Local Nature-based Learning Programme

பல்லுயிர்

Palluyir

First Term Report

August-October 2023

Contents

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Acknowledgments

This project is supported by the Rainmatter Foundation and Freshworks. Nature Classrooms provided valuable inputs in the process of study design and analysis. The team thanks the Greater Chennai Corporation for their encouragement and interest in nature education.

Introduction

This study includes three elements, a curriculum aligned nature-based education programme, nature-based learning classroom materials, and close observation of students and their participation. This study will run from August 2023 to March 2024 for Grade 8 students of five government schools in Chennai. Schools for the study have been chosen based on nearby access to a green space such as a public park or a wooded area.

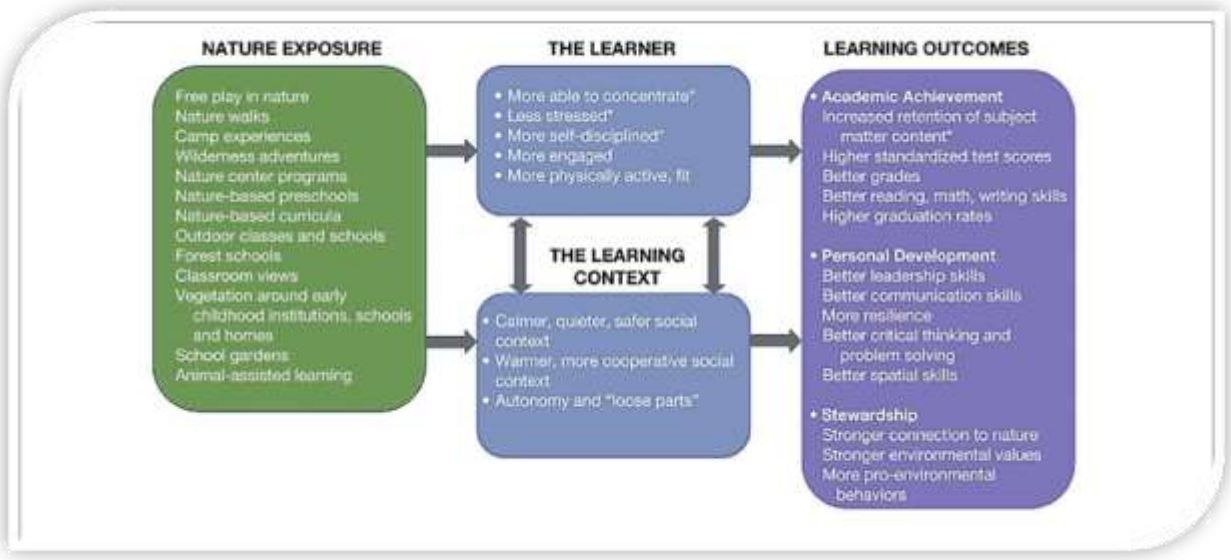
Each session of the nature-based learning programme has an active learning component where students will engage with the local biodiversity and society. There are three pillars of the programme around which all the activities are designed. They are- direct engagement, local relevance, and interconnectedness. We call this an 'Action Pedagogy'. Each class has a 1.5 hour session every fortnight (excluding school holidays, exams, etc.) and around 14 sessions yearly.

Throughout the programme, there is a progressive addition of nature-based learning materials for children to engage with. These include guidebooks, bingos, surveys, activity sheets, etc, based on local biodiversity. Each session is anchored by a teacher(s) from the school to ensure the safety of the children and 2 to 3 facilitators from Palluyir.

With this study, we aim to implement an excellent place-based nature and climate education programme and study its effects on children from 5 different government schools, especially for their critical thinking, curiosity, interpersonal skills, and nature connectedness as well as their motivation to learn, attendance, academic performance, mental health, and environmental sensitivity. Such a study is a first of its kind in India and Tamil Nadu. It will give us important insights into the applicability of nature and climate literacy and its many benefits, especially to vulnerable communities. This study's findings could also inform the state's future education policy.

Why nature-based learning?

One of the most comprehensive meta-reviews on this subject is by Ming Kuo et al. (2019), which brings together nearly 100 studies from across (primarily the Western) world showing how 'nature' in education benefits a child's learning and the learning context. This, they show, leads to academic achievement, personal development, and stewardship for one's ecology and other species. This is summarized in the diagram below -



Source: Ming Kuo et al. 2019

The authors of this meta-review study also note that - “Not only can nature-based learning work better for disadvantaged students, but it appears to boost interest in uninterested students, improve grades, and reduce disruptive episodes and dropouts among “at-risk” students. Nature-based learning may sometimes even erase race- and income-related gaps…. If nature is equigenic, giving low-performing students a chance to succeed and even shine, the need to document this capacity is pressing."
Palluyir’s own work with coastal communities and children/youth from vulnerable backgrounds has time and again shown that nature-based learning can be an equalizing force.

The benefits of nature in education are found to be both academic and socio-emotional. For instance, Nancy Wells’ work (2021) shows how access and engagement with nature can create mental resilience among children, especially those in poverty and facing adversity. Nature engagement can also reduce behavioural and emotional dysfunctions amongst at-risk students (Flouri, 2014) and improve affective and cognitive development across ages (Kellert S.R., 2002). There is a significant connection between nature-based learning and better mental health (Harvey et al., 2020). Some studies find that nature can reduce symptoms of ADHD in children (Faber Taylor et al., 2001). Another study by Camasso and Jaganathan (2017) investigates the impact of a programme called ‘Nurture Thru Nature’ whose curriculum was aligned with those of the mainstream subjects of elementary school children. They found significant improvements in the children's grades in science, maths, and language in the programme compared to control groups. These findings are also echoed in other studies (Hodson, 2017). Nature-based learning has been shown to improve

children's skills in language and interpersonal collaboration (Fjortoft, 2000, Moore & Wong, 1997) Similarly, knowledge retention is also markedly greater among students who had biology lessons linked with the local ecology outdoors (Fägerstam and Blom, 2012). It has also been shown to reduce absenteeism in school (MacNoughton, 2017).

The local context

Studies described in the above sections are almost absent from the Indian educational research and policy field except for anecdotal examples from practitioners spread out few and far between. The benefits of nature-based learning, especially for the urban working class and socio-economically backward in the Indian context, have never been studied. Similarly, the importance of nearby wild and accessible wild spaces like parks, marshlands, and grasslands in children's literacy and well-being has not been investigated. If nature-based learning can improve children's academic performance and overall well-being, it could make a significant difference in the lives of children in Tamil Nadu, especially those from socio-economically challenged backgrounds. If meaningfully and place-sensitively implemented at scale in a richly biodiverse state that is Tamil Nadu, nature-based learning could significantly improve literacy rates, pass rates, employability, stewardship for the environment, and dropout rates.

Chennai is the capital city of the state of Tamil Nadu, situated along the Coromandel coast. The mean temperature of Chennai is around 28.6°C and receives an annual mean rainfall of 140 cm. During the northeast monsoon, Chennai gets a lot of rain, and the annual mean

precipitation is 140 cm. Tropical dry evergreen forests, scrub forests, grasslands, mangroves, coastal areas, and sand dunes are some of the habitats in the city. This habitat variation shows how diverse the flora and fauna of Chennai are. Mammals such as Jackals and Blackbuck, reptiles such as Rat Snakes and Fan-throated Lizards, and birds such as Yellow-wattled Lapwings, Spotted Owlets, and more common Indian Robins, not to mention a variety of insects, amphibians, and fishes enrich the biodiversity of the region.

Common Jay butterfly, Common Club-tail dragonfly, Cattle Egret, and Painted Frog are an integral part of biodiversity of Chennai

In 2022, Greater Chennai Corporation released the Chennai climate action plan. This document showed how critically climate-vulnerable the city is. A Council of Energy, Environment, and Water report shows that Chennai is India's second most climate-vulnerable city. This being the case, good nature and climate education become essential during an increasing climate crisis, especially for vulnerable communities towards adaptation, mitigation, and action. Good climate education contextualized in the nearby ecologies has been studied to be very effective in reducing climate change impacts (EC Cordero, 2020) this is echoed in several United Nations reports as well. It would be new and vital to investigate the relationship between climate mitigation/adaptation and good, locally relevant nature and climate education pedagogy in the Indian and Tamil Nadu context.

Curriculum

We formed a curriculum that is based on the following core aspects-

1. Chennai's biodiversity
2. Climate and seasons
3. Action pedagogy
4. Children's developmental stages

Our nature curriculum is based on the action pedagogy we are evolving. This action pedagogy has three pillars - direct action in any form of learning, local relevance in any form of learning, and interconnectedness between various subjects, concepts, and skills. It also weaves with it the importance of local nature/biodiversity for the cognitive, social and emotional well-being of the learner as well as developing their stewardship for the local landscape.

Expected Outcomes

Through this study, we intend to lead to specific improvements in students' knowledge, attitudes, and the learning environment. They are as described below-

1. Significant improvement in epistemic curiosity, driving the student to learn better and involved in intrinsically motivated learning in the classroom and at home as well
2. Significant improvement in critical thinking skills, allowing the students to think for themselves, ask relevant questions, and learn better
3. Improved knowledge of local biodiversity and ecosystems leading to stewardship of the local environment and awareness of ecological issues
4. Significant improvement of children's happiness in learning contexts and capacity to work with others by developing interpersonal skills

Methodology

From the boundaries of Chennai city, we were appointed the schools that had proximity to parks and green spaces across North, Central, and South Chennai. We did a pilot survey of all the selected parks and decided to concentrate on vegetation since it is the most accessible form of biodiversity. The Corporation Park in Besant Nagar, which is adjacent to the CMS Gandhigramam School, has about 25 species of trees. Robinson's Park, a few meters away from CUHS and Chennai High School, has about 55 species of trees which is

the maximum species diversity of all the parks, and Independence Day Park has about 30 species of trees. A few ornamental and indigenous plants were also present in the park. The class strength in schools ranged from 20 - 45.

The final list of school and park combinations we decided to work in is as follows-

No.	School Name	Zone	Parks	Distance to Parks	Class Strength
1.	Chennai High School, Manikanda Street	North Chennai	Robinsons Park	230 m	27 9 Girls 18 Boys
2.	Chennai Urdu High School	North Chennai	Robinsons Park	600 m	41 15 Girls 23 Boys
3.	Chennai Boys Higher Secondary School, Nungambakkam	Central Chennai	Independence Day Park	230 m	15 Boys
4.	Chennai Girls Higher Secondary School, Nungambakkam	Central Chennai	Independence Day Park	350 m	42 Girls
5.	Chennai Middle School Gandhigramam Kalakshetra Colony	South Chennai	Corporation Park, Beasant Nagar (Near Kalakshetra)	10 m	22 9 Girls 13 Boys

To help us assess pre and post-project changes and to generate primary data on students we work with, we designed a baseline survey that included standard columns for personal information, including name, date, and class. To assess the current levels of epistemic curiosity/intrinsic motivation, critical thinking, and nature-connectedness of the children, a questionnaire with 24 statements was formulated. The students were instructed to rate the first 18 statements on a scale from 1 to 5, with 1 indicating the lowest level of agreement and 5 representing the highest level of agreement.

There were another 6 questions included to assess the students' connection with nature and their abilities to observe their local ecology. Students were given the opportunity to provide detailed responses for this particular section of the survey. This helped in assessing the mindset and attitude of the students towards nature. It allowed us to identify gaps in children's understanding or misconceptions about the environment, which helped tailor the curriculum in such a way that it resonated with their energy levels.

In addition to the baseline assessment, an icebreaker activity -Thiran Thedal (People's Scavenger Hunt)- was provided to establish momentum and facilitate a meaningful connection with the nature educators. It was employed to assess the interpersonal dynamics

among the students within the class. At the end of the baseline session, we provided the Butterflies of Chennai- a field guide to some of the common butterfly species present in the city.

To get a more detailed understanding of the changes in students, we decided to observe them during sessions on the following aspects and qualities-

1. Curiosity and Wonder
    - Asking Meaningful questions
    - Pursuing a question
    - Interested in learning new things
    - Pursuing question learning outside the session

2. Interpersonal Skills & Independence
    - Collaborating with others
    - Working with different people
    - Resolving problems/solving conflicts
    - Taking independent initiatives

3. Critical Thinking
    - Making connections across topics
    - Problem-solving

4. Nature Connectedness
    - Enjoying/observing/spending time with nature
    - Acknowledging oneness/dependence on nature
    - Developing the importance of conservation.

Additionally, we noted casual observations with the nature of students' doubts, reactions to the nature of education materials, and peaks and lows in enthusiasm or interest.

Results

The Project started in August 2023. We are currently engaging with 153 kids, all Class 8 students, from five schools in Chennai through the local nature-based learning programme. The baseline survey shows that most students like spending time in nature, although the level of response varied across schools (Figure 1). The baseline survey also showed that students in Chennai associate nature with positive experiences such as rain, feeling the breeze, or the feeling of peace when in green or open areas (Figure 2). As a part of the

project, we wanted to understand where students learn about nature so as to describe the role of education and learning spaces in students' lives. Given the increasing use of technology, quite a few students reported television and phones as mediums to learn about nature, even though school, books, and family were also a part of the list (Figure 3).

When it comes to nature connectedness, the baseline survey showed that students associate time spent in nature with reducing stress or processing emotions and that they feel most connected to nature when they have positive experiences such as holidays and night walks (Figure 4) associating connection with events and experiences such as "peaceful environment" "sunset" "walking through the trees" and "the earthy smell when it rains." Children in schools from Nungambakkam and Manikanda, for the question when do you connect with nature, mentioned seeking nature as a mental health buffer. One student in Nungambakkam BHSS said when his parents hit him, he leaves the house and sits under a tree. Another boy in Manikanda CHS said when his parents hit him, he goes to the lake, watches the water, and throws stones in it to feel better.

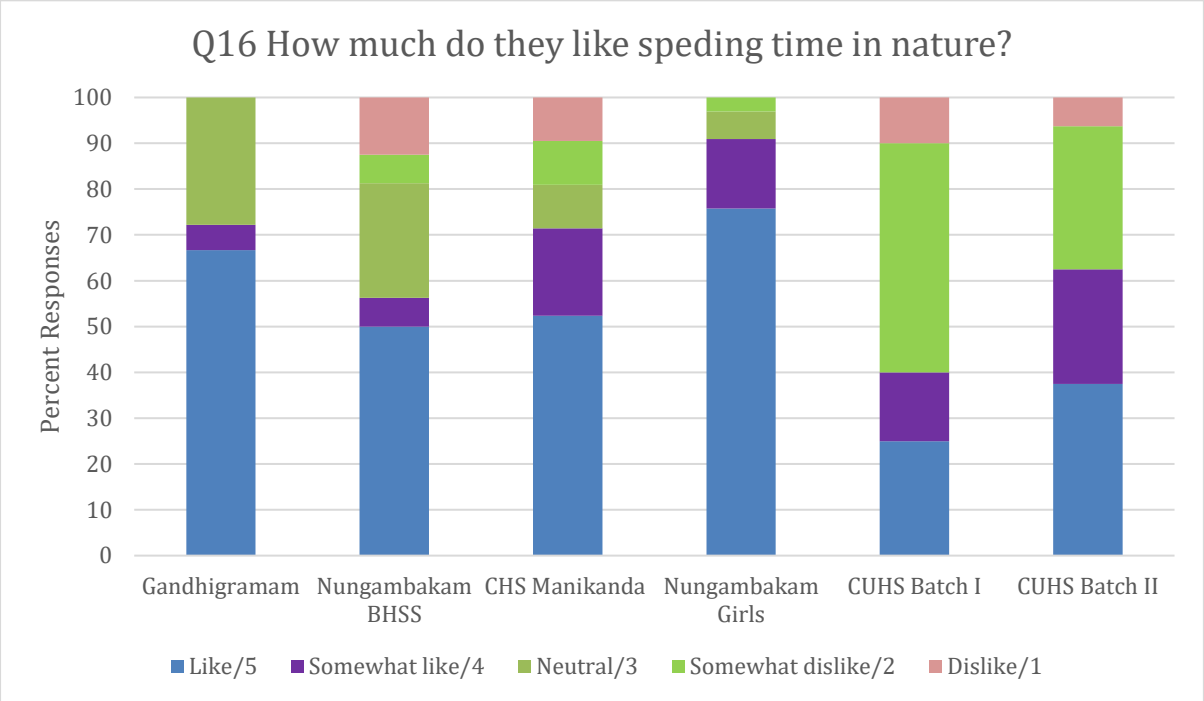


Figure 1: Baseline data from all schools showing students' responses to the question- "How much do you like spending time in nature?"

What do you think of when you hear the word ‘nature’?	
“Makes me happy”	“Terrace”
“Rain”	“Village”
“Feelings”	“Beach”
“Getting wet in the rain”	“Land, animals, sky, rain, trees”
“A tree that moves with the wind”	“Wind breeze”
“Birds chirping”	“Peace, to breathe in clean air”

Figure 2: Students’ responses to the open-ended question, “What do you think of when you hear the word nature?”

Where do you get to learn about nature the most?	
“Forest”	“Television and park”
“Book”	“School”
“My family and my school”	“TV, storybook, phone”
“Grandmother”	“School, news, zoo, beach, park”
“I saw a tree falling down in Sun News and I felt bad that's when I started liking nature”	“TV channels - Animal Planet, NGC Wild, Natgeo Wild”

Figure 3: Students' responses about mediums of" knowledge about nature

What is the time when you feel most connected to the nature around you?	
"When it rains"	"I like the earthy smell when it rains"
"When I am sad"	"I spend my holidays with nature, and I go swimming too"
"When I go to my farm/garden"	"Never"
"Sunset"	"When in a peaceful environment"
"Whenever I play"	"I like to get air in the night"
"Park time from 6 to 6.30"	"In my terrace"
"When I walk through the trees in Independence Day Park"	"I like to go to parks when I feel sad"

Figure 4: Students' responses to times when they feel connected to nature.

Along with the baseline survey, we started with a set of activities. The activities organised so far fall broadly into the following segments-

1. **Orientation** was conducted to analyse the students' emotional states. Then students were introduced to the session with interesting stories and be oriented on how to go about the session.
2. **Observation and journaling** by the students played a pivotal part in the activity, which required the students to engage in observations and record their findings in the provided journals.
3. **Reflection** by both the students and the facilitators at the end of each session by discussing the activity and its results.
4. The **distribution of resources** followed this**.** The students were provided complimentary guides to inculcate the habit of observing the environment and local ecology.

The facilitators designed and implemented the following activities-

1. Tree walk

This activity's primary objective was to acquaint the students with the local ecology and cultivate nature-connectedness. The facilitators briefed upon the “wood-wide-web”- the intricate fungal network that interconnects the roots of trees and plants within an ecosystem. To facilitate a deeper understanding, pictures were presented within the classroom. Each student had a comprehensive guide to "Common Trees of Chennai" and a dedicated notebook for journaling their observations in the nearby park. Bark Survey Poster was also used in this activity. The kids were given a maximum of half an hour to make their observations. Subsequently, a brief group discussion ensued, wherein the students were encouraged to share their respective observations.

Tree Walk session at Robinson's Park with students from Chennai Urdu High School

2. Curiosity mapping

The primary objective of this activity was to foster curiosity in students, prompting them to inquire about their environment and cultivate the practice of posing questions. This principle was elucidated to the students through examples like the process behind significant discoveries like "the impact of music on plant growth” by Jagdish Chandra Bose. The students were introduced to the concepts of open and closed questions. They were taken to the park for the activity after a brief in-class discussion. Their task involved observing a tree of their choice and framing a minimum of fifteen questions. After a dedicated half-hour for this activity, a comprehensive discussion ensued to review the questions to enhance their comprehension of the distinctions and similarities among various trees.

Nungambakkam Boys High School students having a discussion during the Curiosity Mapping activity

3. I notice, I wonder, it reminds me of

To instil a sense of fascination and appreciation for nature among the students, a visual representation of the life cycle of the lychee stink bug was presented, accompanied by an explanation delivered by facilitators. Additionally, to introduce and emphasize the concept of "I notice, I wonder, it reminds me of," an image of a praying mantis was displayed in the class. They were encouraged to articulate - their observations, questions that arose from their observations, and previous experiences associated with the image of a praying mantis. Following an illustrative example within the classroom, the students were taken to a nearby park, where they were asked to observe at least four different insects. They were required to document their observations by categorizing them into three sections: "I notice," "I wonder," and "It reminds me of." To enhance the engagement and appeal of the session, the nature educators complemented the activity with captivating narratives about various insects, such as bum chums, shield ants, and others. These stories added an enriching dimension to the activity, making it significantly more engaging for the students. A comprehensive discussion was facilitated after a designated half-hour observation period to encourage the students to share their findings and questions. Clues and Tracks Poster was distributed as resource material.

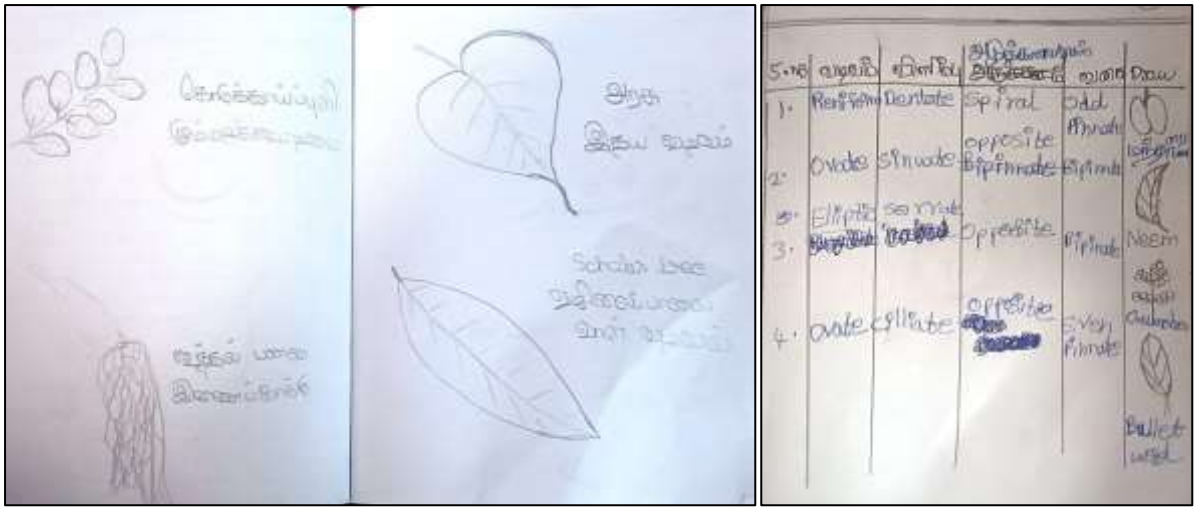
Orientation for the “I notice, I wonder, it reminds me of ” activity at Chennai High School, Old Washermanpet

Students keenly observing insects for the “I notice, I wonder, it reminds me of ” activity at CMS Gandhigramam

Outcomes and learnings

That meaningful forms of learning could happen outdoors and through local aspects of the natural world seemed rather new for both children and teachers. Learning, in its conventional sense, was associated with the indoors upon desks and chairs, and fun was associated with the outdoors. This was an important binary beginning to get dissolved during these sessions, and both could happen together. Many children were excited to visit the park or the outdoor space on their campus while simultaneously keen to observe the trees, insects, and other aspects of nature in it. Some had the urge to play at the park and had to be frequently reminded to focus on the activity being done. However, many were engaged with the learning opportunities being offered. In all schools, children requested more sessions or weekly sessions.

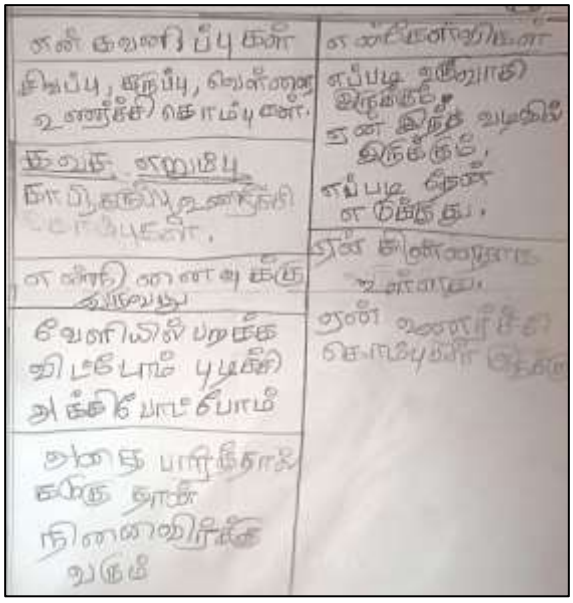
During the tree-observation session, many children across schools were moved by the ‘wood-wide-web’ story. They were surprised to discover so many tree species in their locality/local park. During the activity, children’s observation skills could be seen distinctly improving, as is noticeable in their journals. Difficulty and/or reluctance to write and draw was observed in most children - with the children in the North broadly showing more challenges than in the South. These reluctances were observed to decrease as well through the activity. Many children showed intrinsic motivation and interest to learn the spellings and sentence structures in English or Tamil to be able to complete/participate in nature activities. Many children worked in groups and helped each other. Many children’s boldness to share their thoughts, observations, and questions in the significant group discussions at the end of each session increased too, and they began communicating with more openness and courage. Children who already had an interest in learning about the natural world immensely enjoyed these sessions.



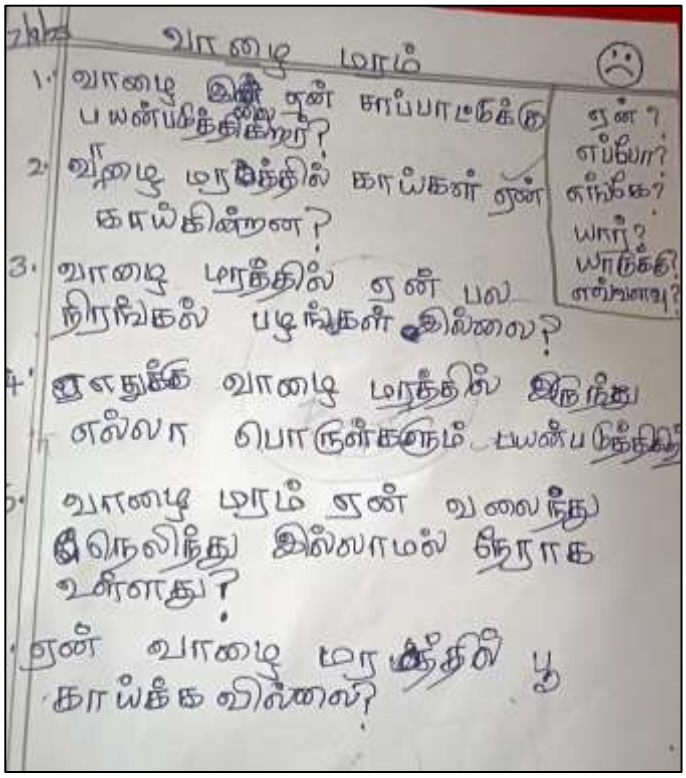
Leaves shape journaling done by students as part of the Tree Walk activity

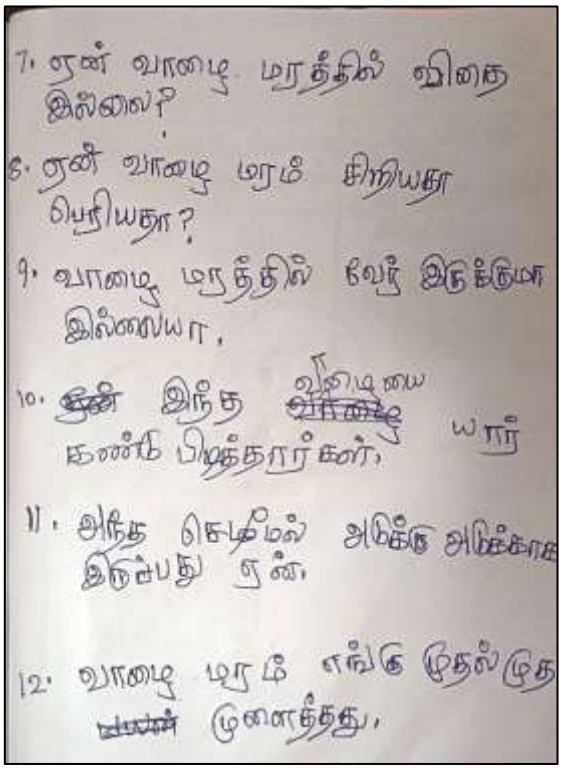
Children's conservation attitudes and connection to nature had starkly increased. Beginning with just awareness of the different living beings, ways to observe slowly translated into forms of care and concern. A student in Nungambakkam Boys was interested in how paint on trees might impact the well-being of trees. Another in CUHS empathized with biting ants and said they are protecting their homes as we might do. At Gandhigramam, one student made sure others followed the instruction of not plucking leaves on trees.

Activities like 'Curiosity Mapping' and 'I notice, I wonder, it reminds me of' directly exercised children's capacity to question and be curious - a capacity crucial for scientific thinking.



A student's journal entry of "I notice, I wonder, it reminds me of " activity





Journal pages of a student's "Curiosity Mapping" activity

Students could undertake critical thinking and nature observation and connect it to scientific concepts. In Nungambakkam boys, children could connect the growth and slant of trees to their phototropic movement. Children of all schools could name the physiological parts of trees and insects and use them to identify the species. Debates on what is an insect and what is a spider or what is a tree and a shrub between the children and the facilitators gave space for rich discussions. Another girl in Gandhigramam was interested in linking her observations of trees to their cultural, medicinal, and religious aspects.

Some teachers were enthusiastic learners too during the sessions. Some helped keep order and engagement during the activities. Others accompanied but were uninvolved in holding the space for children's learning.

As part of the activities, the team also observed students and made reflective notes of their experiences while conducting the sessions. The qualitative analysis of observation notes made by educators indicates that when it comes to interpersonal skills, which is one of the qualities being observed, the girls seem to exhibit interpersonal skills more by being interactive, working in groups, and volunteering to help with the activities. Even though the students were not asked to form groups, they would split and form pairs or groups, often sticking to their friends. When anyone was inquisitive, they would communicate with the educators and ask questions to know more.

The observation of the second quality of interest to this programme- curiosity and wonder- shows that when students actively wanted material such as butterfly and tree guides, that action reflected their curiosity. The material also seems to help sustain curiosity as it is distributed at the end of the activities. Questions to educators about the subsequent sessions also showed that students were curious. An indicator of sustained interest and curiosity was when students completed all the required activities in the session on time and submitted their work. Insects as a group seem to be connected to curiosity as being something that elicits wonder. Moths, beetles, and butterflies garnered interest. Language was a barrier to expressing curiosity and wonder, but students tried to come up with terms or questions nonetheless. The curiosity chain activity helped students form questions.

There were more qualities being observed, viz. independence, critical thinking, and interconnectedness. It was seen that some students participated in activities better independently rather than in a group. When needed they would seek assistance from educators or cross-check their answers to questions to see if they were correct and ask for more information. Most of those who were independently trying to do the activities also

showed excitement for those activities. They would also choose to sit alone separately from the rest of the students and write observations in their journals. Without the educators prompting them, some female students from one of the schools not only participated in the activities but volunteered to be a part of the game designed around the butterfly field guide.

Students' circles of friendship in a school seem to have a strong influence on their performance as well as critical thinking abilities. Some students could observe even the most intricate details and pose questions. For some who couldn't get started with the curiosity mapping activity, we asked what questions they'd ask a stranger or think of when they see a stranger in the distance. It helped them ask questions like their name, age, height, what they were wearing, who they lived with, and where they were from, some of which translated well to trees. When we introduced a little bit of association of the tree with other organisms, they started to think about what all creatures eat the fruit. Relational thinking was developed, but only towards the end of the activities. Many of the students were very keen on learning the written spelling and language to be able to write the questions. They came up with keen observations. For instance, they asked why the leaves of the False Ashoka tree were drooping rather than standing straight.

Challenges and way forward

One of the main challenges has been to work with the existing system well and create space for students without overwhelming them. There are usually many other events happening in schools which result in children sometimes being distracted or preoccupied. The teachers are too tied with various responsibilities and hence cannot support the activities fully. Additionally, the lack of sufficient reading and writing skills narrows the scope of activities that can be done and the assessment of its impacts. The team tries to work with these challenges and often adapts to situations presented to them.

In the coming term, the team plans to conduct more activities. Over time, the value of involving teachers more in these activities is becoming evident, especially after conducting a teachers' training workshop at IMSc with teachers from 45 GCC schools some of whom are part of this programme. In the future, including a teachers' training programme would benefit the efforts initiated by this project and make it a sustained part of school activities.

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Climate, Biodiversity and People Programme

FIRST TERM REPORT

TIMELINE: August-October 2023

With support from the State Education Department and partnership with the Greater Chennai Corporation, the program will run in 5 government schools.

- 3 Months - 24 Sessions
- 5 Government Schools : Grade 8
- 1.5 Hours each
- 10 Nature Educators

Robinson Park
- Chennai High School, Old washermanpet — 27
- Chennai Urdu High School — 41

Independence Day Park
- Chennai Girls Higher Secondary School, Nungambakkam — 42
- Chennai Boys Higher Secondary School, Nungambakkam — 15

Corporation Park, Beasant Nagar
- Chennai Middle School, Kalakshetra Colony — 22

OUR ACTIVITIES

1. Baseline Survey to understand pre and post-intervention changes in students and **Thiran Thedal (People's Scavenger Hunt)** an icebreaker activity.
2. Tree Walk to acquaint the students with the local ecology and cultivate nature-connectedness.
3. Curiosity mapping to foster curiosity in students, prompting them to inquire about their environment and cultivate the practice of posing questions.
4. I notice, I wonder, it reminds me of To instill a sense of fascination and appreciation for nature among the students.
5. Distribution of resource materials the students were provided complimentary guides and posters to inculcate the habit of observing the environment and local ecology like Butterflies of Chennai, Common Trees of Chennai, Bark survey etc.

HIGHLIGHTS

- In all schools, children requested more sessions or weekly sessions.
- During the activity, children's observation skills could be seen distinctly improving, as is noticeable in their journals
- Children's conservation attitudes and connection to nature has increased.

- Students could undertake critical thinking and nature observation and connect it to scientific concepts.

In the future, including a teachers' training programme would be beneficial for the efforts initiated by this project.

For more details about our work and copy of the full report
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