A photograph showing an interview outdoors. A man in a grey shirt is seated on the left, looking towards a woman on the right. The woman is wearing a yellow patterned top, a blue shawl, and a face mask. She is holding a smartphone. They are standing in front of a building with blue and green walls. A yellow water container is visible in the background.
<p>Chennai – Madhavaram (Urban)</p>	<p>Coimbatore – Ukkadam (Urban)</p>
 A photograph showing an interview outdoors. A woman in a pink top is seated on the left, looking at a smartphone. Another woman in a blue patterned sari is seated on the right, looking towards the first woman. They are in a residential area with laundry hanging in the background.	 A photograph showing an interview outdoors. A woman in a blue and white striped shawl is standing on the left, looking at a smartphone. Another woman in a green top and white shawl is standing on the right, also looking at the smartphone. They are in a residential area with a motorcycle and buildings in the background.
<p>Madurai – Tirumangalam (Urban)</p>	<p>Tanjavur – Tirukannurpatti (Semi urban)</p>
 A photograph showing an interview outdoors. A woman in a colorful sari is standing on the left, looking at a smartphone. A man in a light blue shirt is seated on the right, looking towards the woman. They are in a residential area with a building in the background.	 A photograph showing an interview outdoors. Two men are standing near a motorcycle. One man in a light green shirt is on the left, and another man in a white shirt is on the right. They appear to be engaged in a conversation. The background is slightly blurred.
<p>Thoothukudi – Thoothukudi Town (Semi Urban)</p>	<p>Salem – Semi Urban</p>



Tenkasi – Kurumpalaperi (Rural)



Tirupathur – Yelagiri (Rural)



Dindigul – Nochiodaipatti (Rural)

3. Main Findings

In the present study of climate literacy, the following three broad aspects were covered:

- Knowledge about climate change and the causes and impact of it
- What are the initiatives and efforts being made to tackle climate change.
- What are the attitudes of the respondents and are they practicing (action) mitigation and adaptation vis-à-vis climate change.

For the purposes of the study, the optimum level of knowledge set as a benchmark included the following:

- Awareness about definition or understanding of the concept of climate change. The UN defines climate change as long-term shifts in temperatures and weather patterns. The causes are man-made (emission of greenhouse gases mainly due to burning of fossil fuels which are trapped around earth and thus contribute to rising temperatures.)
- The second level of awareness about the consequences of climate change. (The most obvious consequence is rising temperatures. Besides that, it could result in frequent natural disasters such as landslides, flooding, etc and loss of biodiversity, increase in soil salinity, desertification, etc)
- The third level of awareness is about national and international efforts to tackle climate change. (Awareness of the efforts such as the United Nations Framework Convention on Climate Change and Conference of the Parties, Kyoto Protocol, Paris Agreement, etc were assessed)

Individuals play important roles in strategies meant to tackle climate change through their personal attitudes and behaviours. These include four major areas of intervention through individual action – 1) in travel and commuting - by reducing private transport and taking public transport, use of electric vehicles, etc; 2) in diet and food; 3) in habitat - protecting green spaces in cities, towns, villages, etc, and 4) reducing energy consumption through better house design and use of energy efficient appliances, etc.

Some of the keywords used in the questionnaire include:

- Climate change
- Environment & Climate
- Rise in surface temperature
- IPCC (Intergovernmental Panel on Climate Change – a UN body)
- Carbon Cycle (How carbon is exchanged from atmosphere to living organisms to dead matter and return to atmosphere)
- Greenhouse Gases (Gases in earth's atmosphere that trap heat leading to increase in temperatures. These include carbon dioxide, methane, and hydrofluorocarbons)
- Ozone layer and its depletion (A layer of ozone which acts as a shield blocking UV ray from sun reaching the surface of earth)
- Paris Agreement (A legally binding international agreement on climate change which includes targets to limit temperature rise)

- Net Zero (The quantum of greenhouse gases added, and the quantum of greenhouse gases removed – resulting in net zero emissions)
- Recycling of Waste
- Climate-friendly practices
- In Climate Literacy, a reasonably well-informed knowledge about climate change would require knowledge of the above concepts.

The quantitative component of the baseline study focuses on four aspects:

- Knowledge about key climate change concepts, knowledge about causes and effects of climate change.
- Awareness about International, national and state-level Initiatives regarding climate change.
- Attitude towards issues relating to climate change.
- Practice – what respondents are doing about mitigating/adapting to climate change in their lives.

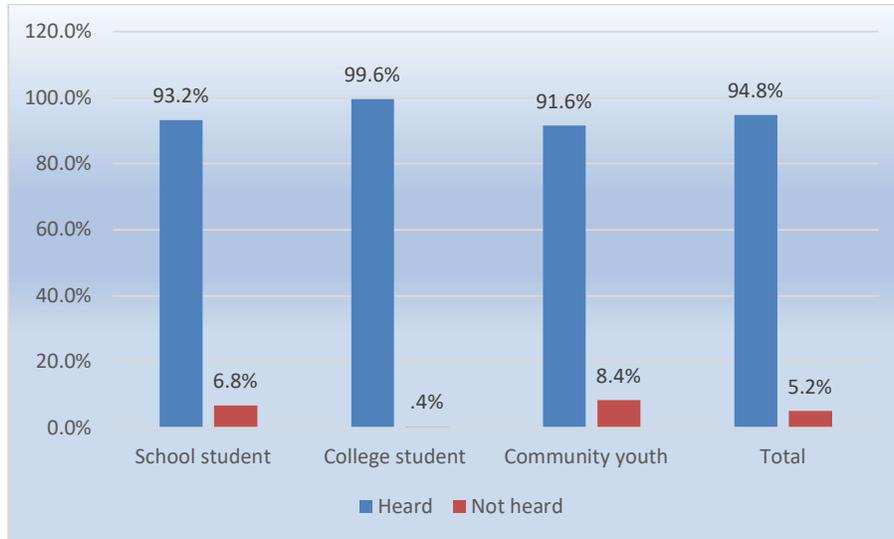
Knowledge and awareness are expected to bring in the desired change in attitudes and practice. Knowledge of basic concepts is critical to understanding the issue of climate change. The next step is to understand the causes and effects of climate change. Knowledge of initiatives (both global and local) is necessary to view an individual or community as part of a larger macro effort. It further helps in defining an individual's or community's role in the initiatives. Knowledge and awareness need to be seen through the prism of critical thinking and internalization which would influence one's attitude towards the issue. Direct campaigns and initiatives ensure that the desired impact is achieved. The influence on attitude should be positive, enabling and prompting action. It should not lead to negative views and denial. Lastly, armed with the right knowledge and attitude, an individual or a community will be prompted to act on it, put ideas into practice and use it in day-to-day life.

This study predominantly focuses on mapping the present knowledge level among school and college students, and among other stakeholders such as youth in the community and officials.

3.1 Knowledge of basic concepts

Familiarity with the term 'climate change'

Figure 7: Have you heard of the term 'Climate Change'?



94.8% of respondents were familiar with the term climate change, with no notable differences between male and female respondents.

Table 5: Familiarity with the term 'climate change' by Gender

Gender	Have you heard of the term 'Climate Change'?		Total
	Yes	No	
Male	1124	65	1189
	94.5%	5.5%	100.0%
Female	1180	61	1241
	95.1%	4.9%	100.0%
Total	2304	126	2430
	94.8%	5.9%	100.0%

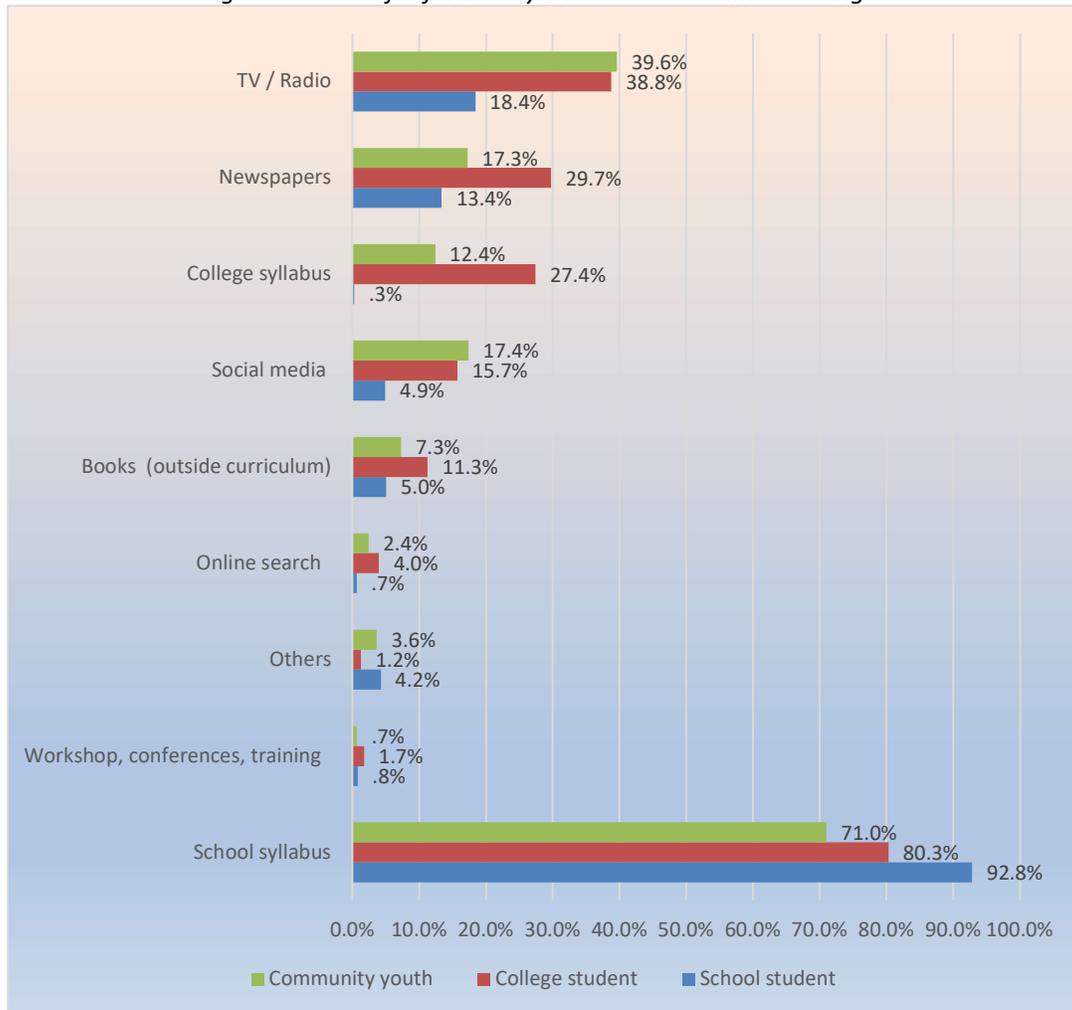
Similarly, there are no significant differences across rural, urban and semi-urban categories of districts. 92.8 % of students reported that their awareness of the term came from the school textbooks - this is since environmental education⁷⁸ is integrated in the school curriculum across the country. The

⁷⁸ There are school textbooks (from primary school to higher secondary school) with the following names adopted by CBSE, ICSE, etc: Environmental Studies, Environmental Science and Environmental Education. TN

higher percentage of awareness of the term ‘climate change’ was mainly due to the observation that the term per se is widely used in both inside and outside school/college. But just being familiar with the term does not automatically lead to a critical grasp of the subject.

Source of knowledge about the term ‘climate change’

Figure 8: Source for familiarity with the term ‘climate change’



(Multiple Response)

SCERT has textbooks titled both Environmental Studies and Environmental Sciences. Typically, at college level (under-graduation course in engineering or science) it is environmental science and environmental engineering.

Validating the government's strategy to integrate environmental education in school curriculum, it was found that on average 81.4 % of respondents said that they became familiar with the idea of climate change through the school syllabus. Mass media – TV/Radio (32.4 %) and newspaper (20.4 %) follow as the next two sources of information.

Only 27.4% of college students had the opportunity to hear about climate change through the college curriculum.

What has been learned in school needs to be updated and refreshed subsequently in their lives through mass media and digital platforms. A concerted communication strategy and campaign is necessary to not only spread awareness but also refresh, reinforce, and update knowledge about climate change.

List of subjects studied in the school / college curriculum

The State Boards of Education have played a vital role in imparting Environmental Education through the school curriculum. It has become a subject right from primary (up to class V) and upper primary education (class V to VIII). At the primary stage, the objective is to sensitize the child about the environment. Soon students are made to see connections between environment and society, culture, etc. Initially, it would be a part of a subject and for later classes it would be a standalone subject with a separate textbook.⁷⁹ The different levels of education (classes) at which the environmental education is provided are: (a) Class 1 and II – Through activities, (b) Class III to V – Environmental Studies (EVS), (c) Class VI to X – Infusion Model, and Class XI to XII – Project based study. In the present study explored with the students the list of the climate literacy related subjects they have studied as below.

⁷⁹<https://files.eric.ed.gov/fulltext/ED629147.pdf>

Table 6: List of subjects/topics studied in school/college curriculum

Topics studied in curriculum	Type of respondent		Total
	School student (Class 5 – 9)	College student (UG & PG)	
Social Studies	447	435	882
	55.2%	53.7%	54.4
EVS (Environmental studies)	303	467	770
	37.4%	57.7%	47.5
Geography	92	196	288
	11.4%	24.2%	17.8
Green engineering	0	26	26
	0%	3.2%	1.6
Agricultural sciences	52	68	120
	6.4%	8.4%	7.4
Ecology	15	18	33
	1.9%	2.2%	2.0
Others	103	46	149
	12.7%	5.7%	9.2
Total	810	810	1620

One of the questions posed to the students during the study was which environment- and climate-related subjects were included in the curriculum and they had studied. While environmental studies and social studies are two subjects mentioned in the responses, the data doesn't fully explain the ground reality. At school level, integration of environmental education in curriculum did help in exposing students to the idea of climate change. However, it is not sufficiently integrated in higher education, even in related studies such as ecology, agricultural sciences, etc.

Even though all students are supposed to have studied environmental studies in school, nearly half of them do not indicate it. This could be due to multiple reasons including low recall value among sections of students due to treating it as a supplementary and not a core subject by students and teachers alike and not giving it due importance to it. This needs to be studied further to identify reasons so that the issue can be addressed.

General understanding of the meaning of 'climate change'*Table 7: General understanding of the word 'climate change' by type of respondent*

Response	Type of respondent			Total
	School student (Class 5 – 9)	College student (UG – PG)	Community youth	
Change of seasons	364	441	348	1153
	44.9%	54.4%	43.0%	47.4%
Change in temperature	149	129	176	454
	18.4%	15.9%	21.7%	18.7%
Change in weather	134	124	132	390
	16.5%	15.3%	16.3%	16.0%
Change in the climate over a long period of time	13	29	22	64
	1.6%	3.6%	2.7%	2.6%
Not able to define exactly	25	30	25	80
	3.1%	3.7%	3.1%	3.3%
Don't know	122	55	107	284
	15.1%	6.8%	13.2%	11.7%
Others, specify	3	2	0	5
	.4%	.2%	0.0%	.2%
Total	810	810	810	2430
	100.0%	100.0%	100.0%	100.0%

Irrespective of what the textbooks say or what has been taught in schools, there is a widespread misconception among 47.4% of the total respondents that climate change is all about 'change of seasons'.

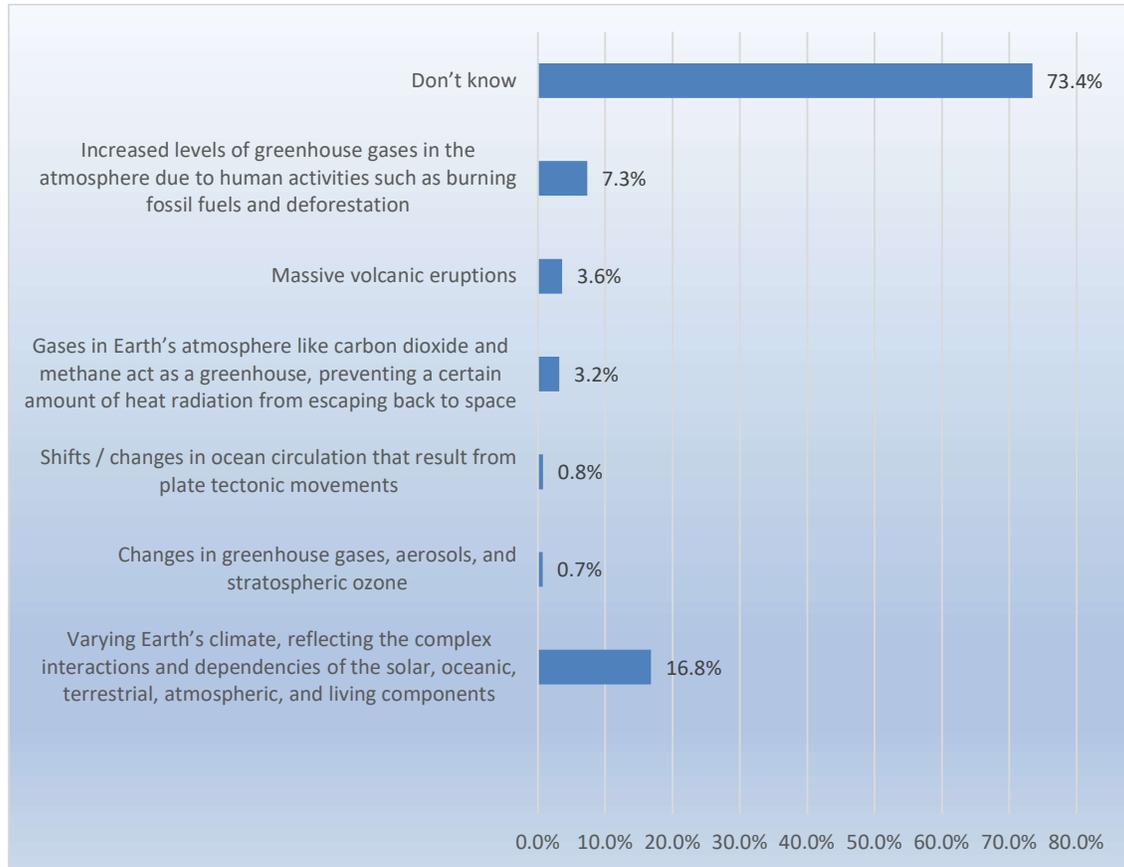
This shows that there is an absolute lack of understanding and even wrong understanding regarding the meaning of the word climate change. The word climate is widely understood/ used in colloquial language as a synonym for change of seasons, i.e., from winter to summer etc.

Not knowing the concept could be addressed through IEC campaigns. But wrong understanding will be more challenging to deal with as it involves correcting a misconception, a more complex process and could be more time-consuming.

The right response, i.e., 'change in the climate over a long period of time' has been cited by only 2.6 % of the respondents. It has also been noted that 3.3% 'don't know' the meaning of climate change.

Knowledge of the scientific meaning of climate change

Figure 9: Knowledge of the scientific meaning of 'climate change'



Climate change is a scientific concept and the study tried to gauge the level of scientific understanding of climate change among the respondents. The level of knowledge expected is not that of an expert, but of a lay person. About 73.4% didn't have any scientific understanding of climate change. Only around 16.8% were aware of one scientific meaning of climate change. School and community youth had less understanding compared to college youth.

A reasonably basic level of understanding (on increased levels of greenhouse gases in the atmosphere due to human activities such as burning fossil fuels and deforestation) was known only to 7.3% of respondents.

Table 8: Scientific understanding of Climate Change by Category of district

Response statements	Category of district			Total
	Urban (N=810)	Semi-urban (N=810)	Rural (N=810)	
Varying Earth’s climate, reflecting the complex interactions and dependencies of the solar, oceanic, terrestrial, atmospheric, and living components	152	137	120	409
	18.8%	16.9%	14.8%	16.8%
Increased levels of greenhouse gases in the atmosphere due to human activities such as burning fossil fuels and deforestation	62	60	55	177
	7.7%	7.4%	6.8%	7.3%
Gases in Earth’s atmosphere like carbon dioxide and methane act as a greenhouse, preventing a certain amount of heat radiation from escaping back to space	39	7	31	77
	4.8%	.9%	3.8%	3.2%
Shifts / changes in ocean circulation that result from plate tectonic movements	11	5	3	19
	1.4%	.6%	.4%	0.8%
Massive volcanic eruptions	44	33	11	88
	5.4%	4.1%	1.4%	3.6%
Changes in greenhouse gases, aerosols, and stratospheric ozone	7	6	5	18
	.9%	.7%	.6%	0.7%
Don’t know	562	593	629	1784
	69.4%	73.2%	77.7%	73.4%
Total	810	810	810	2430
	100%	100%	100%	100%

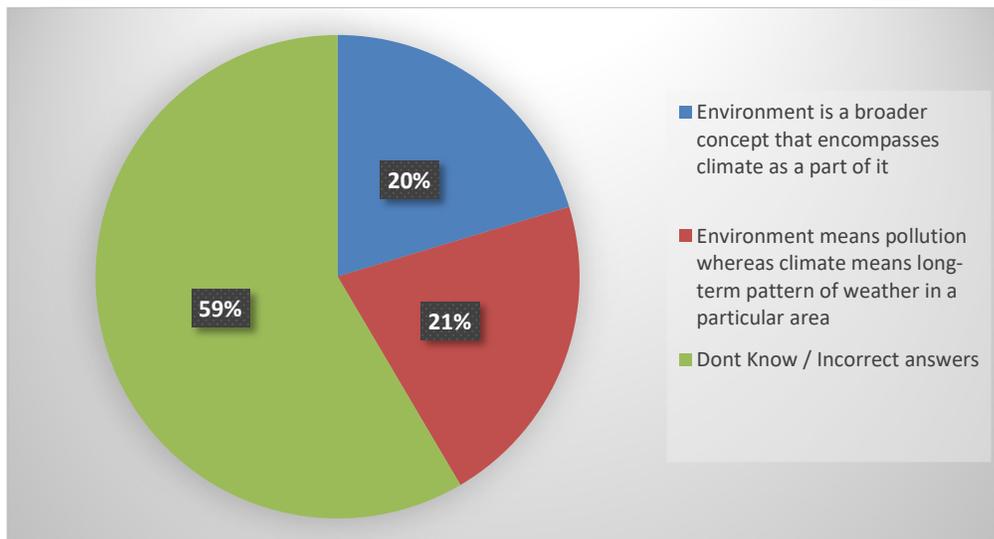
Urban respondents had slightly better percentages of correct responses. in all three right responses. But they were very insignificant. This shows that geography doesn't have an impact on their knowledge of climate change.

Female respondents had higher knowledge than males on the first point. Respondents with the 19 - 25 years age group had better scientific understanding of climate change compared to other age groups.

The larger point however is the lack of scientific understanding of a scientific phenomenon among a large number of people. This lack of scientific understanding becomes a hurdle in grasping the seriousness of the issue, the magnitude of the problem and its relevance to people.

Knowledge of environment and climate

Figure 10: Knowledge on difference between environment and climate



If not taught and learned in a structured way, complex ideas relating to the environment can be difficult to master. One such example is mistaking climate change for change in seasons. The second example is using the word environment as a synonym for pollution and not knowing the difference between weather and climate which is critical to climate literacy.

The majority (58.5%) did not know the difference between the concepts of weather and climate and had wrong perceptions of climate change as change of seasons. It also shows that 21.2% had the misconception that the environment means pollution. The proposed IEC programme should clearly focus on differentiating these concepts.

No significant differences were observed between genders as 20.8% and 19.9% of male and female respondents respectively had the right knowledge about the term environment and climate. Semi-urban (16.7%) had poor/wrong understanding compared to urban (22.8%) and rural (21.5%). Younger age (below 14 years) respondents (16.7%) had the least knowledge on the meaning of the two concepts compared to older respondents.

Knowledge of the role of the oceans in climate change

Table 9: Knowledge on role of oceans by type of respondents by category of district

Role of Ocean	Type of respondents			Total
	School students	College students	Community youth	
The oceans absorb carbon dioxide from the atmosphere, which can lead to ocean acidification and harm marine life	173	262	143	578
	21.4%	32.3%	17.7%	23.8%
The oceans have no role in climate change	81	84	125	290
	10.0%	10.4%	15.4%	11.9%
Don't know	556	464	542	1562
	68.6%	57.3%	66.9%	64.3%
Total	810	810	810	2430
	100.0%	100.0%	100.0%	100.0%

The role of oceans in climate change is a complex subject which basic and young learners are not expected to know. However, data has some interesting points. However, across age groups and categories, 64.3% did not know about the role of oceans in climate change.

The magnitude of the problem

The following four questions try to assess the understanding of respondents regarding the seriousness and magnitude of the problem and the urgency that needs to be shown:

Going by the current estimations, how do you think the earth's global average surface temperature is changing over a period?

If it is increasing, can you specify what the average increase in the rate of earth's surface temperature was during the 20th century?

What is the global target set by IPCC as the maximum global average temperature of earth's surface to be achieved by 2050?

Knowledge on the change of earth’s global average surface temperature that could reach by end of the century

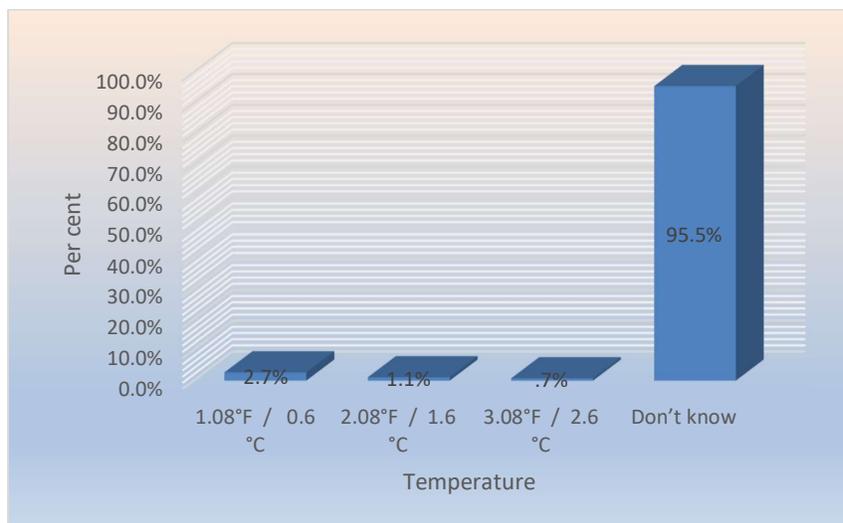
Table 10: Knowledge of estimated averaged surface temperature by Category of district

Response	Type of respondent			Total
	School students	College students	Community youth	
Increasing	638	715	668	2021
	78.8%	88.3%	82.5%	83.2%
Decreasing	45	34	37	116
	5.6%	4.2%	4.6%	4.8%
Doesn’t change	37	25	20	82
	4.6%	3.1%	2.5%	3.4%
Don’t know	90	36	85	211
	11.1%	4.4%	10.5%	8.7%
Total	810	810	810	2430
	100.0%	100.0%	100.0%	100.0%

It is a positive sign that the majority (83.2%) acknowledged the increase in earth’s temperatures. This is evident across all types of respondents. This is a good starting point for awareness programmes.

Knowledge about temperature rise during the 20th century

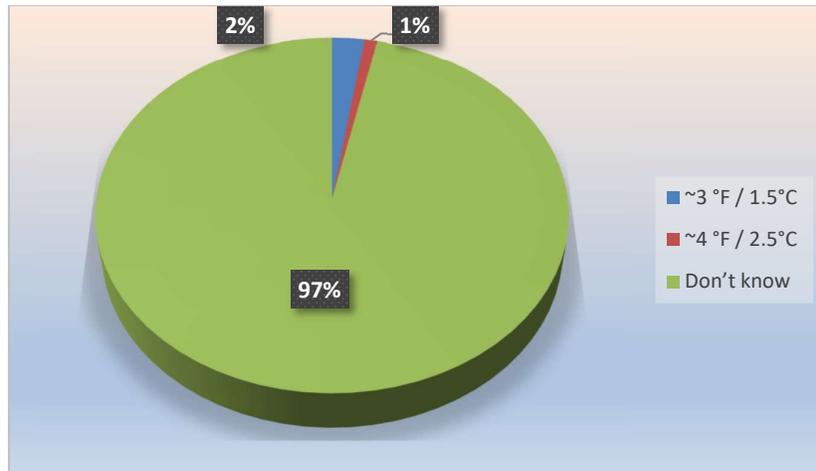
Figure 11: Knowledge of the average rate at which the earth’s surface temperature rose during 20th century



The majority (95.5%) did not know the actual measure of temperature increase that has happened during the twentieth century. Only 2.7% mentioned the right answer. It is surprising to note that even among college students only very few (3.7%) could give the correct answer for this question.

Knowledge of IPCC’s global target set for maximum temperature rise

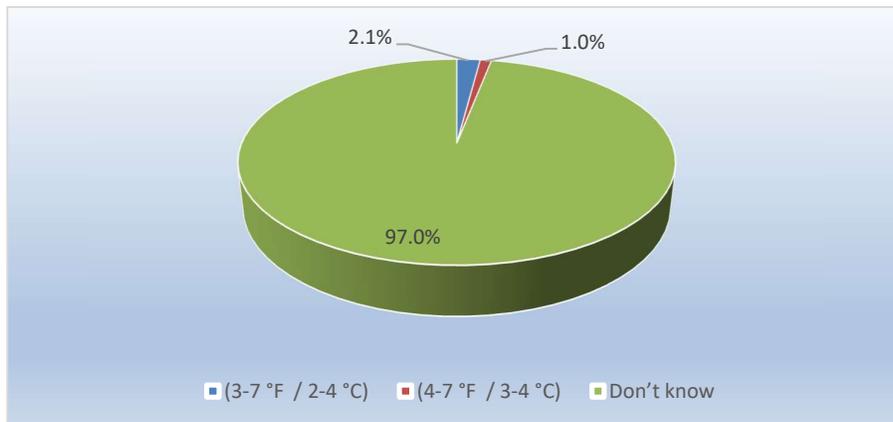
Figure 12: Knowledge of the global target set by IPCC as the maximum additional temperature of earth’s surface to be maintained by 2050⁸⁰



Only 2.4% of respondents could give the correct answer. The majority (96.6%) did not know the answer.

Prediction of possible rise of temperature

Figure 13: Prediction of possible rise of temperature by end of the century if no action is taken⁸¹



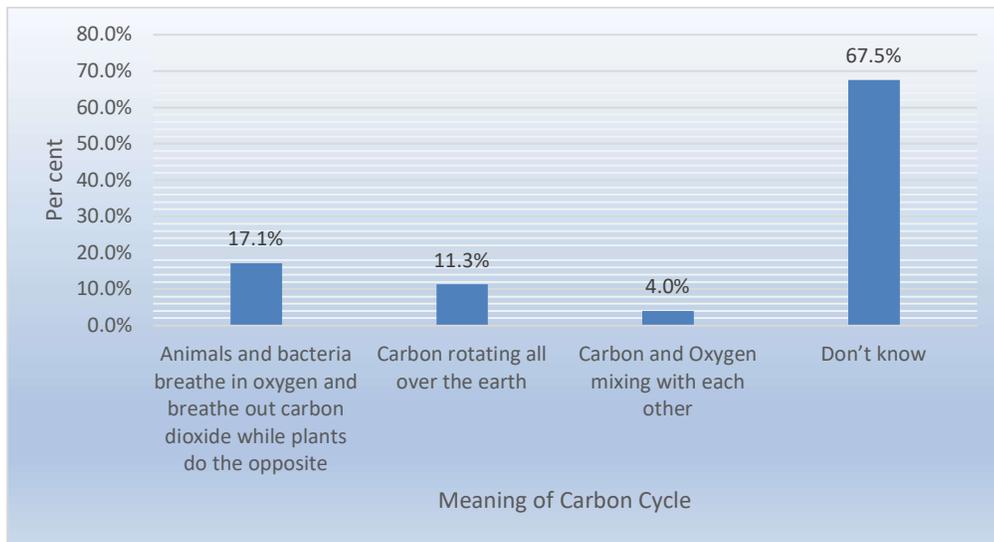
⁸⁰[https://www.ipcc.ch/sr15/#:~:text=Limiting%20warming%20to%201.5%C2%B0C%20implies%20reaching%20net%20zero,particularly%20methane%20\(high%20confidence](https://www.ipcc.ch/sr15/#:~:text=Limiting%20warming%20to%201.5%C2%B0C%20implies%20reaching%20net%20zero,particularly%20methane%20(high%20confidence)

⁸¹ <https://www.nature.com/articles/d41586-020-01125-x>

Only 2.1% could tell the correct answer i.e., 2-4 degree Celsius by end of the century⁸². The majority (97%) did not know it.

Awareness of carbon cycle

Figure 14: Awareness of the meaning of carbon cycle



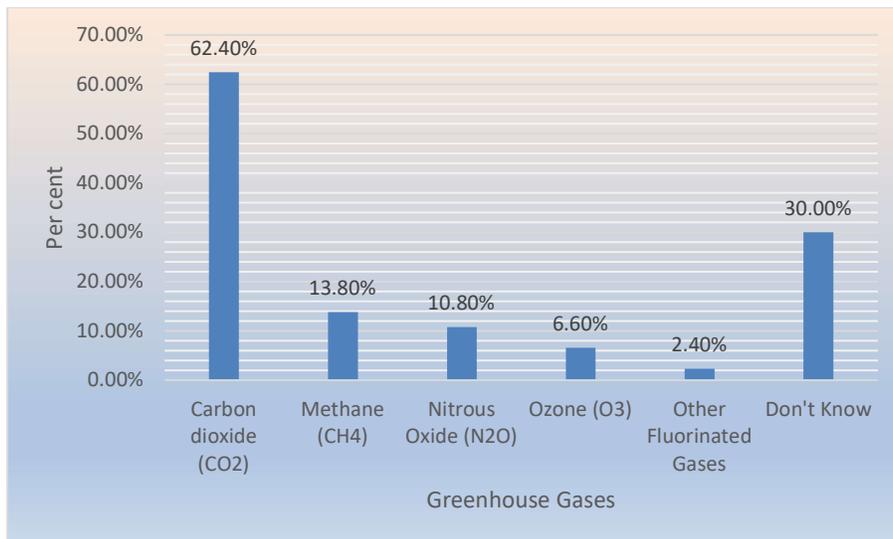
Only 17.1% of the respondents could mention the right meaning of carbon cycle, while the rest of them (82.9%) either could not tell or mentioned the wrong meaning.

One of the findings that emerged from the study was the prevalence of low level of awareness among the target group when it came to important details required for deeper understanding of the subject. Television and social media, which were important media for accessing information about climate change, it only provided superficial and fragmented knowledge that contributed to basic awareness and not deeper and nuanced understanding. This can be inferred from an understanding of the nature of social media and how youth consume social media content.

⁸² <https://www.reuters.com/sustainability/climate-energy/climate-track-warm-by-nearly-3c-without-greater-ambition-un-report-2023-11-20/#:~:text=The%20anticipated%20level%20of%20warming,Agreement%20was%20adopted%20in%202015.>

Knowledge of greenhouse gases

Figure 15: Knowledge of greenhouse gases



(Multiple Response Figure)

While the majority (62.4%) of the respondents could mention carbon dioxide as a greenhouse gas, other potent greenhouse gases were named by less than 14% of respondents.

Knowledge of major greenhouse gases that contribute to the rise of global temperatures

In the context of reasons for the rise of global temperature, one of the questions dealt with was which major greenhouse gases contributed to the rise in global temperature and listed 5 gases as options, and the sixth option being “Don’t Know”.

Table 11: Knowledge of the major greenhouse gas contributing to the rise of global temperatures

Greenhouse gas	Type of respondent			Total
	School student	College student	Community youth	
Nitrous Oxide	27	64	16	107
	3.3%	7.9%	2.0%	4.4%
Oxygen	33	42	49	124
	4.1%	5.2%	6.0%	5.1%
Carbon Dioxide	254	339	225	818
	31.4%	41.9%	27.8%	33.7%
Ozone	11	17	18	46

Greenhouse gas	Type of respondent			Total
	School student	College student	Community youth	
	1.4%	2.1%	2.2%	1.9%
Sulphur dioxide	2	7	3	12
	.2%	.9%	.4%	.5%
Don't know	483	341	499	1323
	59.6%	42.1%	61.6%	54.4%
Total	810	810	810	2430
	100.0%	100.0%	100.0%	100.0%

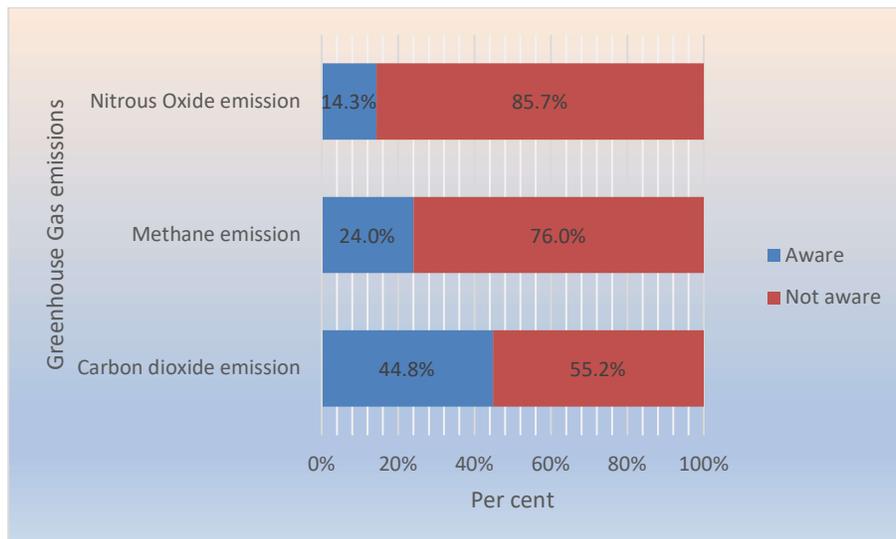
Only 33.7% of the respondents could mention the major greenhouse gas (i.e., CO₂), while others couldn't not.

Knowledge of ways of Carbon Dioxide (CO₂) emissions

Carbon dioxide in the atmosphere is an important cause for global warming and therefore the question asked was as to how CO₂ emissions happen.

In the following figures, the knowledge on the sources of greenhouse gas emissions is explored. Among the respondents, the majority (more than 75%) could not mention the other greenhouse gases; however, 44.8% of respondents knew of carbon dioxide emissions.

Figure 16: Awareness of ways of key greenhouse gas emissions



In the following figure, the specific sources of carbon dioxide mentioned by the respondents are presented.

Figure 17: Knowledge of ways of Carbon Dioxide (CO₂) emissions

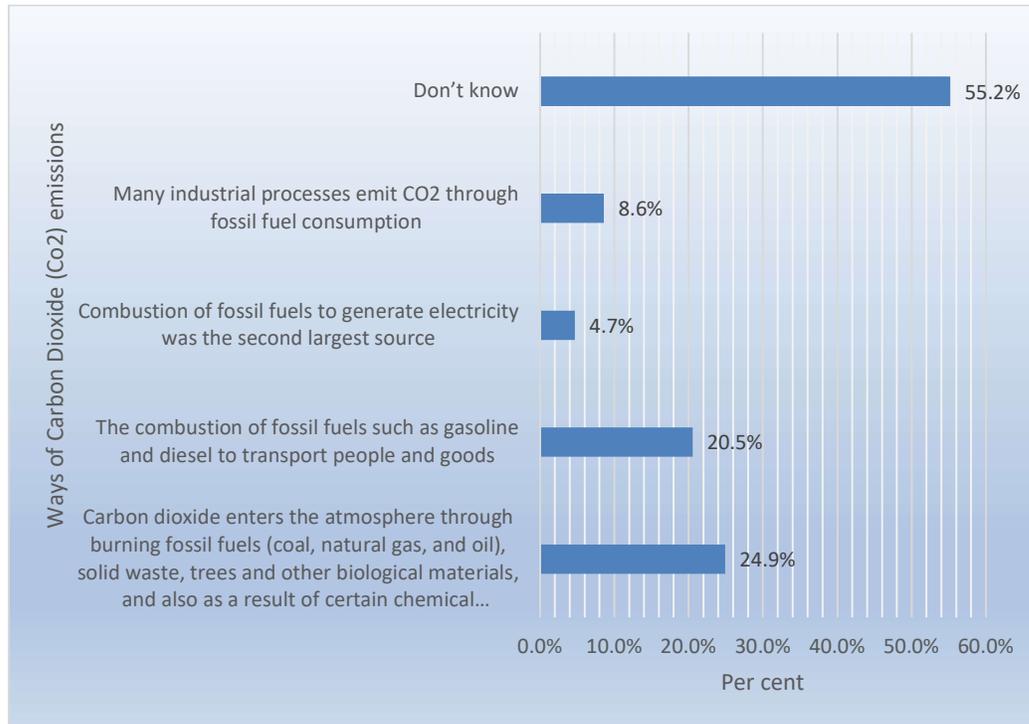


Figure 18: Sources of Methane (CH₄) emissions

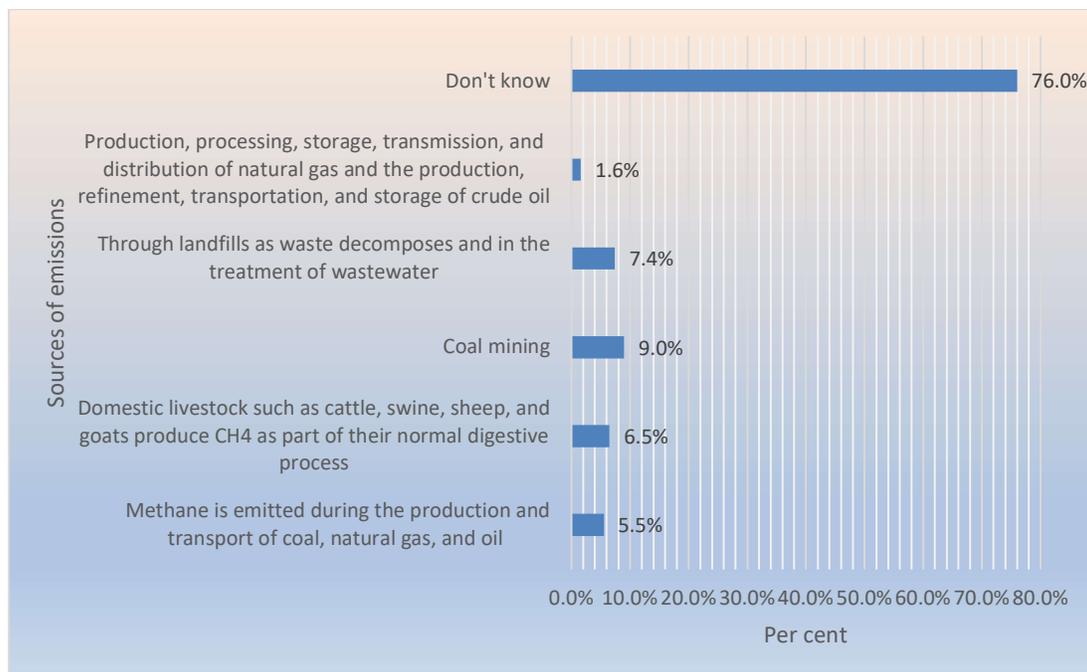
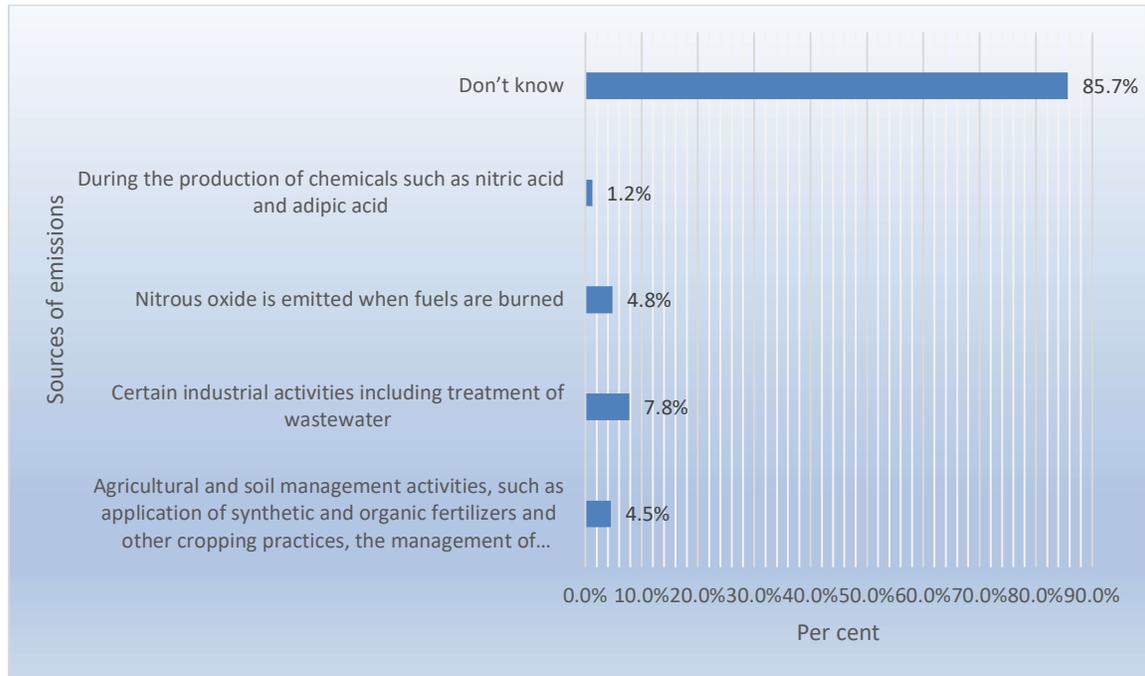


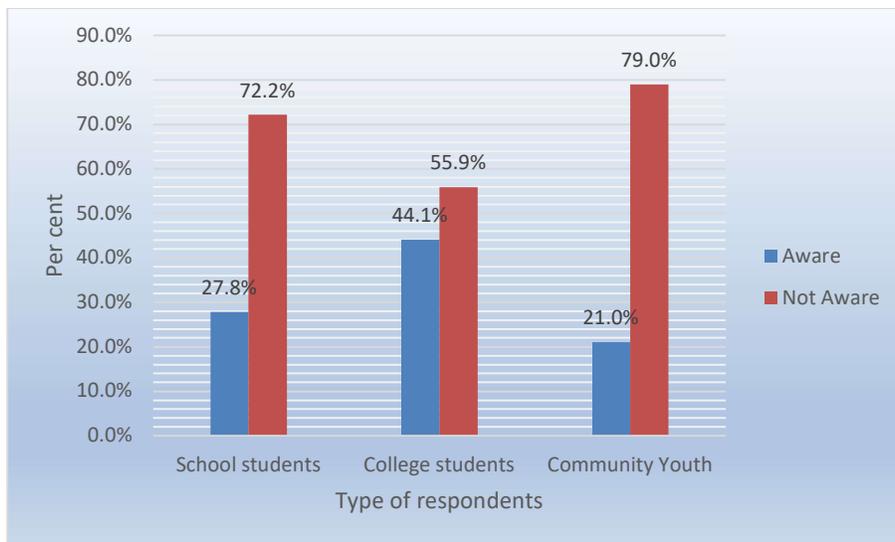
Figure 19: Sources of Nitrous Oxide emissions



Knowledge about the role of the ozone layer in climate change

More than 70% of school students and community youth didn't have the knowledge on the role of ozone layer in climate change. 44.1% of college students were aware of the role of the ozone layer.

Figure 20: Knowledge on role of ozone layer by type of respondents



3.2 Knowledge of Causes and Effects

One of the premises of the study is the link between causes and effects of climate change and climate action. Understanding this link should lead to identifying and seeking mitigation and adaptation strategies.

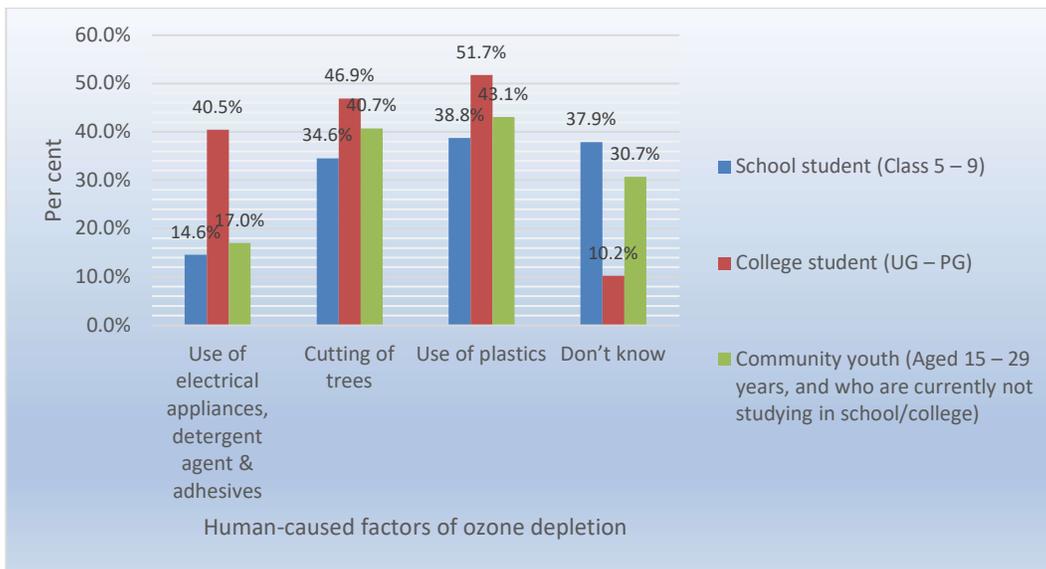
Since students are in the formative stage not only in terms of gaining knowledge, but also forming values and belief systems which will shape their future lifestyles, awareness of causes and effects will enable them to adopt a “green” lifestyle.

In this section, questions relating to the following were asked:

- Human-caused factors for ozone depletion
- Effects of ozone depletion
- Sectors that contribute to ozone depletion
- Causes of climate change
- Natural causes
- Human-induced causes
- Impact of climate change

Knowledge of Human-caused factors for ozone depletion

Figure 21: Knowledge of human-caused factors for ozone depletion by type of respondents



A person who has studied in school and college and with some knowledge of current affairs gained formally or informally through media, social media and other sources is expected to know the use of

plastics, cutting down of trees and using goods that release chlorofluorocarbons (CFCs) could increase ozone depletion.

However, out of 2430 respondents, only 126 respondents (5.2%) could tell all three ways through which human actions cause ozone layer depletion. The majority (44.5%) were aware of the 'use of plastics' as human action causing ozone layer depletion. Next was cutting trees (40.7%).

It is important to know that only 24% were aware of depleting ozone layer by using various household appliances such as ACs, solvents, adhesives etc. Lack of knowledge regarding the use of appropriate, energy-friendly household appliances may be an obstacle to initiate action either to avoid or minimize the use of ozone depleting substances.

Here again, college students had better awareness compared to the other two groups.

Knowledge of effects of Ozone layer depletion on human health

Figure 22: Knowledge of effects of Ozone layer depletion on human health by Type of respondents

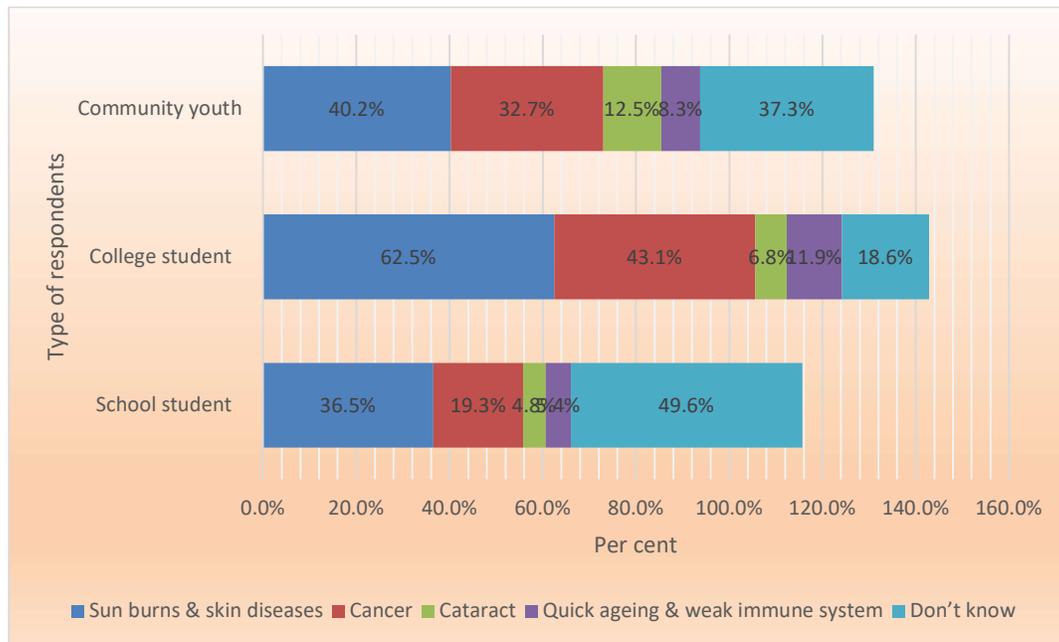


Table 12: Knowledge on effects of Ozone layer depletion on human health by Age group of respondents

Effects on human health	Age group of respondents				Total
	Below 14 years	14 - 19 years	20 - 25 years	Above 25 years	
Sun burns & skin diseases	293	289	372	174	1128
	36.9%	56.3%	51.7%	43.2%	46.4
Cancer	154	199	274	143	770
	19.4%	38.8%	38.1%	35.5%	31.7
Cataract	39	40	59	57	195
	4.9%	7.8%	8.2%	14.1%	8.0
Quick ageing & weak immune system	44	42	79	42	207
	5.5%	8.2%	11.0%	10.4%	8.5
Don't know	392	140	197	126	855
	49.3%	27.3%	27.4%	31.3%	35.2
Total	795	513	719	403	2430

The majority (46.4%) were aware of sunburn and skin diseases as effects of ozone layer depletion on human health. It is important that common people are aware of all these effects.

Awareness about greenhouse gas emission sectors

The roadmap to reduce greenhouse gas emission is being worked out both globally and within individual countries. While macro policies about energy and manufacturing sectors could be made by the government and the private sector, there are steps individuals can also take to help in overall reduction of emissions.

Figure 23: Awareness about Sectors that contribute to greenhouse gas emission

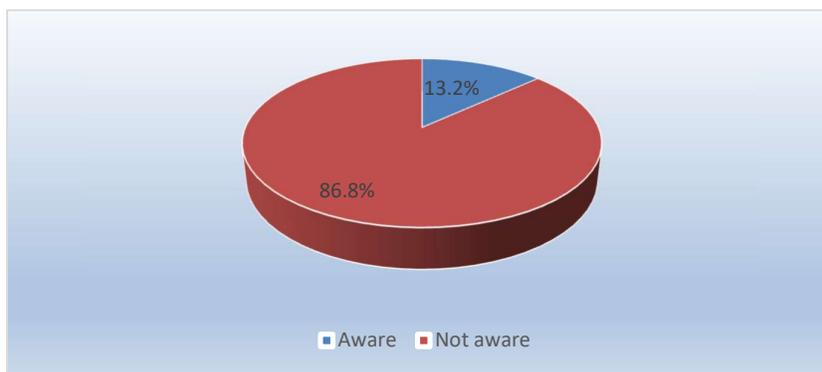


Table 13: Awareness about Sectors that contribute to greenhouse gas emissions

Sectors	Type of respondent			Total
	School student	College student	Community youth	
Energy (electricity, heat, and transport)	86	124	110	320
	10.6%	15.3%	13.6%	13.2%
Direct industrial processes	212	367	263	842
	26.2%	45.3%	32.5%	34.7%
Agriculture, forestry, and other land use sector	48	35	38	121
	5.9%	4.3%	4.7%	5.0%
Don't know	464	284	399	1147
	57.3%	35.1%	49.3%	47.2%
Total	810	810	810	2430
	100.0%	100.0%	100.0%	100.0%

Only 13.2% of the respondents were able to identify the energy sector as a major source of greenhouse gas emission, while 34.7% mentioned direct industrial processes as the main source of greenhouse gas emission. However, "don't know" was the response of 47.2% of respondents.

Awareness of sources/factors causing climate change

Figure 24: Awareness of causes of climate change by Type of respondents

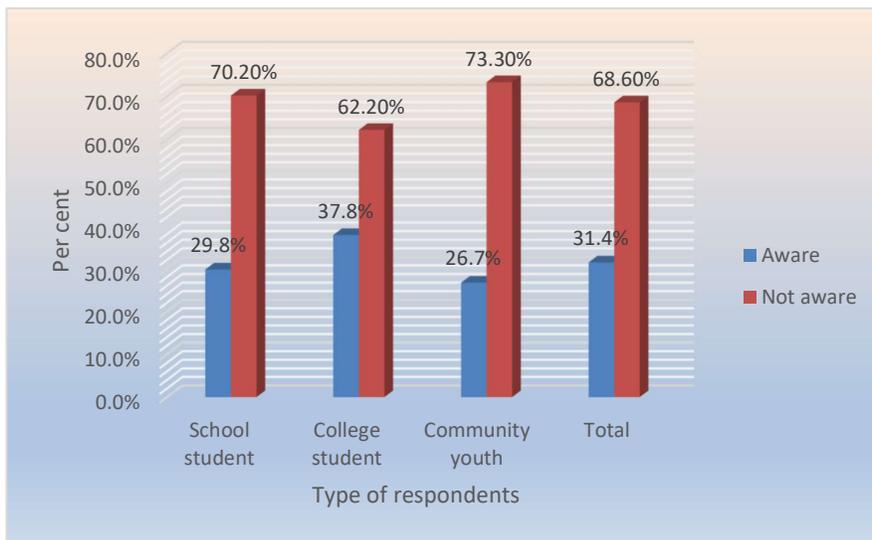


Table 14: Awareness of specific factors causing climate change

Sources/factors causing climate change	Type of respondent			Total
	School student	College student	Community youth	
Climate change is entirely caused by natural processes	129	86	90	305
	15.9%	10.6%	11.1%	12.6%
Climate change is mostly caused by natural processes	82	84	72	238
	10.1%	10.4%	8.9%	9.8%
Climate change is partly caused by natural processes and partly caused by human activity	241	306	216	763
	29.8%	37.8%	26.7%	31.4%
Climate change is mostly caused by human activity	117	153	117	387
	14.4%	18.9%	14.4%	15.9%
Climate change is entirely caused by human activity	86	97	132	315
	10.6%	12.0%	16.3%	13.0%
There is no such thing as climate change	4	5	5	14
	.5%	.6%	.6%	.6%
I don't know	151	79	178	408
	18.6%	9.8%	22.0%	16.8%
Total	810	810	810	2430
	100.0%	100.0%	100.0%	100.0%

Only 31.4% mentioned that climate change is partly caused by natural processes and partly caused by human activity. This shows that the respondents had multiple, wrong perceptions regarding the causes of climate change.

Knowledge on nature-caused factors of climate change

Table 15: Knowledge of nature-caused factors of climate change

Nature-caused factors	Frequency of respondents who were aware	%
Volcanic eruptions	446	18.4
Shifts in ocean currents	410	16.9
Forest fire	618	25.4
Fluctuations in solar radiation	125	5.1
Don't know	1357	55.8

(Multiple Response Table)

More than half (55.8%) reported 'don't know' for this question. Among those who answered, 25.4% cited 'forest fire' as a key factor causing climate change.

Knowledge of human-caused factors of climate change

Table 16: Knowledge of human-caused factors of climate change

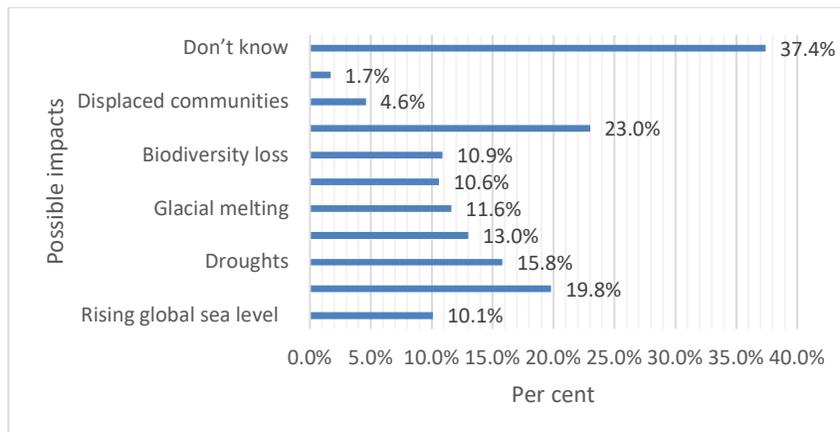
Human-caused factors	Frequency of respondents who were aware	%
Burning fossil fuels	454	18.7
Deforestation	1076	44.3
Industrial emission	706	29.1
Agriculture activities	167	6.9
Creating more cities, highways, and farmlands	244	10.0
Don't know	802	33.0

(Multiple Response Table)

Deforestation (44.3%) and Industrial emission (29.1%) were the two human-caused factors identified by the majority of the respondents. It must be noted that other major factors were not known to majority of the respondents.

Knowledge of possible impacts of climate change

Figure 25: Knowledge of possible impacts of climate change



(Multiple Response Figure)

23% of respondents reported water shortage is an outcome of climate change and less than 20% of respondents knew of the other impacts of climate change. 37.4% answered they did not know what the impacts were.

3.3 Knowledge of Climate Change Initiatives

The United Nations and the Indian government have emphasised the importance of awareness about climate change and initiatives taken to tackle it. The UN Framework Convention on Climate Change (UNFCCC) entrusted the responsibility of creating awareness on member nations or Parties of the Convention. The Indian government as a party of the convention has been making efforts to spread awareness⁸³. Under the NAPCC, National Mission on Strategic Knowledge for Climate Change (NMSKCC) is being implemented with a broader mandate to promote climate education.

Since continuous and concerted efforts are being made to reach the public with awareness messages, it is important to measure if these messages are actually reaching the public.

Knowledge of measurement and reporting of Greenhouse Gas emissions each year

In order to take steps to reduce greenhouse gas emissions countries, including India, measure and report their emissions every year. The question therefore asked was if the participants were aware of such initiatives.

⁸³ (<https://unfccc.int/resource/docs/natc/indnc2.pdf>
<https://pib.gov.in/PressReleasePage.aspx?PRID=1885731>)

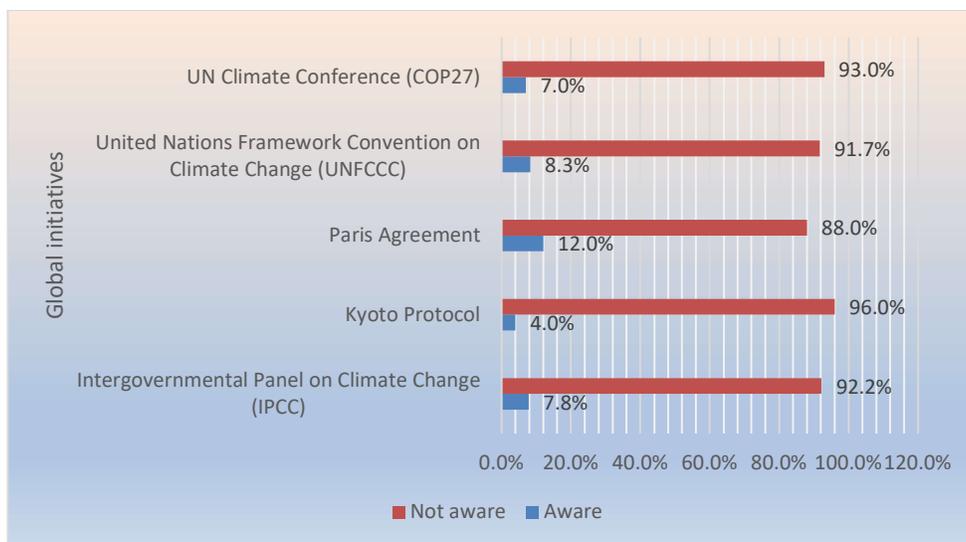
Table 17: Knowledge on emissions of various greenhouse gases in each country being measured and reported globally every year

Response	Type of respondent			Total
	School student	College student	Community youth	
Yes	345	477	393	1215
	42.6%	58.9%	48.5%	50.0%
No	465	333	417	1215
	57.4%	41.1%	51.5%	50.0%
Total	810	810	810	2430
	100.0%	100.0%	100.0%	100.0%

College students have more awareness compared to school and community youth respondents on greenhouse gases measurement. In the previous tables it was found that majority of the respondents didn't have knowledge of the estimated and targeted temperature increase by IPCC (see Figure). This can be correlated to this table that the respondents only know that greenhouse gas emissions are being measured. In summary, there is only awareness up to knowing the names of a few initiatives and not to the extent of its actual implementation. Awareness about this appears significantly lower among rural respondents.

Awareness of global initiatives on climate change

Figure 26: Awareness of global initiatives on climate change (N = 2430)



Only 12% were aware of the Paris Agreement, while less than 10% of respondents were aware of each of the other global initiatives on climate change (such as Intergovernmental Panel on Climate Change (IPCC), Kyoto Protocol, Paris Agreement, United Nations Framework Convention on Climate Change

(UNFCCC), and UN Climate Conference (COP27). This shows that there is very poor knowledge of such global initiatives across all types of respondents. Student respondents from colleges showed better awareness compared to other groups but only 20% for all the initiatives.

Awareness of National initiatives

Figure 27: Awareness of various national initiatives in India to address climate change issues

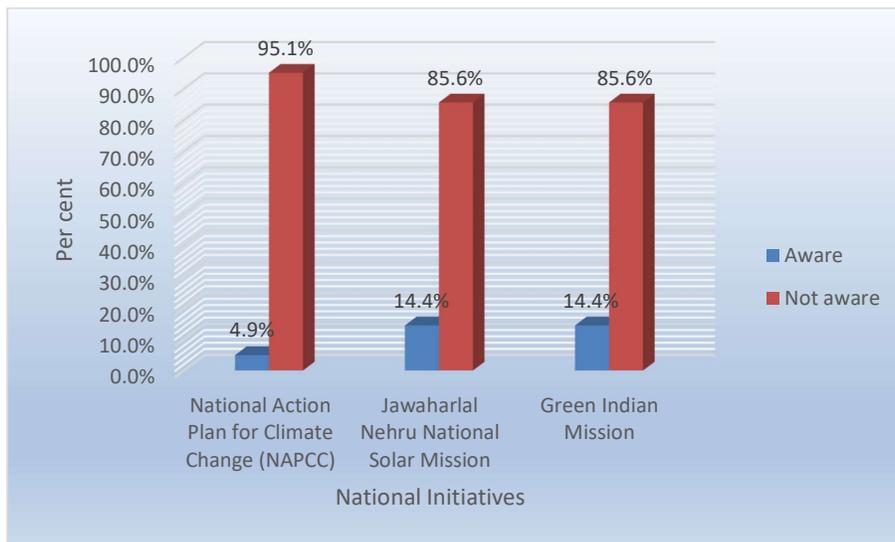


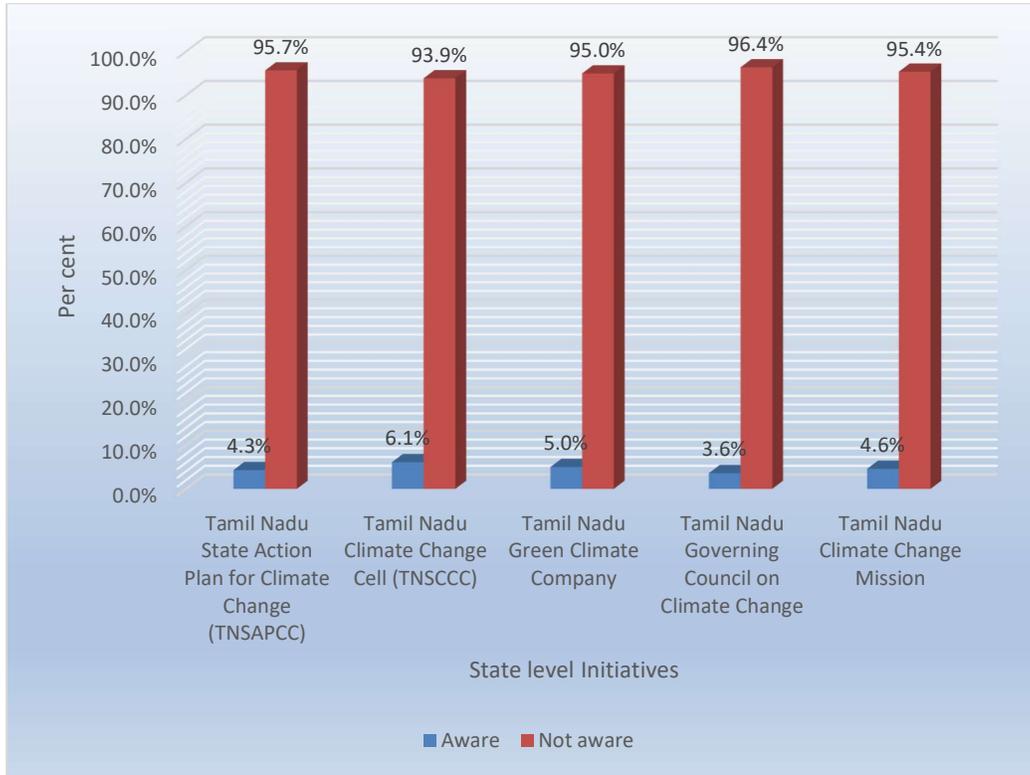
Table 18: Awareness of National initiatives for Climate Change

National Initiatives for Climate Change	Respondent who are aware of national initiatives			Total
	School student (N=810)	College student (N=810)	Community youth (N=810)	
National Action Plan for Climate Change (NAPCC)	25	71	23	119
	3.09%	8.77%	2.84%	4.9%
Jawaharlal Nehru National Solar Mission	66	181	102	349
	8.15%	22.35%	12.59%	14.4%
Green Indian Mission	50	203	98	351
	6.17%	25.06%	12.10%	14.4%

College students reported an increased level of awareness on all the three national initiatives for climate change compared to the other two groups. However, not more than 25% of college students were aware of any of these key initiatives of Government of India.

Awareness of Tamil Nadu state level initiatives to address climate change issues

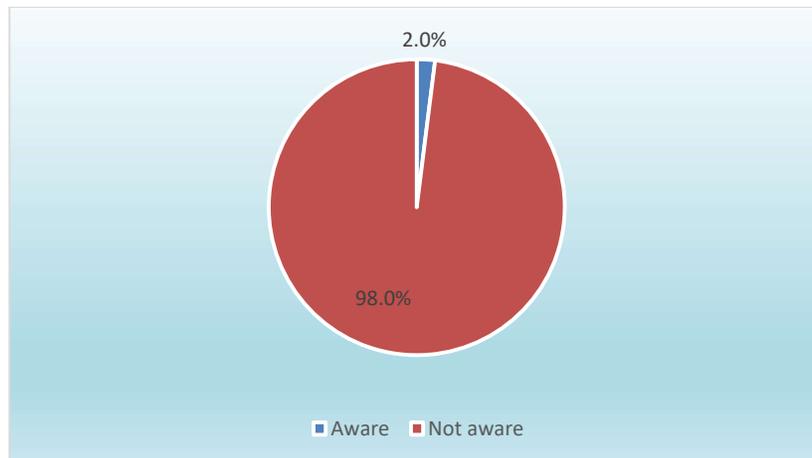
Figure 28: Awareness on Tamil Nadu state level initiatives of Climate Change



Only less than 7% of the total 2430 respondents interviewed were aware of the climate change initiatives by Tamil Nadu state government. 96% of respondents unaware of government initiatives raised concerns about how well messages of mitigation and adaptation measures are being conveyed to the public.

Awareness of Indian government’s commitment to achieve Net Zero emissions

Figure 29: Awareness on the year by which the Indian government committed to achieve Net Zero emission at the COP 27



Only 2% of the 2430 respondents were aware of the target year the Government of India set as year 2070 for achieving Net Zero Emission at the COP27⁸⁴.

3.4 Attitude towards Climate Change

The subjective attitude of a person towards climate change has emerged as a critical factor in climate action as lack of awareness and denial of climate change are major obstacles in promoting climate action. Secondly, mere awareness imparted through environmental education is not enough to prompt climate action. The public needs to demonstrate attitudes of concern and willingness to change for critically addressing climate change. Climate literacy must therefore also aim to change attitudes and beliefs of students, youth, and communities in favour of climate action.

Unlike other subjects which involve a certain “objectivity” on the part of the learner (student), environmental literacy and especially climate literacy has a subjective component involving belief or disbelief and interest or disinterest in following the updates related to climate change concerns.

Table 19: Have you noticed in the past 10-15 years any drastic change in the weather/seasonal pattern in your locality?

Response	Type of respondent			Total
	School students	College students	Community youth	
Yes	535	644	611	1790
	66.0%	79.5%	75.4%	73.7%
No	98	85	63	246
	12.1%	10.5%	7.8%	10.1%
Don't know	177	81	136	394
	21.9%	10.0%	16.8%	16.2%
Total	810	810	810	2430
	100.0%	100.0%	100.0%	100.0%

Globally, drastic weather change has been reported in the last two 20-year periods during 1980 – 2020 with an increase of 138% heatwaves, 193% lightning strikes, 25% in cold waves, 28% in floods etc.⁸⁵ The present study explored if the respondents were sensitive of such changes in their life. Of the total respondents, 73.7% of them were able to notice the drastic change in weather pattern in their locality. This indicates that there is both cognition and sensitivity among the respondents to notice and track the weather change. This needs to be strengthened through adequate awareness of climate change

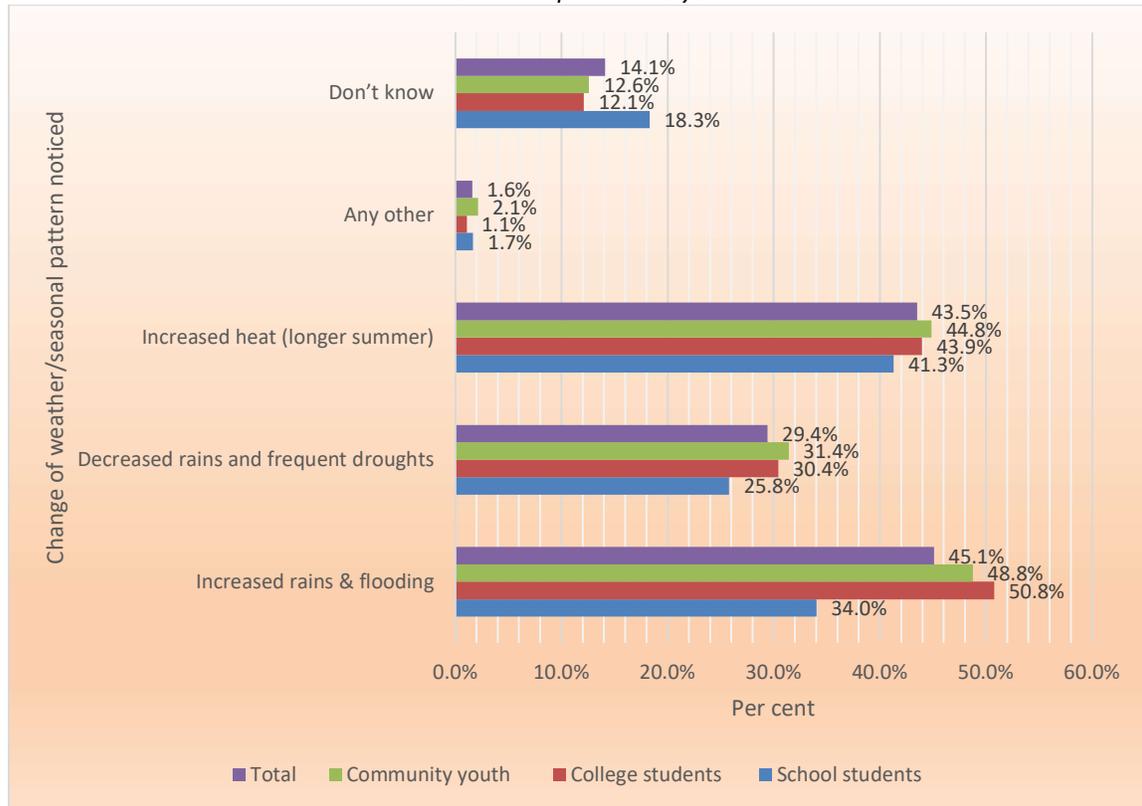
⁸⁴<https://pib.gov.in/PressReleasePage.aspx?PRID=1876119#:~:text=Our%20Hon'ble%20Prime%20Minister,emissions%20by%202070%20at%20Glasgow.>

⁸⁵ <https://www.hindustantimes.com/environment/study-sharp-rise-in-extreme-weather-events-in-last-50-yrs-101614638532952.html>

concerns, initiatives and roles and responsibilities. More college students reported that they had noticed the changing weather patterns in their localities.

Observation of specific change in weather/seasonal pattern over a period

Figure 30: Specific change noticed in the weather/seasonal pattern in your locality that you have noticed in the past 10-15 years

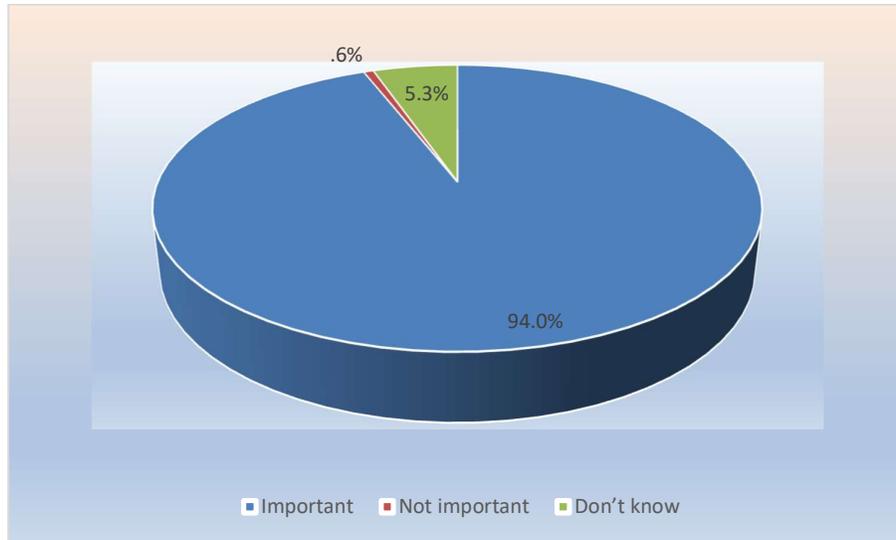


(Multiple Response Figure)

It is interesting to note that the majority (45%) of respondents across all the respondent groups have noticed ‘increased rains& flooding’ and ‘increased heat – long summer’ as changes in the season over a period of past 10-15 years. In all the three key changes expressed, the student category reported lesser knowledge compared to other groups.

Importance of individuals to know all the basic information about climate change and its effect on human life

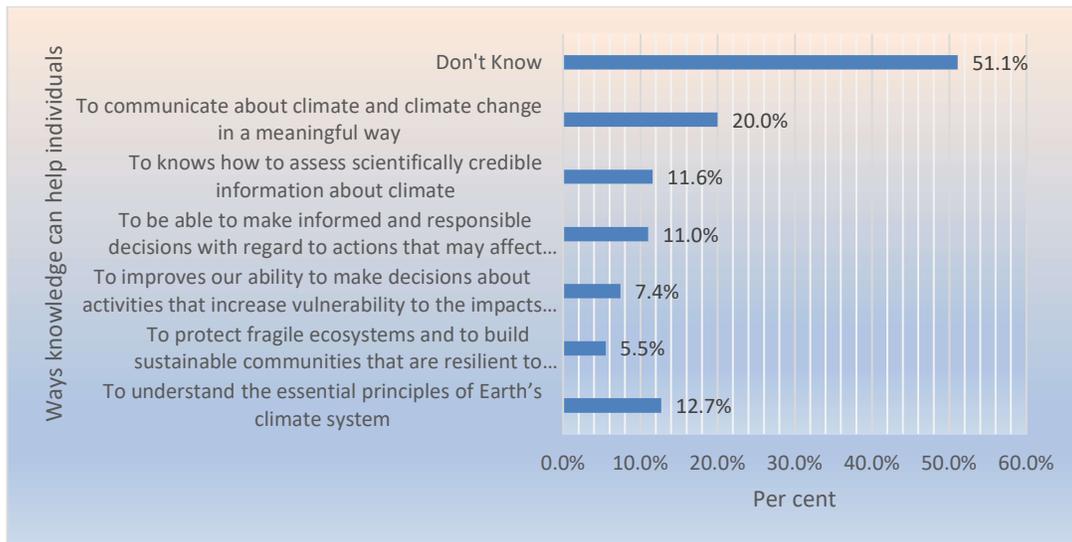
Figure 31: How important is it for an individual like you to know all the basic knowledge about climate change and its effects on human life?



The majority (94%) considered 'important' regarding the need for individuals like them to know the basics of climate change and its effects on human life

Ways knowledge on climate change can help individuals

Figure 32: In what ways does knowledge of climate change help individuals?



(Multiple Response Figure)

About 51% reported that they are not aware of how knowledge on climate change can help an individual. This is a serious concern. Unless the need/purpose for the knowledge is established, providing mere knowledge will not make any impact. Any programme designed to improve climate literacy should first address this issue.

Agreement over key statements related to climate change

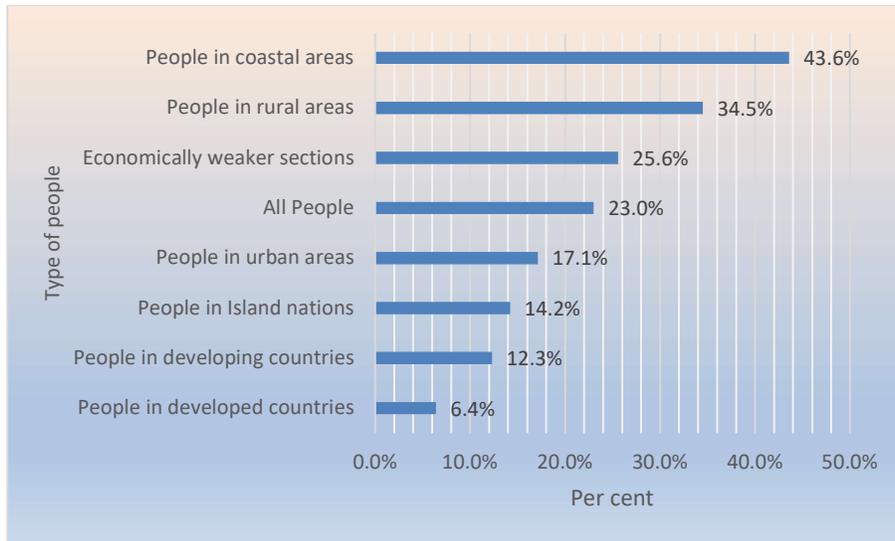
Table 20: Do you agree with these statements related to climate change?

Do you agree with the statement?	Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree
Protecting the environment is critically important for the survival of future generations	0	1.6%	.4%	36.7%	61.4%
Protecting the environment is equally important as job creation	.7%	3.1%	2.7%	48.3%	45.2%
Environmental education should be a necessary component of primary and secondary school education	.4%	4.9%	2.1%	47.9%	44.7%
Recycling waste is a benefit to both the natural environment and the economy	2.0%	7.5%	4.7%	49.4%	36.4%
Environmental laws are properly enforced in Tamil Nadu	20.5%	29.3%	11.1%	25.4%	13.7%
It is important that individuals like me need to understand and implement climate-friendly practices in day-to-day life	.4%	3.1%	4.7%	51.6%	40.2%

More than 80% of respondents have either agreed / strongly agreed to all the statements, except the statement about enforcement of environmental laws in Tamil Nadu.

Knowledge of people who will bear the brunt of climate change effects

Figure 33: Who will bear the brunt of climate change effects?



(Multiple Response Figure)

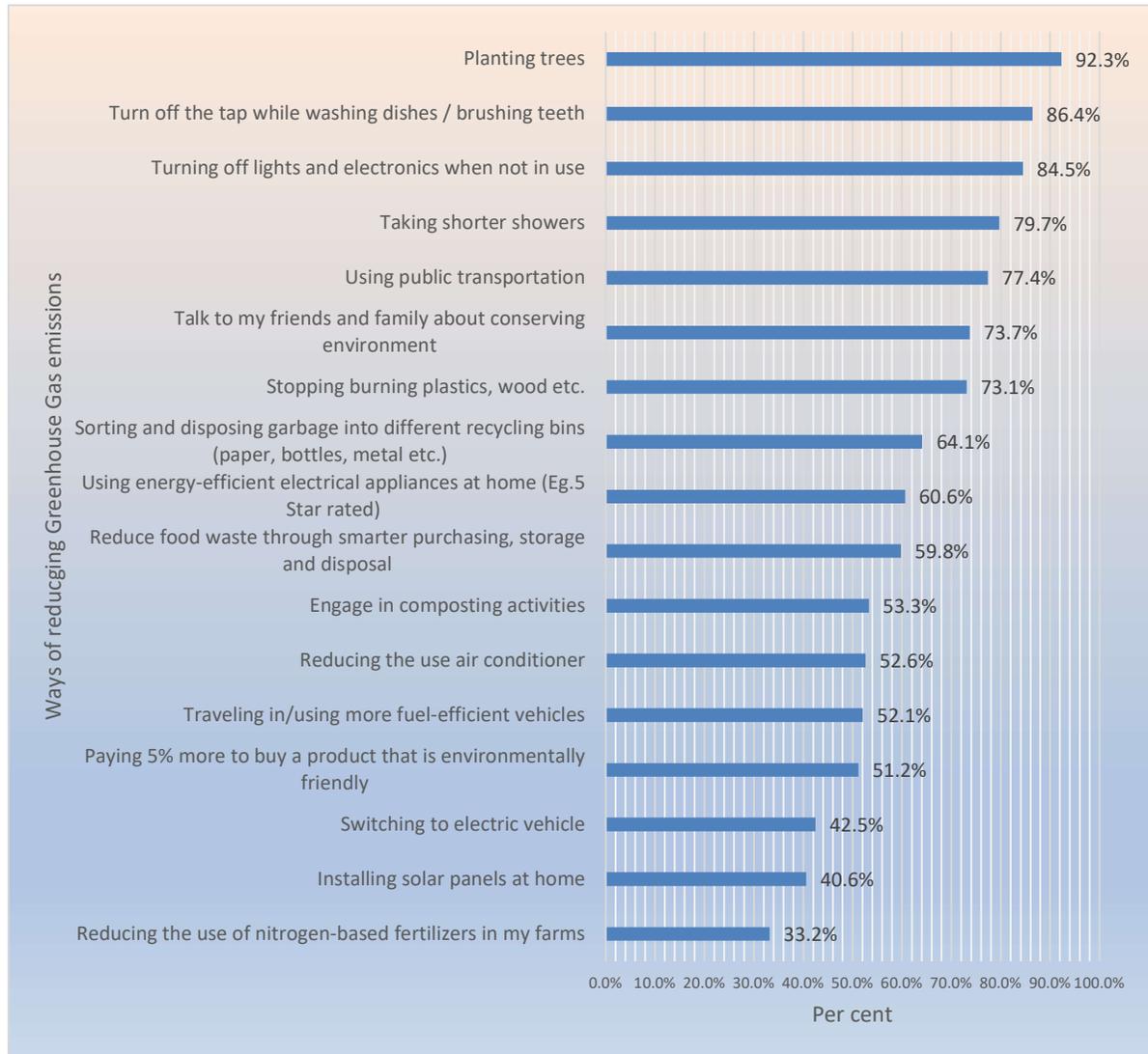
Only 23% of the respondents had the knowledge that all people, irrespective of geography, or socio-economic background, would bear the effects of climate change. The majority (43.6%) had the notion that only people living in coastal areas would be affected.

3.5 Level of Climate Action Practice in Daily Life

Practices that can reduce greenhouse gas emissions in day-to-day life

In the formative years of a child, school plays an important role in shaping a child’s overall personality and inculcating values. From basic hygiene to “moral science” lessons about truth, honesty and empathy, values are taught a child through various subjects, curricular and extra-curricular activities. Environmental studies is one subject that could teach students how to practice a sustainable lifestyle as part of larger efforts to adapt to climate change and mitigation measures.

Figure 34: Are you currently practicing or intending to practice in near future any of these ways of reducing greenhouse gas emissions as part of your daily life?



(Multiple Response Figure)

Given the emphasis on tree plantation as the most common activity done during World Environment Day and other occasions, respondents tend to give it top priority. Two other activities – namely, avoiding plastic burning and saving energy and water – appear prominently in the responses.

3.6 Summary of Findings of the Quantitative Component of the Baseline Study

Knowledge and awareness of climate change concepts: The introduction of environmental education in the school curriculum has helped children understand basic ideas and concepts of climate literacy. However, the knowledge remains superficial, and some concepts have been confused with others, especially when it comes to a nuanced understanding of ideas like weather, climate, and seasons.

Many respondents were unaware of greenhouse gases and their role in climate change. CO₂ was mentioned by the majority of the respondents as a key greenhouse gas. The majority of respondents were not aware of other greenhouse gases.

Knowledge and awareness of causes and effects: Many had some hearsay, rudimentary knowledge about the causes and effects of climate change. For instance, cutting down trees, use of plastics, emission from vehicles / industries were cited as predominant reasons for climate change, without being able to explain how these led to climate change.

Awareness on Initiatives of climate action at national and international level: The majority of the respondents were not aware of any initiatives, while some could mention only the name but not the programmes.

Attitude: There is no widespread denial about climate change. Many respondents said they did notice perceptible changes in weather patterns in their areas. An issue that needs to be addressed urgently is to create awareness about the role of individuals in tackling climate change as 51% reported that they are not aware of how knowledge on climate change can help an individual to play a meaningful and effective role.

Practice: When asked about what they were doing / intended to do, to tackle climate change, the most common responses were: planting trees, segregation of waste, taking short showers, turning off electronic/electrical devices and reduced use of plastics.

Difference between school students and college students: In colleges, the coverage on climate change is largely missing, as it is considered as already covered in schools.

But again, given their relative maturity and exposure to mass media and other sources of information, college students showed more awareness of certain aspects of climate change.

3.7 Qualitative Responses from Teachers / Government Officials

As part of the baseline study, about 18 focus group discussions (9 each in schools and colleges) across 9 districts, along with 45 in-depth interviews (5 in each district) were conducted with officials from select government departments. The consolidated responses are presented in this section below.

One of the main points of difference between students and other stakeholders such as teachers and government officials is the source of information regarding climate literacy.

School students have an opportunity to learn a few things about environment related issues as they have been integrated into the school curriculum. Naturally, school students seem to have some basic grasp of a few concepts and ideas.

When it comes to college students, there is a discernible decline in the level of knowledge as they tend to forget what they learned in school once they pass the examination. Some ideas stick, many don't.

Adults who were interviewed on the other hand (school teachers, college faculty and members of the government) do not have access or opportunity to learn the subject in a structured way. Their primary source in the past was mass media, especially newspapers and television. Lately, they might rely more on websites and social media and their understanding is often shallow and many times wrong due to fake news and misinformation.

Knowledge

Familiarity with concept and definition

Given the outreach efforts by the government and various NGOs, many people could recall hearing about climate change. But, this is wrongly interpreted as “change of seasons that occurs as a natural process.” Such a view was present among schoolteachers, college faculty and some junior level government officials.

“Climate changes based on the direction of the sun rays. It changes by the north and south Hemispheres” – A schoolteacher in Tirupathur district

We know this from our childhood. There 4 different climates – summer, rainy, winter and spring -A college faculty in Thanjavur district

“We have heard about climate change in social media, radio, and TV. It happens because of plastic usage” - A college faculty member from Salem district

Climate change means rain for some time, summer for some time and cold for some time – a Tahsildar from Coimbatore district

Yes, I have heard about it...Climate and Seasons change once in 4 months. – a District Educational Officer from Madurai district

I know the meaning of climate change i.e., instead of raining in rainy season it rains at some other time. Because of the change in season agriculture is affected. This means climate change – a Tashildar from Tenkasi district

In the qualitative study, we also came across a few respondents who had a reasonable grasp of climate change.

For instance, only in one school, somewhat scientific definition of climate change was mentioned by a teacher as:

“Because of global warming climate change has happens. Ozone layer is getting depleted, and due to that ultraviolet radiation is reaching earth. Change in sea levels, high temperature and rains. Because of CFCs and vehicle emissions Ozone layer is damaged”.

The observations from the qualitative interviews revealed that among officials, higher level officers, such as Municipal Commissioners, District Environment Engineers, district level officials from departments such as Agriculture, Fire and Safety, Forest, and Mines had better and relatively more comprehensive knowledge about climate change.

Middle and entry-level officials often referred to climate change superficially and without in-depth understanding regarding unpredictability of seasons, weather, increased heat/temperature/summer days year on year, sea level rise, melting of ice.

In summary, except for a few department officials, the majority of them lacked the basic and minimum level of awareness on the meaning of climate change. However, this needs to be validated only through a substantial quantitative study in future.

Nuanced Understanding of Weather, Climate and Environment

To understand the principles of climate literacy, one should know the difference between climate and weather and should not use it synonymously. Weather changes in the short-term, while climate changes on a much longer timescale. Climate change itself is caused by a mix of natural processes and man-made causes, but tilting heavily towards man made causes.

Despite being in the education sector wherein there is a need to keep one’s knowledge updated, and one is expected to have sound knowledge of current affairs, most respondents among school and college teachers were unable to differentiate between weather and climate. Among college teachers, about one in four (25 percent) were able to explain the differences to some extent.

The awareness levels among officials however were better than that of the school and college teachers. The majority of respondents among the officials were able to explain that weather is short term, season is once in 3 months, and climate change is a long term phenomenon.

Process of Climate Change

One of the important components of climate literacy is the scientific explanation of the process of climate change. The climate on earth is influenced by heat from the sun and the retention of heat in the atmosphere. Several other factors come into play. The related ideas include ozone layer/hole, greenhouse gas emissions, solar radiation, global ocean circulation (movement of large quantities of water in ocean basin) and global atmospheric circulation (movement of air which could be impacted by uneven heating of earth's surface).

School teachers: Very few teachers (who teach select subjects directly or indirectly connected with climate literacy) could mention the name of greenhouse gases and how it results in climate change. Others could mention mostly the emission of CO₂ as the only reasons for climate change.

Climate change happens due to the 8 planets in the sky. When they come near the earth the temperature increases slightly and when they are far from earth it is a bit cooler. Earth gets hot because of the plastics we use. Air pollution is main reason – Teacher from aided school, Chennai.

Radiation of the sun, changes happening in earth's rotational path, Tectonic activities, volcano eruption and changes in the density of the atmosphere are some reasons – Teacher, private school, Coimbatore

College Teachers: Majority could explain that the earth's temperature rises because of deforestation and emissions from vehicles and industries.

As the needs of the people of the present world increase, artificial means are used to meet those needs [such as the use of more vehicles, air conditioners etc.]. Because of this climate change happens – Professor, aided college, Coimbatore.

Officials: From the select departments (from Agriculture, Pollution, Mines etc etc.) respondents could mention the names of greenhouse gases (GHGs), and only a very few could explain the process completely, others could not exactly explain from where and how these gases are produced and the emission of these gases result in climate change. Respondents from other departments, most of them could cite pollution, use of chemicals, and emission of smoke from vehicles as major causes while about 40% of the respondents simply said they don't know.

During the day Methane, Carbon dioxide, Nitrous oxide get heated by sun and in the night, it turns to poisonous gasses – A District Education Officer (DEO)

The change in temperature causes the greenhouse gases - scientifically we can describe it – Agriculture officer.

I didn't study about this – A sub-Inspector (SI), Police department.

High population and technology are the reasons for climate change – An Engineer from the Tamil Nadu Water Supply and Drainage Board (TWAD Board)

How does the scientific process of climate change take place?

Given the awareness and education efforts by government and other agencies regarding climate change, one would expect school and college teachers and officials to have a good grasp of the scientific process of climate change. Added to that is their exposure to mass media and social media and their comprehension and understanding levels that come with age and experience. However, the results did not prove the above assumption right.

Very few teachers (select subjects connected with climate change) could mention the name of GHGs and how it results in climate change. Others could mention mostly the emission of CO₂ as the only reasons for climate change.

What are the main causes of climate change?

The responses across different respondent groups are summarised below:

School teachers: Pollution, cutting down trees, emission from vehicles and factories, use of more technology and electrical appliances, reduced farming activities, urbanization, and use of plastics and crackers were cited by majority as reasons for climate change.

At least 50% of the respondents were able to cite at least one or two right reasons for climate change.

College Teachers: Vehicle emissions, industrial waste, burning of plastics, water & air pollution, use of refrigerators and AC equipment, cutting trees, forest fires were cited as main causes.

Government officials: Only some department officials could mention deforestation, industrialization, high use of fertilizers and vehicles, urbanization, migration and destroying nature as causes of climate change. Among officials from the health and revenue departments, the majority were not aware of this subject.

Knowledge Initiatives to address climate change

Aware of the various climate change actions / initiatives at global, India and the Tamil Nadu state level

School Teachers: Only two out of 9 schools where FGDs were conducted, were the teachers able to mention the Paris agreement and Climate Change Mission initiatives. However, their understanding of the initiatives themselves were limited.

"I remember a GO saying that if we cut one tree, we have to plant four trees to replace that. Other than this I don't know any programs – A teacher from government school, Salem

College teachers: Apart from the mention of June 5th as a celebration of Environment Day, not much else was mentioned.

Government officials: G20 conferences, 2050 Carbon neutrality and net zero, Green Cover Mission (TN), IPCC were the initiatives mentioned by Agricultural department officials.

Only a few officials could list Climate Change Mission by TNGCC, besides international efforts such as the Kyoto protocol, Paris Agreement, UNFCCC and IPCC.

An official from the District Rural Development Agency, Thoothukudi district listed the Central government's "Amrith Sarovar" mission, clearing of silt in the lakes, individual farm ponds initiatives, etc.

Awareness of global Initiatives

Majority of the respondents were not aware of the details of any global level climate change initiatives, while some could mention only the name but not the programmes.

Sources: No formal training was given to the majority of the respondents across all three segments.

Attitude towards climate change

School teachers have no formal and designated platform where they talk about climate change and action except Green Clubs and NSS programmes in a few schools. Compared to school teachers, college teachers have less opportunity to talk about climate change concepts, as the former, relatively speaking, teach a wider range of science and humanities subjects at basic to intermediate levels (as against obviously more advanced levels taught in colleges) which lend themselves such conversations..

Most of the respondents (about 90%) believed that the existing policies and programmes on climate change are not implemented effectively on ground, or they were not aware of its working. Government officials were aware only of the functions of their own department or the departments they had worked in earlier.

Officials from TANGEDCO, TNPCB, expressed that they have adequate knowledge of climate change as there are lots of ongoing discussions on climate change in their department. All the others felt that they don't have adequate knowledge of climate change. All of them felt they needed to be given orientation on this topic.

It is widely felt by school teachers that there is adequate coverage of syllabus on climate change in the books, but the importance is given by students only to score marks. They don't connect it with their daily life. It is not viewed as something that they plan to implement.

Practice of climate-friendly practices in daily life

School and college teachers and government employees had very similar responses to questions relating to practice what they are doing as part of climate action in their daily life. This included planting trees, sustainable solid waste management (including segregation of waste at source, etc.) to energy saving appliances. Those who were more aware of the issues were able to link their practices relating to water, energy usage and transport with climate action.

When asked for their suggestions and recommendations, school and college teachers and government officials had several suggestions to make, based on their own experience and their area of expertise. Some of them are mentioned in the recommendations below.

School Teachers

1. Conduct competitions, fairs, and other programmes
2. Provide access to eco-friendly products
3. Encourage use of alternative products
4. Reduce fossil fuel burning, encourage use of public transport
5. Reduce use of plastics
6. Promote reuse and recycling
7. Reorient and expand scope of “Green Clubs” in schools
8. Have small gardens in schools which have adequate land to implement some of the green initiatives.

College Teachers

1. Introduce a separate lesson on climate change for students of all streams/specializations
2. The orientation should be to have global perspective and act locally
3. Rainwater harvesting and planting trees
4. Spread awareness through mass media
5. Motivate youth through street plays, posters and social media campaigns

Officials

- Conduct awareness campaigns on Government policies and schemes on climate change for officials, schools and colleges and general public in Gram Sabha meetings
- Involve youth in tree plantation
- Utilize SHG groups and NGOs for awareness campaigns
- Include climate change in school and college syllabus
- Conduct district-wise training courses on climate change for government officials
- Intensive check of quality of electrical and electronic appliances and take stringent measure to curb sale of sub-standard appliances and equipment
- Government should promote green energy
- Solar panels should be widely used
- Organic farming should be encouraged
- Restrictions should be imposed on industries
- Care must be taken to ensure that dye waste does not enter water bodies
- Use of social media platforms for outreach.

4. Conclusion and Recommendations

The baseline survey was done to assess the understanding of school and college students, community youth and government officials in Tamil Nadu on the issues around climate change, impacts and vulnerability and to document knowledge products and delivery mechanisms available and assess the existing knowledge gaps across these stakeholders. The end objective is to generate programme recommendations to enhance climate literacy among different stakeholders in Tamil Nadu.

The study looked at a broader idea of stakeholders to include not only school and college students who could be reached through the formal educational system, but also youth outside the formal school system and government officials who have the responsibility and opportunity to incorporate climate change knowledge in their work.

The central point of the study stems from the review of literature which showed that while integrating environmental education in school syllabus was a good move, it lacked a few things such as stronger practical components and a prompt to action, which is central to climate literacy as against knowledge of environmental science.

At this point of time, the idea is to “enhance climate literacy”, which in simple words would mean building on the present base of environmental science knowledge by adding critical components of climate change literacy through supplementary efforts both in formal and informal settings.

So far, the emphasis has been on creating environmental awareness – that is, making students aware of the concepts and problems relating to the environment. Climate literacy, on the other hand, emphasizes follow-up action in terms of identifying problems and coming up with solutions to tackle them. Central to the climate literacy approach is the inculcating critical thinking, equipped with knowledge and skills which are applied to problem-solving.

This requires reorienting of educators. Usually, the aim of education is to impart knowledge. Some practical subjects and skills have an element of application. But in climate literacy, it is all about “from knowledge to action” or “education for climate action”; that is, the main objective is to impart knowledge which will result in behavior change and climate action.

Another aspect of the climate literacy strategy is helping students develop a global outlook which will inform local action – both at the individual level and the community level. This is easier said than done as the educational materials should be customized to specific societies and factor in specific challenges or problems those societies face.

India is a country of diverse culture and languages. The related issue is how to make “scientific and other jargon” used in the context of climate change accessible to students and citizens from different walks of life and of varying socio-economic classes.

Developing educational materials about a field that is constantly changing and evolving due to extensive research can also be a major challenge – as it will be difficult to make people change or

unlearn facts as new evidence comes up. With the widespread use of internet and social media as a source of information, people can fall prey to misinformation and fake news⁸⁶.

To summarise the key conclusions drawn from the study findings are:

- The introduction of environmental science in school curriculum has been helpful, but it lacks a few essential aspects of climate literacy - such as **stronger practical components** and a **prompt to action**.
- So far the emphasis has been on creating **environmental awareness** – that is, making students aware of the concepts and problems relating to the environment.
- Climate literacy emphasises **follow-up action** - in terms of identifying problems and coming up with solutions to tackle them.
- Central to the climate literacy approach is the inculcating of **critical thinking, and equipping with knowledge and skills** which are **applied to problem-solving**.
- In climate literacy, it is all about “**from knowledge to action**” or “**education for climate action**”; that is, the main objective is to impart knowledge which will result in behavior change and climate action.
- Many respondents were **unaware of greenhouse gases** (except Co2) and their role in climate change.
- Many had **only some hearsay, rudimentary knowledge** about the causes and effects of climate change.
- For instance, cutting trees, use of plastics, emission from vehicles / industries are cited as predominant reasons for climate change, **without being able to explain how these led to climate change**.
- The majority were **not aware of any initiatives on climate change action**.
- The majority **acknowledged the issue of climate change** and witnessed perceptible change in weather patterns in their areas.
- The majority were not aware of how knowledge on climate change can help an individual to play a meaningful and effective role.
- The most common responses on individual roles in climate change action were limited to **(a) planting trees, (b) segregation of waste, and (c) reduced use of plastics**.
- College students showed more awareness of certain aspects of climate change compared to school students and community youth.

⁸⁶ Exploring the Challenges of Climate Science Literacy: Lessons from Students, Teachers and Lifelong Learners https://www.uvm.edu/~vtstclim/Documents/pdfs/GeoCompass_literacy_article.pdf

The baseline study has provided some clear pointers about the future course of action. There were some areas which needed further study which could help with better programme design. There is a foundation of knowledge and awareness, and the need of the hour is to build on it and convert environmental awareness into climate literacy and action.

Recommendations

The recommendations are based on an analysis of the key findings of both quantitative components covering school and college students and community youth and the qualitative component targeting school and college teachers and government officials in different departments and across different levels of hierarchy.

The recommendations are formulated for the following two categories of target groups:

- **Formal category**
 - Students from schools / colleges
 - Teaching faculty from schools and colleges
 - Government officials
- **Informal category**
 - Community Youth

For both formal and informal category of target groups, there needs to be a well thought-through curriculum prepared with wide consultation and participation of stakeholders, especially the teachers, researchers, policy experts and CSOs etc., and consolidation and development of learning resources or instructional materials including textbooks, digital, multimedia presentations, visual aids, etc. The review of literature in this study proved there are a good number of training resources and curriculum materials already developed and widely used with student and generation population. Hence, in developing the learning resources, efforts should be made to consolidate the available materials, instead of reinventing the wheel or duplicating efforts and materials.

One way to achieve this is to develop a State Climate Change Communication Strategy to enable effective communication of climate change knowledge. An effective communication strategy will help targeted and informed implementation of adaptation and mitigation actions. Few elements that should be part of a successful community strategy mechanism are, make climate change as state agenda, form a public relation committee, form a local voluntary group/change agent, local participatory engagement, climate change brand ambassador of high influence among targeted stakeholders and the communication should be consistent and constant.

Develop a Management Information System (MIS) to have a clear picture on the data related to climate literacy among the targeted groups for officials to take informed decisions and develop action plans to fill the gaps.

4.1 Recommendations for formal Category Target Groups – in schools and colleges

Knowledge and Awareness

- i. **Conducting Training of Trainer (ToT) programme for teachers/professors:** A minimum of one EVS/Social Science/Science teacher in each school /college can be given ToT training and he/she in turn can conduct periodic trainings and refresher sessions to fellow teachers and students. He/she can be called the School/College-Climate Change Champion (CCC) of that school/college in that year. There can be one block and district level teacher-trainer (CCC) who can constantly be involved in conducting the ToT for the teachers. The trainers / teachers can be given periodic refresher training on the updated content on a regular basis.
- ii. **Developing Training curriculum development:** For the training of various groups of teachers (class, medium etc) different level of curriculum modules can be developed. The curriculum should help the targeted beneficiaries achieve the twin-objectives of:
 - Developing knowledge through basic/ fundamental concepts on climate change and ongoing initiatives / programmes at state & central level.
 - Equipping individuals to be able to apply the knowledge in daily life.
- iii. **Participative and Interactive mode of dissemination:** The mode of delivery should be fully participative/interaction /activity based, using various audio-visual, games, exercises and self-review and self-assessment format. Specific videos of successful climate change practitioners / activists can be created. The content can cover a wide range of issues in climate change, such as fundamental concepts, causes, effects, preventive strategies, roles and responsibilities of students in day-to-day life, etc.
- iv. **Regular update of curriculum:** Updating curriculum to make it more climate literate friendly, from the present environment science orientation, is a medium-term project that needs wider consultation and approval of appropriate authorities.
- v. **Identification of Gaps in Curriculum:** Review the present environment science curriculum across boards and classes and identify the climate literacy gaps in it.
- vi. **Organization of guest lectures as part of co-curricular activities:** The Government, together with some environmental NGOs and academic institutions, should identify climate literacy topics and subject matter experts who will be able to deliver them (online and offline), curate and share for remote schools. These experts could be asked to deliver lectures in schools in their city, and such lectures should also be recorded and made available on YouTube so that other schools could play them in their schools. These experts could also be asked to do interactive virtual sessions (Zoom or Google Meet) for students in small towns and villages.

Attitude & Practice

- vii. **Conducting Field Trips / Exposure visits:** A major criticism about the present environmental education in schools is that it is very theoretical. Climate literacy is about putting knowledge to action and therefore needs a strong practical component. The Government should identify

some important climate change hotspots with adequate instruction materials about them which could be used for the field trips. A list of eco sensitive zones for each district can be prepared along with development of handbooks and manuals for students and teachers going on field visits to such places. These field visits will generate interest among students towards climate change and help them connect theory learned through “Guest Lectures” with ground realities. This will also help them think critically and come up with innovative solutions for communities to practise and individual lifestyle changes as well.

- viii. **Commemoration of Climate Change Day as week-long event:** Every school may be provided with required funds and templates to hold a week-long event on climate change after their field visits once a year during Climate Change Day. Students, in small groups/teams, can be asked to present solutions to climate change problems they witnessed during the field visits. The students may be asked to generate original IEC materials (posters, etc) on climate change, and which will be displayed in the school, college and community over a period of time. The students would be awarded marks for their work and given incentives in terms of prizes and awards. Such events will provide a platform for students to present their findings and solutions.
- ix. **Awards and Recognitions:** Institution of annual awards and recognitions for students who have made significant contributions towards climate literacy and action in the school/college will motivate fellow students.

4.2 Recommendations for government officials

Knowledge and Awareness

- 4.2.1 Inclusion of climate literacy in regular training to officials:** Climate literacy may be included as a part of the regular training provided for government officials. The curriculum will have both fundamental concepts, knowledge on currently ongoing initiatives/programmes, and application of knowledge in daily life. A list of climate-friendly practices in government offices may be designed and displayed in key government offices (like, avoiding plastic usage, minimising use of electricity and water, use of rooftop solar, conserving trees, etc....).
- 4.2.2 Orientation on existing climate change programmes:** It is important to create awareness on existing programmes and schemes on climate change (state, national and global level) and individual roles, as about 90% of the respondents were not aware of the ongoing programmes/policies regarding climate change. Government officials were aware only about the functions of their own department or the departments they had worked in earlier. Hence, it is recommended that an e-handbook containing information about all the key initiatives of climate change be provided to all the government employees. Mandatory display of posters with such information to be displayed for a week during Climate Change Day, which will be celebrated also by schools and colleges across the State.
- 4.2.3 Training of Trainer (ToT) Orientation:** Select department officials (such as from Agriculture, Fire and Rescue, Pollution, Municipal Administration, Disaster management, Education department (in schools) for ToT training on climate change literacy and action. They in turn can conduct periodical orientation programmes for other department officials.

4.2.4 Short online certificate course on climate change: Certificate courses (online-based short term i.e., one month.) on climate change can be formulated by DoE & CC and delivered in collaboration with state universities to help the interested government officials / school & college teachers to enrol and do the course.

4.3 Recommendations for Informal Category of respondents – the Community Youth

Knowledge & Practice

- 4.3.1 The local administration bodies – village panchayats, municipality, and corporation etc – may effectively be involved in mobilizing community youth into small Community Climate Change Clubs or reach out to them if they are already organized into small clubs or groups (sports clubs, SHGs, youth clubs, etc).
- 4.3.2 The elected representatives of local bodies may be given a formal orientation on climate change and the need to involve the youth.
- 4.3.3 The elected representatives, in turn, would do the outreach with the youth through formal and informal meetings to the community youth.

Attitude and Practice

- 4.3.4 Under the guidance and supervision of the elected representatives, community youth may be encouraged to hold a one or two-day Climate Change Fair/Day event (in similar lines proposed for the schools and colleges). The government could provide financial assistance through the local administration bodies for conducting such event.
- 4.3.5 Wherever possible, the local youth could be made to participate in the Climate Change Day organized in schools and colleges, the students should be encouraged to participate in the Climate Change Fair/Day organized by community youth as well. This ensures an effective cross-learning for both the beneficiary groups.
- 4.3.6 Institution of annual awards and recognitions for community youth who have made significant contribution towards climate literacy and action in the community. This will motivate fellow community members.

Annexure 1

1. Climate Literacy Training Modules & Curriculum Plan

- A. UGC's 6 Months Module Syllabus for Environmental Studies for Under-Graduation students: https://www.ugc.ac.in/pdfnews/2269552_environmentalstudies.pdf
- B. Text Book on Environmental Studies for all Under-Graduation students: <https://www.ugc.ac.in/oldpdf/modelcurriculum/env.pdf>
- C. GLOBE's Curriculum and Training Module for School Students: <https://www.globe.gov/do-globe/classroom-ready-activities/learning-activities>
- D. Training manual for community level training on air pollution and its impact on children's health: <http://dgmhup.gov.in/documents/NPCCHH/ChildrenTrainingManualEnglish.pdf>
- E. Training manual for community level training on air pollution and its impact on women (English): <http://dgmhup.gov.in/documents/NPCCHH/WomenTrainingManualEnglish.pdf>
- F. The Compendium of the Indian studies on the Impact of Air Pollution on Health: <http://dgmhup.gov.in/documents/NPCCHH/CompendiumAirPollutionHealth.pdf>
- G. Handbook for Health Professionals on Air Pollutions & Its Impact on Health: <http://dgmhup.gov.in/documents/NPCCHH/HandbookHealthProfessionals.pdf>
- H. Pictorial-Story based Educational Module for Children on Climate, Air Quality, Atmosphere, Seasons, Clouds, Earth system, Soil system, Water:
 - i. Climate - <https://www.globe.gov/web/elementary-globe/overview/climate>
 - ii. Air Quality - <https://www.globe.gov/web/elementary-globe/overview/air-quality>
 - iii. Atmosphere - https://www.globe.gov/documents/348830/55942059/EGaerosols_book_FINAL.pdf/8a315123-0a89-4d09-90f2-416276bc4c3a
 - iv. Seasons - https://www.globe.gov/documents/348830/55942067/Seasons_book_FINAL2017.pdf/c6c1a217-e7f9-4907-8bf3-92a1b1c3920a
 - v. Clouds - https://www.globe.gov/documents/348830/55942511/Cloud_book_FINAL2017.pdf/d4f70c29-1894-420f-8ac3-173f039e796d
 - vi. Earth system - <https://www.globe.gov/web/elementary-globe/overview/earth-system>
 - vii. Soil system - <https://www.globe.gov/web/elementary-globe/overview/soils>
 - viii. Water - <https://www.globe.gov/web/elementary-globe/overview/water>

2. E-books on Climate Literacy

- A. Climate Literacy: Beyond the Written Word by Earthday: https://www.earthday.org/wp-content/uploads/2021/11/EDN_eBook-Climate-Literacy-Beyond-the-Written-Word.pdf
- B. Environmental Orientation to School – Some Experience and Learnings: <https://www.ceeindia.org/product-page/?id=4>
- C. Environmental Education Handbook - Standards VI – VIII: <https://www.ceeindia.org/product-page/?id=5>

- D. Energy Matters – A School Energy Education Guide: <https://www.ceeindia.org/product-page/?id=6>
- E. Garbage to Gardens – An Activity Booklet on Solid Waste Management for Schools: <https://www.ceeindia.org/product-page/?id=7>
- F. Joy of Learning – Handbooks for Science and Environmental Education Activities for classes 3 -5, 6 – 8, and 9-11: <https://www.ceeindia.org/product-page/?id=3>
- G. The Green Action Guide – A Manual for Planning and Managing Environmental Improvement Projects for Schools: <https://www.ceeindia.org/product-page/?id=12>
- H. Green Games Manual for Children: <https://www.ceeindia.org/product-page/?id=9>
- I. YOUR GUIDE TO CLIMATE ACTION IN 2020: <https://www.climaterealityproject.org/learn/your-guide-climate-action-2020>
- J. Pathways to Green Cities – Innovative Ideas from Urban India: <https://www.earthday.org/wp-content/uploads/2020/06/Pathways-to-Green-Cities-Innovative-Ideas-from-Urban-India -Volume-I.pdf>
- K. Climate Crisis 101 – Learn the Basis of Climate Change Science and How you can take action : <https://www.climaterealityproject.org/climate-change-basics>
- L. Extreme Weather and The Climate Crisis: The Facts: <HTTPS://WWW.CLIMATEREALITYPROJECT.ORG/EXTREMEWEATHER>
- M. State Of India’s Environment 2022: In Figures: <https://www.cseindia.org/state-of-india-s-environment-2022-in-figures-11271>
- N. Other reading materials available on: <https://www.climatereality.org.in/reading-material>
 - o Your guide to climate action in 2020
 - o Climate crisis 101
 - o The 12 questions every climate activist hears and what to say
 - o 2017 handbook on carbon pricing instruments
 - o Top solar energy myths
 - o Right under your feet: soil health and the climate crisis
 - o Facing the smog challenge
 - o Extreme weather and climate change: what you need to know

3. IEC Materials related to Environment Education (Posters, Pamphlets, Cards, Games, Videos etc.)

1. <https://nidm.gov.in/PDF/IEC/awareness.pdf> - Safeguard Environment for Disaster Risk Reduction : Poem & Slogan Book
2. <https://nidm.gov.in/PDF/pubs/Poem%20Book%202012.pdf> - New Year Greeting Cards based on the theme of Disaster Management.
3. https://nidm.gov.in/PDF/IEC/Greeting_2014.pdf - World Environment Day, an annual event observed by NIDM for creating awareness about our Environment among school children.
4. [IEC Activities-1 - http://dgmhup.gov.in/documents/NPCCHH/1.pdf](http://dgmhup.gov.in/documents/NPCCHH/1.pdf)
5. [IEC Activities-2 - http://dgmhup.gov.in/documents/NPCCHH/2.pdf \(Hindi\)](http://dgmhup.gov.in/documents/NPCCHH/2.pdf)
6. [IEC Activities-3 - http://dgmhup.gov.in/documents/NPCCHH/3.pdf](http://dgmhup.gov.in/documents/NPCCHH/3.pdf)
7. [IEC Activities-4 - http://dgmhup.gov.in/documents/NPCCHH/4.pdf](http://dgmhup.gov.in/documents/NPCCHH/4.pdf)

8. [IEC Activities-5 - http://dgmhup.gov.in/documents/NPCCHH/5.pdf](http://dgmhup.gov.in/documents/NPCCHH/5.pdf)
9. [IEC Activities-6 - http://dgmhup.gov.in/documents/NPCCHH/6.pdf](http://dgmhup.gov.in/documents/NPCCHH/6.pdf)
10. [IEC Activities-7 - http://dgmhup.gov.in/documents/NPCCHH/7.pdf](http://dgmhup.gov.in/documents/NPCCHH/7.pdf)
11. [IEC Activities-8 - http://dgmhup.gov.in/documents/NPCCHH/8.pdf](http://dgmhup.gov.in/documents/NPCCHH/8.pdf)
12. [IEC Activities-09 - http://dgmhup.gov.in/documents/NPCCHH/09.pdf](http://dgmhup.gov.in/documents/NPCCHH/09.pdf)
13. Videos: <https://www.climate reality.org.in/videos>

4. Policy, Acts and Report on Climate Change, Literacy & Action

- A. G.O of Tamil Nadu State Action Plan on Climate Change (TNSAPCC):
<https://www.environment.tn.gov.in/Document/go/tamil%20nadu%20climate%20change%20mission%20g.o.pdf>
- B. National Education Policy 2020:
https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf
- C. Report on the state of Global Climate and Environment Education by World Bank:
<https://www.earthday.org/wp-content/uploads/2020/07/World-Bank-Environmental-and-Climate-Literacy-Final-Report.pdf>

5. Glossary of terms on climate literacy

Anthropogenic: (chiefly of pollution or environmental change) originating in human activity. Usually used in the context of emissions that are produced as a result of human activities.

Anthropocene: the current geological age, viewed as the period during which human activity has been the dominant influence on climate and the environment.

Biofuels: Gas or liquid fuel made from plant material, industrial byproducts and solid waste.

Carbon Footprint: The total amount of greenhouse gases that are emitted into the atmosphere each year by a person, family, building, organization, or company. Sources of GHG for individuals include burning fuel for transport, heating, etc and for organizations and factories it is producing goods and services, etc

Climate Adaptation & Climate Mitigation: Climate change mitigation means avoiding and reducing emissions of heat-trapping greenhouse gases into the atmosphere to prevent the planet from warming to more extreme temperatures. Climate change adaptation means altering our behavior, systems, and—in some cases—ways of life to protect our families, our economies, and the environment in which we live from the impacts of climate change.

Climate Change: Any significant change in the measures of climate such as temperature, precipitation, or wind patterns, occurring and lasting over several decades or longer.

Climate Literacy (also known as Climate Change Literacy): “An understanding of your influence on climate and climate’s influence on you and society.”

Ecosystem: Ecosystem is any natural unit or entity including living and non-living parts that interact to produce a stable system through cyclic exchange of materials

Global Warming: The recent and ongoing global average increase in temperature near the Earth's surface.

Greenhouse Gases: Any gas that absorbs infrared radiation in the atmosphere. Greenhouse gases include, carbon dioxide, methane, nitrous oxide, ozone, chlorofluorocarbons, hydrochlorofluorocarbons, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride.

Ozone Layer and Ozone Depletion: The layer of ozone above Earth which shields the Earth from harmful ultraviolet radiation from the sun. Ozone depletion is caused by a man-made chemical compounds (e.g. Chlorofluorocarbons or CFCs which are released by solvents, spray aerosols, refrigerators, air-conditioners, etc.). Ozone depletion causes health problems for individuals and adversely affects environment and animal and marine life.

Renewable energy (non-conventional, green energy): Energy derived from nontraditional sources (e.g., compressed natural gas, solar, hydroelectric, wind).

United Nations Framework Convention on Climate Change (UNFCCC): The Convention on Climate Change sets an overall framework for intergovernmental efforts to tackle the challenge posed by climate change. It recognizes that the climate system is a shared resource whose stability can be affected by industrial and other emissions of carbon dioxide and other greenhouse gases. The Convention enjoys near universal membership, with 189 countries having ratified.

(Source: <https://19january2017snapshot.epa.gov/climatechange/glossary-climate-change-terms .html>)

6. Research Studies on Climate Literacy

- A. **A study on level of environmental awareness among secondary school students in Guntur District, Andhra Pradesh:**
<https://archives.palarch.nl/index.php/jae/article/download/4804/4736/9241>
- B. **Environmental Awareness among College Students in Dindigul:** This study was focused on the level of environmental awareness and habitual practices towards environment among the under graduate regular students with special reference to Arts and Science colleges in Dindigul district, Tamil Nadu. The study looks at the gender dimension and makes some recommendations relevant to this study.⁸⁷
- C. **A Study of Environmental Awareness of Students at Higher Secondary Level (2019):**
<https://files.eric.ed.gov/fulltext/EJ1245148.pdf>
- D. **A Study On Environmental Awareness Among Undergraduate Students:**
<https://www.ilkogretim-online.org/fulltext/218-1647169151.pdf>
- E. **Best Practice Awareness Generation In Children About Environmental Issues:** By Madhya Pradesh Government RCVN Noronha Academy of Administration. Management, Madhya Pradesh Website:

⁸⁷ <https://www.ijraset.com/research-paper/environmental-awareness-among-students>

<https://darpg.gov.in/sites/default/files/45.%20Awareness%20generation%20in%20Children%20about%20Environmental%20issues.pdf>

Annexure 2: Data collection instruments

1. Questionnaires for data collection

(a) Structure Interview Schedule for school and college student and community youth

Introduction

Greetings!! My name is _____. I am from the research team of Citizen consumer and civic Action Group (CAG), Chennai. We are conducting a 'Baseline study on Climate Literacy in Tamil Nadu'. The study is funded by Department of Environment and Climate Change, Government of Tamil Nadu. The aim of the study is to assess the knowledge, attitude and practice of school and college students, community youth and policymakers in Tamil Nadu on the climate change, its impacts, and vulnerabilities.

In this regard, I would like to request you to share with us your views and perspectives on climate change and related aspects. Your responses will help us to understand and develop appropriate strategies and programmes to enhance the level of climate literacy for individuals that will collectively contribute to the mission of achieving the climate change targets set by the state and central government. This interview may take around 30 minutes. Your views and opinions shared will be kept strictly confidential and used only for research purposes.

Verbal consent

Do you agree to participate in the survey?	1.	Yes
	2.	No
Type of respondent	1	School student (Class 6 – 9)
	2	College student (UG – PG)
	3	Community youth (Aged 15 – 29 years, and who are currently not studying in school/college)
Interviewer details	Name: _____ Code: _____	

IDENTIFICATION & DEMOGRAPHIC INFORMATION

Q. No.	Question	Code	Instructions / Skip options
1.	Name of District	1. Chennai 2. Salem 3. Coimbatore	Select any one

Q. No.	Question	Code	Instructions / Skip options
		4. Madurai 5. Tenkasi 6. Thanjavur 7. Thoothukudi 8. Tirupathur 9. Dindigul	
2.	Age of the respondent (completed years)	_____ years	
3.	Gender	1. Male 2. Female 3. Other Gender	
4.	If school/college student, specify the name of the educational institution		If community youth, skip to Qn. No. 13
5.	If school student, specify the type of board of education the school is affiliated to?	1 State Board (Tamil medium) 2 State Board (English medium) 3 Matriculation Board 4 CBSE 5 Any other, specify	
6.	If school student, specify the class currently studying in	Class _____	
7.	If college student, specify course currently he/she is enrolled in.	1 Under Graduation 2 Post-Graduation	
8.	If college student, specify the degree name.	1 Arts (BA / MA) 2 Commerce (B.Com / M.Com) 3 Science (BSC / MSC) 4 Engineering (BE / ME) 5 Any other, specify	
9.	If college student, specify the branch name. (Ex. Economic, Computer Science, History, Tamil		

Q. No.	Question	Code		Instructions / Skip options
	Literature, Mechanical etc.)			
10.	If community youth, specify of specific city / town / village where he/she is living in			
11.	(For Community Youth) Name of specific location/area (ex. Nagar / Hamlet etc.)			
12.	Education of Community Youth (completed standard)	1	Illiterate (unable to read / write any language)	
		2	Neo literate (can only sign)	
		3	Primary (Class 1–5)	
		4	Middle (Class 6–8)	
		5	Secondary (Class 9–10)	
		6	Higher Secondary (Class 11–12)	
		7	Graduation (Degree)	
		8	Post-Graduation (PG)	
		9	Professional (Diploma / ITI)	
		10	Others _____	

KNOWLEDGE ON BASIC CONCEPTS & UNDERSTANDING OF CLIMATE LITERACY

Q. No.	Question	Code	Options	Instructions/SKIP
13.	Have you heard of the term 'Climate Change'?	1	Yes	
		2	No	
14.	If yes, what are the sources that you got to know about climate change?	1	School syllabus	Multiple choice
		2	College syllabus	
		3	Newspapers	

Q. No.	Question	Code	Options	Instructions/SKIP
		3	TV / Radio	
		4	Books & magazines (outside curriculum)	
		5	Online search options (e.g., search engine)	
		6	Social media (WhatsApp, FB, Twitter, Instagram, YouTube etc.)	
		7	Special events (workshops, conferences, training etc.)	
		8	Others, specify	
15.	If you are a student, which of the following environment/climate related topics you have studied in your curriculum?	1	EVS (Environmental studies)	Multiple options
		2	Social Studies	
		3	Geography	
		4	Green engineering	
		5	Agricultural sciences	
		6	Ecology	
		7	Others, specify	
16.	What is your general understanding of the meaning of 'climate change'?	1	Change of seasons	
		2	Change in temperature	
		3	Change in weather	
		4	Change in the climate over a long period of time	
		5	Not able to define exactly	
		6	Don't know	
		7	Other, specify	
17.	Can you define the scientific meaning of climate change? (Don't read out/prompt the given options. Allow the	1	Varying Earth's climate, reflecting the complex interactions and dependencies of the solar,	Multiple option

Q. No.	Question	Code	Options	Instructions/SKIP
	respondent to come up with his/her own responses and you tick the relevant option(s) accordingly.		oceanic, terrestrial, atmospheric, and living components	
		2	Increased levels of greenhouse gases in the atmosphere due to human activities such as burning fossil fuels and deforestation	
			Gases in Earth's atmosphere like carbon dioxide and methane act as a greenhouse, preventing a certain amount of heat radiation from escaping back to space.	
		3	Shifts / changes in ocean circulation that result from plate tectonic movements	
		4	Massive volcanic eruptions	
		5	Changes in greenhouse gases, aerosols, and stratospheric ozone	
		6	Don't know	
18.	What is the difference between environment and climate?	1	Environment is a broader concept that encompasses climate as a part of it	
		2	Environment means pollution whereas climate means season	
		3	None of these	
19.	What is the role of the oceans in climate change?	1	The oceans absorb carbon dioxide from the atmosphere, which can lead to ocean acidification and harm marine life	
		2	The oceans have no role in climate change	

Q. No.	Question	Code	Options	Instructions/SKIP
		3	Don't know	
20.	Going by the current estimations, how do you think the earth's global average surface temperature is changing over a period?	1	Increasing	
		2	Decreasing	
		3	Doesn't change	
		4	Don't know	
21.	If it is increasing, can you specify what the average rate of earth's surface temperature rose during 20 th century?	1	1.08°F / 0.6 °C	
		2	2.08°F / 1.6 °C	
		3	3.08°F / 2.6 °C	
		4	Don't know	
22.	What is the global target set by IPCC as the maximum additional temperature of earth's surface to be maintained by 2050?	1	~3 °F / 1.5°C	
		2	~4 °F / 2.5°C	
		3	Don't know	
23.	What If we don't act, what is the prediction of possible rise of temperature that could occur by end of the century?	1	(3-7 °F / 2-4 °C)	
		2	(4-7 °F / 3-4 °C)	
		3	Don't know	
24.	What is carbon cycle?	1	Carbon cycle (animals and bacteria breathe in oxygen and breathe out carbon dioxide while plants do the opposite).	
		2	Carbon rotating all over the earth	
		3	Carbon and Oxygen mixing with each other	
		4	Don't know	
25.	What are the greenhouse gases?	1	Carbon dioxide (CO ₂)	
		2	Methane (CH ₄)	
		3	Nitrous oxide (N ₂ O)	

Q. No.	Question	Code	Options	Instructions/SKIP
		4	Ozone (O ₃)	
		5	Other Fluorinated gases	
		6	All of the above	
26.	The major greenhouse gas contributing to the rise of global temperature is	1	Nitrous Oxide	
		2	Oxygen	
		3	Carbon Dioxide	
		4	Ozone	
		5	Sulfur dioxide	
27.	The greenhouse effect is a process that occurs when gases in Earth's atmosphere trap the Sun's heat. Do you agree with this statement?	1	Yes	
		2	No	
		3	Don't know	
28.	In your understanding, what are the ways through which the emission of Carbon dioxide (CO ₂) happens?	1	Carbon dioxide enters the atmosphere through burning fossil fuels (coal, natural gas, and oil), solid waste, trees and other biological materials, and also as a result of certain chemical reactions (e.g., manufacture of cement)	Multiple
		2	The combustion of fossil fuels such as gasoline and diesel to transport people and goods	
		3	combustion of fossil fuels to generate electricity was the second largest source	
		3	Many industrial processes emit CO ₂ through fossil fuel consumption	
		4	Don't know	

Q. No.	Question	Code	Options	Instructions/SKIP
29.	In your understanding, what are the ways through which the emission of Methane happens (CH ₄)?	1	Methane is emitted during the production and transport of coal, natural gas, and oil.	
		2	Domestic livestock such as cattle, swine, sheep, and goats produce CH ₄ as part of their normal digestive process.	
		3	Coal mining	
		4	Through landfills as waste decomposes and in the treatment of wastewater.	
		5	Production, processing, storage, transmission, and distribution of natural gas and production, refinement, transportation, and storage of crude oil.	
		6	All of these	
		7	Don't know	
30.	In your understanding, what are the ways through which the emission of Nitrous Oxide happens?	1	Agricultural and soil management activities, such as application of synthetic and organic fertilizers and other cropping practices, the management of manure, or burning of agricultural residues.	
		2	Certain industrial activities including the treatment of wastewater	
		3	Nitrous oxide is emitted when fuels are burned	
		4	During the production of chemicals such as nitric acid and adipic acid	
		5	All of these	

Q. No.	Question	Code	Options	Instructions/SKIP
		6	Don't know	
31.	What is the role of ozone layer?	1	A layer of clouds in the sky	
		2	A thin layer in the earth's stratosphere consists of ozone layers and it protects the earth from the harmful ultraviolet radiation from sun	
		3	A thick layer in the atmosphere protecting Oxygen for earth	
		4	Don't know	

KNOWLEDGE ON CAUSES & EFFECTS OF CLIMATE CHANGE

Q. No.	Question	Code	Options	Instructions/SKIP
32.	How does ozone layer depletion due to human-caused factors occur?	1	Ozone depleting substances (such as CFC, Halons, Carbon tetrachloride etc.) released from use of refrigerators, ACs, solvents, dry-cleaning agents, adhesives etc.	
		2	Cutting of trees	
		3	Use of plastics	
		4	All of these	
		5	Don't know	
33.	What are the effects of ozone layer depletion on human health?	1	Sun burns & skin diseases	
		2	Cancer	
		3	Cataract	
		4	Quick ageing & weak immune system	
		5	All of these	

Q. No.	Question	Code	Options	Instructions/SKIP
		6	Don't know	
34.	Globally, which of the following economic sectors emits the largest percentage of greenhouse gas?	1	Energy (electricity, heat and transport)	
		2	Direct industrial processes	
		3	Agriculture, forestry and other land use sector	
		4	Don't know	
35.	Thinking about the causes of climate change, which, if any, of the following best describes your opinion? (Tick any one option only)	1	Climate change is entirely caused by natural processes	(Tick any one option only)
		2	Climate change is mostly caused by natural processes	
		3	Climate change is partly caused by natural processes and partly caused by human activity	
		4	Climate change is mostly caused by human activity	
		5	Climate change is entirely caused by human activity	
		6	There is no such thing as climate change	
		7	I don't know	
36.	What are the nature-caused factors of climate change?	1	Volcanic eruptions	Multiple option
		2	Shifts in ocean currents	
		3	Forest fire	
		4	Fluctuations in solar radiation	
		5	Don't know	
37.	What are the human-caused factors of climate change?	1	Burning fossil fuels	Multiple option
		2	Deforestation	
		3	Industrial emission	
		4	Agriculture activities	

Q. No.	Question	Code	Options	Instructions/SKIP
		5	Creating more cities, highways, and farmlands	
		6	Don't know	
38.	What are the possible impacts of climate change?	1	Rising global sea level and increasing frequency and intensity of heat waves, droughts, and floods.	Multiple option possible
		2	Increasing frequency and intensity of heat waves	
		3	Increasing frequency and intensity of droughts	
		4	Increasing frequency and intensity of floods	
		5	Glacial melting	
		6	Extinction of wild flora and fauna	
		7	Biodiversity loss	
		8	Water shortages	
		9	Displaced communities	
		10	Affects marine ecosystem (little plants that serve as the base of marine food chains) and killing coral reefs	
		11	Don't know	

KNOWLEDGE ON PROGRAMMES & INITIATIVES FOR ADDRESSING CLIMATE CHANGE

Q. No.	Question	Code	Options	Instructions/SKIP
39.	Are you aware that the emission of various greenhouse gases in each country is being measured and reported globally every year?	1	Yes	
		2	No	

40.	Are you aware of any of these global level initiatives / organizations that work to address the challenges of climate change?	Sl. No.	Initiatives/organizations	1-Aware 2-Not aware
		1	Intergovernmental Panel on Climate Change (IPCC)	
		2	Kyoto Protocol	
		3	Paris Agreement	
		4	United Nations Framework Convention on Climate Change (UNFCCC)	
		5	UN Climate Conference (COP27)	
41.	What is the Paris Agreement about?	1	An agreement among countries to limit global warming to below 2 degrees Celsius above pre-industrial levels and pursue efforts to limit warming to 1.5 degrees Celsius	
		2	An agreement for nuclear control treaties	
		3	An agreement for trading and commerce	
		4	Don't know	
42.	Are you aware of the national level initiatives / organizations that work for addressing the challenges of climate change in India?	Sl. No.	Initiatives/organizations	1-Aware 2-Not aware
		1	National Action Plan for Climate Change (NAPCC)	
		2	Jawaharlal Nehru National Solar Mission	
		3	Green Indian Mission	
43.	Are you aware of the state level initiatives / organizations that work for addressing the challenges of climate change in Tamil Nadu?	Sl. No.	Initiatives/organizations	1-Aware 2-Not aware
		1	Tamil Nadu State Action Plan for Climate Change (TNSAPCC)	

		2	Tamil Nadu Climate Change Cell (TNSCCC)	
		3	Tamil Nadu Green Climate Company	
		4	Tamil Nadu Governing Council on Climate Change	
		5	Tamil Nadu Climate Change Mission	
44.	Indian government has committed to achieve Net Zero Emission at UN Climate Conference (COP27) by which year?	1	2030	
		2	2050	
		3	2070	
		4	2080	
		5	Don't know	

ATTITUDE ON CLIMATE CHANGE

Q. No.	Question	Code	Options	Instructions/SKIP
45.	Have you noticed in the past 10-15 years any drastic change in the weather/seasonal pattern in your locality?	1	Yes	
		2	No	
		3	Don't know	
46.	If yes, can you specify some of them.	1	Increased rain & flooding	Multiple option
		2	Decreased rain and frequent droughts	
		3	Increased heat (longer summer)	
		4	Any other, specify	
		5	Don't know	
47.	If you have noticed any drastic change, do you think it may be due to climate change?	1	Yes	
		2	Not able to say	
		3	No	

48.	How important is it for an individual like you to know all the basic complete information about climate change and its effect on human life?	1	Important	
		2	Not important	
		3	Don't know	
49.	In what ways will adequate knowledge about climate change help an individual like you?	1	To understand the essential principles of Earth's climate system	Multiple options
		2	To know how to assess scientifically credible information about climate	
		3	To communicate about climate and climate change in a meaningful way	
		4	To be able to make informed and responsible decisions regarding actions that may affect climate	
		5	To protect fragile ecosystems and to build sustainable communities that are resilient to climate change	
		6	To improve our ability to make decisions about activities that increase vulnerability to the impacts of climate change and to take precautionary steps in our lives and livelihoods that would reduce those vulnerabilities.	
		7	All of these	
50.	Do you agree with these statements? (Give score on a 5 point scale – 1- Strongly disagree, 2-Disagree, 3- Either disagree nor agree, 4- Agree, 5-Strongly agree)	S.N.	Statements	Score(1-5)
		1	Protecting the environment is critically important for the survival of future generations	

		2	Protecting the environment is equally important as job creation	
		3	Environmental education should be a necessary component of primary and secondary school education	
		4	Recycling waste is a benefit to both the natural environment and the economy	
		5	Environmental laws are properly enforced in Tamil Nadu	
		6	It is important that individuals like me need to understand and implement climate-friendly practices in day-to-day life	
51.	Who do you think in society are mostly vulnerable to bear the brunt of climate change effects?	1	People in developed countries	Multiple option
		2	People in developing countries	
		3	People in coastal areas	
		4	People in Island nations	
		5	People in rural areas	
		6	Economically weaker sections	

ADOPTION OF CLIMATE-FRIENDLY PRACTICES IN DAY-TO-DAY LIFE

52. Are you practicing any of these ways of reducing greenhouse gas emissions in your day-to-day at present?

S.No.	Practices	Response (1-Yes, 2- No ; 3-Planning to; 4-NA)
1.	Planting trees	
2.	Traveling in/using more fuel-efficient vehicles	
3.	Using energy-efficient electrical appliances at home (Eg.5 Star rated)	
4.	Stopped burning plastics, wood etc.	
5.	Switched to electric vehicle	
6.	Installing solar panels at home	
7.	Turning off lights and electronics when not in use	
8.	Reduced the use of nitrogen-based fertilizers in my farms	
9.	Sorting and disposing garbage into different recycling bins (paper, bottles, metal etc.)	
10.	Pay 5% more to buy a product that is environmentally friendly.	
11.	Reduce food waste through smarter purchasing, storage and disposal	
12.	Engage in composting activities	
13.	Reducing the use of air conditioner	
14.	Take shorter showers	
15.	Talk to my friends and family about conserving environment	
16.	Turn off the tap while washing dishes / brushing teeth	
17.	Use public transportation	
18.	Any other, specify	

53. *Anything else if you would mention about climate change or related aspects of this study, please specify.*

Focus Group Discussion with School / College Teachers

Instructions to organizers:

The FGD is to be administered with school / college teachers in the sample districts. About 8 to 10 persons representing targeted classes in school (i.e., Grade 5 – 9) / colleges (i.e., UG & PG) will participate in the discussion.

FGDs are to be conducted by 2 members. The lead member of the team will be the facilitator and the other the recorder. The questions provided are guidelines and you may have to develop further probes through healthy debate/discussion. Answers to some of the questions will emerge during the course of the discussion. Introduce each section, so that members are mentally prepared for the same.

Starting the FGD

Begin the FGD by introducing yourself and explain the purpose of the survey being undertaken for the Tamil Nadu Climate Change Mission

Greetings!! My name is _____. I am from the research team of Citizen consumer and civic Action Group (CAG), Chennai. We are conducting a 'Baseline study on Climate Literacy in Tamil Nadu'. The study is funded by Department of Environment and Climate Change, Government of Tamil Nadu. We are here to facilitate an important discussion with you to study your perspectives on the knowledge, attitude and practice of school and college students on the climate change, its impacts and vulnerabilities.

It is very important that each one of you feel free to discuss your views and opinions. Your responses will help us to understand and develop appropriate strategies and programmes to enhance the level of climate literacy for individuals that will collectively contribute to mission of achieving the climate change targets set by the state and central government. All that you share will be kept confidential and we are recording the discussion so that we do not miss anything or forget what each one of you have said. We urge you once again to be loud, clear and free and remember there is no right and wrong opinion or view. So do not hesitate to speak your views and observations on relevant issues. This discussion may take around 60 minutes."

Important guidelines

- Build rapport and help the group members to relax (Use points on location related information for this)
- Stress on confidentiality of any information to be gathered.
- Be respectful and presentable (dress code).
- Local etiquette must be observed and always followed.
- Acknowledge and maintain dignity of the respondents.
- Establish understanding of mutual benefits of the survey (establishment of benchmark to observe project progress).
- Do not make promises; you can assure the participants that their concerns will be transmitted to project personnel.
- Be observant and take note of comments, perceptions and observations.

Summing up

At the end of the discussion, sum up the main issues, emerging from the discussions with the participants.

Identification details

District name	
Block name	
Specific location name	
Name of the institution	
Moderator	
Recorder	
Date and time	

Details of FGD participants

S. No	Participants	Gender (1-Male; 2-Female)	Education background	Years of experience in teaching	Specific grade / course currently handling the classes for
1					
2					
3					
4					
5					
6					
7					
8					
9					

Discussion questions (Checklist)

S.No.	Themes & lead Questions
	A. Knowledge of Climate Change
1.	Have you heard of Climate Change? How will you define the meaning of climate change?
2.	How will you differentiate climate change from weather, seasons, and environment? <i>(Probe into the meaning of each concept and its inter-linkage with one another)</i>
3.	How does the scientific process of climate change take place? <i>(Probe into the types of greenhouse gases, greenhouse effect, global warming etc)</i>
4.	What are the main causes of climate change? <i>(Categorize the causes into natural and human-induced factors, including various sectors that contribute to greenhouse gas emissions across the world)</i>
5.	What are the potential impacts of climate change on environment, human health, livelihood and economy? <i>(Categorize the responses under the given heads)</i>
6.	Are you aware of the various climate change actions / initiatives at global, India and the Tamil Nadu level? <i>(Categorize the responses under the given heads)</i>
7.	What are the key sources of the knowledge that you have acquired on climate change and related concepts? Have you received any training on climate change? <i>(Refer to the responses shared to the above questions)</i>
8.	What steps do you think individuals can take to reduce their impact on the environment to mitigate climate change?
9.	How do you incorporate discussions about climate change into your teaching?

	B. Attitude
10.	Do you think climate change is a serious issue for common people like you today? If yes, why do you think so? (<i>Probe if they have observed any change in the climate in the past 10 to 15 years</i>)
11.	How concerned are you about the impact of climate change on our planet?
12.	How often do you get to talk/discuss about climate change / action? And, with whom and on which occasions you get to talk on this topic?
13.	How do you think the existing policies and programmes aiming to address the issues of climate change are working on ground? (<i>Request them to specify the policies/programmes that they are referring to for this question. E.g. IPCC, COP 27, Kyoto protocol, UNFCCC, NAPCC and TNSAPCC, TN Climate Change Mission etc.</i>)
14.	How adequate do you feel about your knowledge about climate change? If not adequate, can you elaborate on why, and ways we can help you to enhance your knowledge on climate literacy?
15.	In your opinion, what role should schools and colleges play in addressing climate change?
	C. Practice
16.	What actions do you take to reduce your impact on the environment to mitigate climate change? That actions may be global, national, and local?
17.	How adequate is the existing curriculum on climate change for school (class 5 to 9) / college (UG & PG) students? Do you have adequate teaching/learning aids, tools and materials required for effective delivery of climate literacy to students?
18.	How do you think the students today are serious about, and practicing, the necessary climate-friendly practices in their day-to-day life? (<i>probe into sustainable lifestyle practices, renewable energy etc.</i>)
19.	How do you think we can further enhance the climate literacy of students so that they not only gain adequate knowledge but also follow them in life? What are your suggestions and recommendations regarding programme and policy levels?

Semi-structure Interview Tool for Government Officials at the District level

Instructions:

Greetings!! My name is _____. I am from the research team of Citizen consumer and civic Action Group (CAG), Chennai. We are conducting a ‘Baseline study on Climate Literacy in Tamil Nadu’. The study is funded by Department of Environment and Climate Change, Government of Tamil Nadu. The aim of the study is to assess the knowledge, attitude and practice of school and college students, community youth and policymakers in Tamil Nadu on the climate change, its impacts and vulnerabilities.

In this regard, I would like to request you to share with us your views and perspectives on climate change and related aspects. Your responses will help us to understand and develop appropriate strategies and programmes to enhance the level of climate literacy for individuals that will collectively contribute to the mission of achieving the climate change targets set by the state and central government. This interview may take around 30 minutes. Your views and opinions shared will be kept strictly confidential and used only for research purposes.

Verbal consent

Do you agree to participate in the survey?	1.	Yes
	2.	No
Interviewer details	Name: _____ Code: _____	

Identification details

1	Block	
2	District	
3	Type of respondent	_____ (Block/district level officials representing departments: 1=Rural Development, 2= Water supply, 3. Agriculture dept., 3. Health, 4. Education, 5. Environment, 6 Pollution control, 7. Geology / Mining, 8. Any other, specify)

Details of Respondent

1	Name	
2	Age	
3	Education	

4	Designation / occupation	
5	Dept. name / Office location	
6	Office location & District	
7	Work experience in the present service	

Discussion questions (Checklist)

S. No.	Themes & lead Questions
	A. Knowledge of Climate Change
1.	Have you heard of Climate Change? How will you define the meaning of climate change?
2.	How will you differentiate climate change from weather, seasons, and environment? (<i>Probe into the meaning of each concept and its inter-linkage with one another</i>)
3.	How does the scientific process of climate change take place? (<i>Probe into the types of greenhouse gases, greenhouse effect, global warming etc.</i>)
4.	What are the main causes of climate change? (<i>Categorize the causes into natural and human-induced factors, including various sectors that contribute to greenhouse gas emissions across the world</i>)
5.	What are the potential impacts of climate change on environment, human health, livelihood, and economy? (<i>Categorize the responses under the given heads</i>)
6.	Are you aware of the various climate change actions / initiatives at global, India and the Tamil Nadu level? (<i>Categorize the responses under the given heads</i>)
7.	What are the key sources of the knowledge that you have acquired on climate change and related concepts? Have you received any training on climate change? (<i>Refer to the responses shared to the above questions</i>)

S.	
No.	Themes & lead Questions
8.	What steps do you think individuals can take to reduce their impact on the environment to mitigate climate change?
9.	How do you incorporate discussions about climate change into your teaching?
	B. Attitude
10.	Do you think climate change is a serious issue for common people like you today? If yes, why do you think so? <i>(Probe if they have observed any change in the climate in the past 10 to 15 years)</i>
11.	How concerned are you about the impact of climate change on our planet?
12.	How often do you get to talk/discuss about climate change / action? And, with whom and on which occasions you get to talk on this topic?
13.	How do you think the existing policies and programmes aiming to address the issues of climate change are working on ground? <i>(Request them to specify the policies/programmes that they are referring to for this question. E.g. IPCC, COP 27, Kyoto protocol, UNFCCC, NAPCC and TNSAPCC, TN Climate Change Mission etc.)</i>
14.	How adequate do you feel about your knowledge about climate change? If not adequate, can you elaborate on why, and ways we can help you to enhance your knowledge on climate literacy?
	C. Practice
15.	What actions do you take to reduce your impact on the environment to mitigate climate change? That actions may be global, national, and local.
16.	What are the existing programmes for enhancing your knowledge on climate literacy? Are there adequate teaching/learning aids, tools, and Information Education Communication (IEC) materials required for effective delivery of climate literacy among policy makers like you? If it is not adequate, please explain why.

S. No.	Themes & lead Questions
17.	How do you think the policymakers/government employees today are serious about, and practicing, the necessary climate-friendly practices in their day-to-day life? (<i>probe into sustainable lifestyle practices, renewable energy etc.</i>)
18.	How do you think we can further enhance the climate literacy among policymakers/government employees so that they not only gain adequate knowledge but also follow them in life? What are your suggestions and recommendations regarding programme and policy levels?

2. List of sample districts, schools, colleges, and communities

List of schools covered for the study

District	School	District	School
1. Coimbatore	Vaidheeshwara Vidhyalaya	2. Thanjavur	Micheal's Higher Secondary School
	Brindisi Matriculation School		Govt Model Higher Secondary School
	St Marys High School		Model Higher Secondary School
3. Chennai	Loyola Matriculation	4. Salem	Little Flower Hr Sec School
	Ambattur Lions Club School		St MarysHr Sec School
	St. Agnus School		Govt Hr Sec School
5. Madurai	Govt. Middle School	6. Tenkasi	St Joseph's High School
	Govt Hr Sec School		Govt Higher Secondary School
	Mepco Schelnk Mat Hr Sec School		Annai Velankanni Matric Her Sec School
7. Thoothukudi	Government Higher Secondary School	8. Dindigul	JMJ Matriculation High School
	Auxillium Higher Secondary School		RC Fathima High School
	Seeni Matriculation School		JRC High School
9. Tirupathur	SFS School		
	St. Charles Metric Her Sec School		
	Govt Middle School		

List of colleges covered for the study

District	College	District	College
1. Coimbatore	STC	2. Thanjavur	Bharath Arts/Science College
	Bishop Ambrose College		Kundavai Nachiyar Government Women's College
	Rathinam College		Adaikala Madha College
3. Chennai	Don Bosco Arts & Science	4. Salem	Jairam College
	Loyola College		Govt Arts and Science College
	SRM College		Jayarani Womens Arts and Science College
5. Madurai	Govt Arts College	6. Tenkasi	JB College Of Engineering College
	Govt Arts College		JB College Of Arts and Science College
	Madurai Kamaraj University		MSP Velayuthanadar Lakshmi Thaimmal Polytechnic College
7. Thoothukudi	Don Bosco College of Arts and Science	8. Dindigul	Anugraha College Institute of Social Science
	ThevanesamEruthayammal Polytechnic College		Christian engineering college
	Geetha Jeevan College of Arts and Science		GTN arts and science college
9. Tirupathur	Holy Cross Arts & science		
	Sacred heart college		
	Pothigai Engineering college		

List of Community

District	Community area	District	Community area
1. Coimbatore	Pollachi	2. Thanjavur	Madakottai
	Ukkadam		Thirukanurpatti
	Velandipalayam		Vallam
3. Chennai	Kodambakkam	4. Salem	Erumaapalayam
	Vyasarpadi		Pallapatti
	Saidapet		Omalur
5. Madurai	Melur	6. Tenkasi	Pullukattuvalasai
	Thirumangalam		Kurumbalaperi
	Kalavasal		Keelapavur
7. Thoothukudi	Vilathikulam	8. Dindigul	Nochiodapatti
	Ettaiyapuram		Jambuliampatti
	Kulathur		Sanaarpatti
9. Tirupathur	Balnakuppam		
	Arigan Nagar		
	Yelagiri		

List Of Government Officials interviewed for the study

District	Designation of the Official interviewed	Department currently serving under GoTN
1. Coimbatore	Agricultural Officer	Agriculture
	Assistant Treasury Officer	Treasury And Accounts
	District Differently-abled Welfare Officer	District differently abled welfare department
	Assistant Director (AD)	Geology And mining
	Tahsildar	Revenue
	Block Medical Officer (BMO)	Health Department

District	Designation of the Official interviewed	Department currently serving under GoTN
2. Thoothukudi	Assistant Education Officer (AEO)	Education Department
	Revenue Inspector (RI)	Revenue Department
	Block Development Officer (BDO)	Rural Development
	Station Fire Officer	TN Fire & Rescue
3. Tanjavur	Forest Officer	District Forest Office
	Executive Engineer	Water Supply & Drainage Board
	Assistant Commissioner	Labour Department
4. Salem	Tahsildar	Adi Dravida & Tribal Welfare
	Superintendent	District Forest Office
	Superintendent	Education Department
	District Welfare Officer	Social Welfare
	Station Fire Officer	TN Fire & Rescue department
5. Tenkasi	Agricultural officer	Agriculture department
	Senior Revenue Inspector	Revenue Department
	Account Officer	District Collectorate
	Sub-inspector	Police Department
	VAO	Revenue Department
6. Dindigul	Executive Engineer - General	TANGEDGO
	Agriculture officer	Agriculture department
	District youth officer	Department of Youth Empowerment and Sports
	City Health Officer (CHO)	Health Department
	Teachers Educator	Education Department
7. Madurai	Commissioner	Water supply & Drainage board
	Agriculture officer	Agriculture department
	Station Fire Officer	TN Fire & Rescue department

District	Designation of the Official interviewed	Department currently serving under GoTN
	District Environmental Engineer	Pollution control board
	DEO	Education Department
8. Chennai	Hydrologist	TWAD Board
	Asst. Engineer	Department of Environment (GIS Cell)
	Station Fire Officer	TN Fire & Rescue department
	Medical Officer	Health Department
9. Tirupathur	Sub-inspector	Police Department
	Assistance Engineer	EB Department
	Junior Engineer	TWAD Board
	Sub-inspector	Police Department



Tamil Nadu Climate Change Mission,
Department of Environment and Climate Change,
Ground Floor, Panagal Building,
Saidapet, Chennai 600015



CAG

Citizen consumer and civic Action Group

No.103 (First Floor), Eldams Road, Teynampet,
Chennai 600 018

T: +91(44) 2435 4458 | 2435 0387



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