EFFECTIVENESS OF SINGLE-USE PLASTIC REDUCTION STRATEGIES IN SELECTED SCHOOLS UNDER COCHIN MUNICIPAL CORPORATION

Major Project Submitted to St. Teresa's College (Autonomous), Ernakulam in Partial Fulfilment of the Requirement for the Award of the Post-Graduation of

INTEGRATED M.A. PROGRAMME IN SOCIAL SCIENCE – ECONOMICS

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ABBREVIATIONS

- **SUP** – Single-Use Plastics
- **EPR** – Extended Producer Responsibility
- **HEAL** – Health, Education and Livelihood
- **BMC** – Bhoomithra Sena Club

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CHAPTER – I

INTRODUCTION

1.1 Introduction

India's growing reliance on disposable materials, fast urbanization and rising consumption patterns have made plastic pollution a significant environmental concern. Due to its large population, India produces a significant amount of plastic waste overall, even though its per capita plastic consumption is still lower than that of many developed nations. Plastic waste management is a growing environmental governance issue that calls for institutional and systemic interventions, according to the Economic Survey of India (Government of India, 2023). With a focus on source-level reduction and Extended Producer Responsibility (EPR), the Indian government responded by introducing the Plastic Waste Management Rules, 2016 and enacting a national ban on certain single-use plastic products in July 2022 (Government of India, 2016). However, these regulatory actions still face institutional and behavioural implementation issues.

Single-use plastics (SUPs) are one of the most ubiquitous and persistent environmental challenges of the 21st century. Although there are national bans, awareness drives and strict policy directions, consumption of SUPs in daily life is on the rise and in schools where thousands of students generate plastic waste from food packaging, drinking bottles, covers and other disposable items. As a result there is a need to promote sustainable habits among the students as well as reducing SUP use at the source.

In Kerala, State schools and CBSE schools adhere to Green Protocol guidelines, but the implementation and effectiveness of their SUP reduction startegies differ widely as the strategies of the two educational boards differ. While both educational boards follow government guidelines on environmental protection, the strategies they implement, the resources they possess, and the behavioural practices they encourage vary significantly. Some schools adopt strict bans and structured green protocols, others depend on teacher initiative, student clubs, or externally driven programmes. As a result, the effectiveness of SUP reduction strategies differs widely across institutions.

At the same time, behavioural economics has shown that people do not always respond to information or rules alone. Insights from the World Development Report 2015 and the work of Thaler and Sunstein on "Nudges" highlight that small, thoughtful changes in the environment

such as reminders, visual cues, social norms, and easy alternatives can produce large shifts in everyday behaviour. This perspective is especially relevant for schools, where long-term habits are formed and reinforced.

Given this background, evaluating how different types of schools' design and implement their SUP reduction strategies becomes essential. Do schools rely on awareness or on actual behaviour change tools? Do resource differences influence success? Are eco-clubs, teacher groups, or student volunteers able to influence plastic use patterns? And ultimately: Which strategies actually work, and why?

This study examines how selected schools in Kerala implement single-use plastic reduction strategies under the Green Protocol, and assesses their effectiveness in influencing student behaviour. By integrating administrative practices with behavioural insights, the study aims to provide a clearer understanding of what truly reduces SUPs in school environments and what remains only on paper.

There is still limited systematic evaluation of the effectiveness of single-use plastic reduction strategies in school settings, despite growing institutional initiatives and policy attention. Results may be impacted by variations in administrative commitment, behavioural reinforcement systems, and institutional capacity. As a result, it becomes crucial to comprehend both the existence of strategies and their actual effectiveness. This serves as the foundation for the current research problem.

1.2 Statement of the research problem

Single-use plastics (SUPs) remain one of the major contributors to daily waste generation in schools, especially through food packaging, water bottles, carry bags and disposable items. Although the Government of Kerala and various educational boards promote environmental guidelines, many schools still struggle to reduce SUP usage at the source. Schools may have different levels of implementation and effectiveness due to differences in institutional capacity, administrative engagement, and behavioural approaches.

In many cases, the focus remains on awareness campaigns rather than practical behaviour change strategies, leading to limited long-term impact. Systematic research on the implementation Green Protocol in schools and on which strategies are most effective in reducing single-use plastics within institutional settings remains limited. This study aims to bridge the gap by analyzing the strategies adopted by selected schools under Cochin Municipal

Corporation, assessing their effectiveness, and identifying behavioural and institutional factors that influence effective implementation.

1.3 Scope of the study

The study explores different strategies employed by selected schools under Cochin Municipal Corporation to minimize single-use plastics at the source by examining school policies, student behaviour, availability of alternatives, and the role of teachers, eco-clubs and administrative bodies in promoting sustainable practices. The study focuses on the implementation of Green Protocol strategies and evaluates their effectiveness in influencing behavioural change among students.

The scope is limited to the selected schools functioning under Cochin Municipal Corporation and strategies related specifically to single-use plastic reduction only and does not extend to broader waste management systems or recycling processes.

1.4 Objectives of the study

The objectives of the study are:

1. To examine the existing Green Protocol related facilities, groups, and practices in schools.
2. To study the implementation of single-use plastic reduction strategies adopted by schools under the Green Protocol.
3. To assess the effectiveness of these strategies in influencing students' behaviour and reducing single-use plastic use.

1.5 Research Methodology

This current study uses a descriptive and analytical research design to examine the implementation and effectiveness of Green Protocol strategies for reducing single-use plastics (SUPs) in selected schools in Cochin Municipal Corporation.

The study is based on both primary and secondary data. Primary data was collected from 60 selected schools through a structured schedule designed in accordance with the objectives of the study. The primary data for the present study were collected under the *Paristhithikam Project* of the District Office of Environment and Climate Change (DOECC) implemented by the Bhoomithra Sena Club of the college. The initiative is aligned with Malinya Muktha Nava

Keralam Programme jointly implemented by the HEAL (Health, Environment and Livelihood) project of Cochin Municipal Corporation and the Haritha Keralam Mission.

The overall population is known to us. The total number of schools in Cochin Municipal Corporation is 132. The sample size 60 is selected using simple random sampling method. The list of sampled schools is presented in Appendix – I.

The field survey questionnaire consisted of three sections. Section A and Section B were administered to teachers to assess the existing green facilities and the implementation of various plastic reduction strategies. Section C was administered to one student from each school to understand student perception and behavioural change with respect to Green Protocol practices.

Secondary data was collected from books, research articles, government reports, policy documents, and relevant online sources to support the conceptual and theoretical framework of the study.

The collected data was analyzed using percentage analysis and mean score calculation. Tables and diagrams were used for systematic presentation and interpretation of the findings.

1.6 Terms and Concepts

Important terms and concepts used in the study are given below:

1.6.1 Single-Use Plastics (SUPs):

Single-use plastic refers to plastic products that are designed to be used once and discarded immediately after use, including items such as plastic carry bags, packaging materials, straws, disposable cutlery and similar items as defined under the Plastic Waste Management Rules, 2016 (Government of India, 2016)

1.6.2 Extended Producer Responsibility (EPR):

Extended Producer Responsibility is a policy approach under which producers are made responsible for the collection, recycling, and environmentally sound management of post-consumer plastic waste generated from their products, as mandated under the Plastic Waste Management Rules (Government of India, 2016).

1.6.3 Behavioural Nudges:

Behavioural Nudges refers to subtle modifications in the decision-making environment that influence behaviour in a predictable way without restricting freedom of choice, as explained by Thaler and Sunstein (Thaler & Sunstein, 2008).

1.6.4 Green Protocol:

Green Protocol refers to an institutional framework promoted by the Government of Kerala, aimed at minimizing waste generation, particularly single-use plastics, in public institutions and events through reduction-oriented practices, behavioural reinforcements and environmentally sustainable alternatives (Government of Kerala, 2018).

1.6.5 Waste Hierarchy:

Waste Hierarchy is a framework used in the waste management that ranks strategies based on the order of environmental preferences, mainly prioritizing reduction first, followed by reuse, recycling, recovery and disposal. It emphasizes source-level waste minimization as the most sustainable approach (Ellen MacArthur Foundation, 2016).

1.7 Scheme of the study

Chapter I includes introduction, statement of the research problem, scope of the study, objectives of the study, research methodology, scheme of the study and limitations of the study.

Chapter II includes the literature review related to behavioural interventions, policy frameworks, and institutional approaches to single-use plastic reduction.

Chapter III presents the theoretical and institutional framework of single-use plastic reduction. It explains the waste hierarchy, policy approached, behavioural perspectives, the Indian legal framework and the role of Green Protocol in selected schools.

Chapter IV deals with data analysis and interpretation based on primary data collected from 60 selected schools. The findings are presented using percentage analysis and mean score calculations based on the objectives of the study.

Chapter V presents major findings, conclusions, suggestions and scope for future research derived from the analysis.

1.8 Limitations of the study

Due to time constraints, all the schools under Cochin Municipal Corporation cannot be covered. Hence study is limited to 60 schools. The study does not involve direct measurement of the

actual volume of single-use plastic waste generated or reduced in schools and relies instead on reported practices and perceived effectiveness. The findings are based on responses provided by teachers and one student from each school and therefore reflect their perceptions. Only one student respondent was selected from each school, which may not fully represent the perspectives of the entire student population. The responses are self-reported and may be influenced by response bias or social desirability bias. The study focuses only on single-use plastic reduction strategies under the Green Protocol and does not examine broader waste management or recycling systems.

CHAPTER – II

REVIEW OF LITERATURE

2.1 Introduction

This chapter examines the major research, studies and theories that have influenced our current understanding of this subject. It summarizes the findings of earlier researchers, identifies the gaps that still require attention, and draws attention to the significant trends and discussions. The chapter establishes a strong basis for the current study and demonstrates how it relates to the larger academic field by reviewing this body of prior research.

2.2 Review of Literature

2.2.1 Literature Review on Institutional and Structural Frameworks for Plastic Reduction

Jambeck et al. (2015) in their study, by modeling leakage into oceans using national trash generation data, population density, and waste management quality, offer a groundbreaking empirical estimate of land-based plastic garbage entering the marine environment. Inadequate collection and disposal methods are major contributors to environmental plastic pollution, particularly in lower-income coastal communities. The article assesses the problem's magnitude (millions of tonnes annually). This baseline data demonstrates that lowering single-use plastics (SUPs) necessitates significant improvements in waste management infrastructure, targeted policies in high-leakage locations, and changes in consumer behaviour. The report emphasizes that better waste management infrastructure must be paired with upstream reduction. Jambeck et al. suggest that use-phase interventions (such as consumer nudges and prohibitions) will be less successful for behaviour focused initiatives unless they are combined with infrastructure and enforcement that make sustainable choices possible and their environmental benefits genuine.

Ellen MacArthur Foundation (2016) through *The New Plastics Economy* promotes a shift from liner "take-make-dispose" model to a circular plastics economy by offering a systems-oriented study of the world's plastic consumption. The extensive use of single-use packaging, which is used briefly but remains in the environment for decades, is one of the fundamental inefficiencies in the existing plastics system that the paper highlights. It makes the case that plastic pollution is a structural problem with roots in consumer behaviour, market incentives, and product design rather than just a waste management issue. The methodology put forward

in the paper focuses on removing needless plastic packaging, developing reusable and refill-based business models, and making sure that the residual plastics are made with circularity in mind. It highlights that producers, legislators, and consumers must work together to effectively reduce plastic.

Geyer et al. (2017) in their study offer the first thorough worldwide evaluation of plastic manufacturing consumption, and disposal, detailing the total amount of waste produced and manufactured plastic since the start of industrial production. According to the report, just a small percentage of plastic has ever been recycled; the majority has ended up in landfills or the environment. The results show that single-use plastics account for the majority of plastic trash produced, highlighting the fact that short product lifespans play a significant role in environmental buildup. The authors contend that because of material deterioration, financial limitations, and the world's limited capacity for recycling is insufficient to solve the plastic pollution problem. Rather, the report emphasizes the need for upstream measures including cutting back on plastic manufacture, restricting single-use applications, and redesigning products to increase their useful life.

European Commission's Single-Use Plastics Directive (EU) 2019/904 outlines regulatory measures targeting particular high-impact single-use plastic products through prohibitions, consumption reduction strategies, and enhanced producer accountability standards. The European Union's Single-Use Plastics Directive is a comprehensive legal response to plastic pollution. The directive aims to address both product availability and post-consumption waste management, and it is based on evidence that identifies specific items as significant contributors to marine litter. The regulation recognizes the behavioural aspects of plastic consumption by combining market limits with labeling requirements and awareness campaigns. Early implementation evaluations indicate that, when enforced and accompanied by workable substitutes, regulations can lessen the distribution of some single-use plastic products. However, issues like consumer adaptability, unequal implementation among member states, and substitution impacts have also been noted.

Pew Charitable Trusts & SYSTEMIQ (2020) in *Breaking the Plastic Wave* collaborated to publish the report Breaking the Plastic Wave, which offers a thorough systems-level analysis of global pollution and assesses various interventions strategies targeted at lowering plastic leakage into the environment. The paper looks at the whole plastics value chain, from production and consumption to waste management and leakage, using comprehensive data

modeling and scenario analysis. It illustrates how, under normal circumstances, plastic pollution is expected to rise significantly over the ensuing decades, mostly due to the ongoing expansion of single-use plastic products and inadequate waste management systems. While stressing that no single measure is adequate, the research finds source reduction as a critical leverage point. It suggests integrated approaches that incorporate behaviour modification, policy reform, infrastructure development, reduction and reuse models. The study comes to the conclusion that systemic change, not discrete measures, is necessary for the long-term decrease of plastic pollution.

The UNEP Life Cycle Initiative report (2021) used Life-cycle assessment (LCA) to investigate effects of single-use plastic goods and their substitutes. The study questions the notion that substituting plastics inevitably lessens environmental damage, pointing out that substitutes like paper or glass may also have major production and disposal effects. The results demonstrate that addressing plastic pollution requires more than just material substitution. Environmental performance is greatly impacted by user behaviour, including reusability, frequency of use, and appropriate disposal techniques. The study comes to the conclusion that in order to effectively reduce plastic, behaviour change programs that encourage responsible consumption and waste management must be integrated with life-cycle thinking.

2.2.2 Literature Review on Policy Approaches and Implementation Strategies for Single-Use Plastic Reduction

Thaler and Sunstein (2008) in their book Nudge examine how well-thought out, minor environmental adjustments, or “Nudges” can influence people to make better choices without limiting their freedom. The book makes the case that while traditional policies that rely on prohibitions or strict regulations frequently encounter opposition, behavioural economics demonstrates that subtle cues, defaults, or framing can successfully mold habits. The Nudge theory recommends tactics such as making reusable options the default or easier choice in order to reduce single-use plastics. Encouraging ecofriendly behavior through social norms and remainders, creating choice architectures that emphasize environmentally friendly options. Thaler’s work emphasizes that understanding human behavior and gently guiding it toward sustainable choices is more important for successful SUP reduction than merely enforcing strict regulations. This strengthens the study’s emphasis on behavior-based strategies.

World Development Report (World Bank, 2015) titled Mind, Society and Behavior challenge the conventional wisdom that people always behave rationally by highlighting the critical role that human behavior plays in influencing policy outcomes. It highlights how decisions are frequently instinctive, socially influenced, and driven by mental models- deeply rooted ways that people perceive the world. This means that in order to reduce single-use plastics, policies must address the subtle psychological factors that influence behavior in addition to stringent regulations. Interventions can push people toward long-lasting change by creating choice environments that make sustainable options simpler and more enticing and by utilizing social norms that promote eco-friendly behaviors. It does, however, issue a warning that behavioral strategies might not be sufficient to get past structural obstacles like lack of infrastructure or economic interests. These findings provide as a foundation for investigating behaviour-oriented strategies to cutting back on single-use plastics.

Niazi et al. (2021) in their study stress that policy changes and technical fixes by themselves are insufficient without equivalent changes in human behaviour It highlights the extent to which plastic is embedded in Indian daily life, making it especially challenging to change in the absence of institutional and social structures. The paper also argues that an intervention strategy that includes multiple levels (consumer, educational, manufacturer) is required for behaviour change and identifies schools and other community institutions as key sites for the establishment of long-term behavioural norms. It concludes that in order to effectively reduce plastic in India, behaviour change must be integrated into larger circular economy plans.

Goswami and Roy (2024) in their study examine whether single-use plastics (SUP) prohibitions are effective in reducing plastic use on their own, concluding that although prohibitions send a clear policy signal, they often do not achieve sustained behavioural change because of the lack of enforcement, public opposition, convenience-driven consumption and the availability of unofficial alternatives, reflecting the deeply entrenched nature of plastic consumption in daily habits and social norms and that combining behavioural modification strategies with prohibitions is essential to achieve success. Awareness campaigns, community involvement, social norm reinforcement and institutional support are important strategies for promoting compliance and acceptability.

2.2.3 Literature Review on Behavioural Effectiveness and Intervention Outcomes

Allison et al. (2022) in their study examines the factors impacting plastic waste reduction behaviour and the efficacy of different intervention through a meta-analysis. The authors

compare the effects of informative campaigns, financial incentives, legislative actions, and integrated approaches by combining results of several empirical investigations. According to the findings, one-dimensional interventions like awareness campaigns usually result in little or no behavioural change. On the other hand, multi-component strategies that incorporate policy measures, infrastructure support, social norm reinforcement, and education show better and longer-lasting results. The study highlights that when people are supported by institutional and structural frameworks that enable sustainable choices, behavioural transformation is most successful.

Nuojua et al. (2024) in their study methodically investigate behavioural treatments targeted at lowering plastic consumption across various geographic and socioeconomic contexts, Nuojua et al. perform a worldwide scoping review. The review identifies a variety of treatments, such as information campaigns, financial incentives, social norm messages, and regulatory actions, by combining the results of several empirical investigations. The authors discover that because they neglect to address the social pressures and habitual consumption patterns that support plastic use, interventions that only focus on information and awareness typically result in limited or transient behavioural change. The study also emphasizes that context-specific behavioural treatments work best when paired with structural support, such as institutional backing and the availability of alternatives. Sustainable behaviour is found to be significantly influenced by social norms, peer pressure, feedback systems, and nudges. The necessity of context-specific, empirically supported behavioural methods are emphasized by the authors.

Rabiu et al. (2024) in their study look at how plastic consumption is not the product of isolated individual choices but rather is ingrained in daily social practices. The project employs a living lab approach in which people actively experiment with alternatives to using plastic in real-life settings. The authors contend that traditional policy instruments and awareness efforts frequently fall short because they focus on individuals rather than the social practices, material arrangements, and cultural norms that support plastic consumption. The study's conclusions show that when consumers actively participate in co-creating solutions and when sustainable alternatives are smoothly incorporated into daily routines, behavioural change is more successful and long-lasting. In order to lessen reliance on single-use plastics, the study emphasizes the significance of group participation, peer pressure, and shared accountability. Rather than depending only on legislation or awareness, Rabiu et al. suggest that eliminating single-use plastics necessitates a participatory and practice-oriented strategy.

Oludoye and Supakata (2024) analyze pro-environmental behaviors in Thai urban and rural communities with respect to the reduction of single-use plastics and how economic, social, environmental and convenience considerations affect their propensity to use less plastic, including differences in awareness, access to alternatives and behavioural consistency between urban and rural settings. The results show that while cost and availability influence short-term decisions, environmental ideals and perceived social responsibility contribute to long-term plastic reduction strategies. The study concludes that successful public policy aimed at promoting consistent pro-environmental behaviour across different community situations should integrate behavioural insights with institutional support mechanisms.

WWF India survey (2024) conducted by Kamal Model Senior Secondary School aimed to assess students knowledge, attitudes and daily behaviour regarding plastic use and found out that while students had a high level of awareness about plastic pollution and its impact on the environment, this knowledge did not necessarily translate into sustainable behaviour, creating an “attitude-behaviour gap” in the educational setting. The paper also discusses how school-based interventions such as Eco-clubs, student-led campaigns, waste audits and participatory learning activities can help bridge this gap and that when students are engaged in decision-making and when sustainable behaviour are reinforced consistently in the institutional context, behavioural change is more effective.

CHAPTER III

CONCEPTUAL, POLICY AND INSTITUTIONAL FRAMEWORK FOR SINGLE-USE PLASTIC REDUCTION

3.1 Introduction

Plastics are now an important aspect of modern life because of their affordability, durability and adaptability. However, there is now a significant environmental concern due to the quick rise in the use of single-use plastics (SUPs). SUPs are intended to be used just once before being thrown away, in contrast to sturdy plastic products that are intended for repeated use. Large amounts of waste, little recovery value, and serious environmental harm result from this. Their use in homes, businesses and public institutions is still increasing despite detrimental effects on ecosystems, public health and waste management systems.

Reducing SUP consumption has proven challenging, despite the fact that most people are aware of the negative effects plastic pollution has on the environment. It has not been sufficient to merely raise awareness or enact regulations. Convenience, accessibility and ingrained consumption patterns are closely associated with the sustained use of SUPs. As a result of this, the problem is behavioural rather than just informational.

The waste hierarchy, which prioritizes reduction, reuse, recycling, recovery and disposal is emphasized in waste management policies at both the national and international levels. Since it stops waste from being produced at the source and lessens the strain on downstream management systems, reduction is regarded as the most sustainable strategy. The short lifespan and limited recyclability of single-use plastics make this principle even more crucial.

As a result of this, governments have implemented a number of legislative measures to decrease the use of SUP. These include financial tools like fines or levies, deposit-refund schemes, regulatory prohibitions on specific plastic products, and Extended Producer Responsibility (EPR) SYSTEMS. Although awareness campaigns are a component of these initiatives, studies continually demonstrate that awareness by itself does not ensure long-term behavioural change.

This restriction is largely due to the fact that plastic consumption frequently happens out of habit, particularly among youth and students. Carrying disposable items, plastic bottles or packaged food is often instinctive rater than a deliberate choice. Effective reduction techniques therefore increasingly concentrate on modifying behaviour through useful interventions like visual cues, reminders, social norms and the availability of reusable alternatives.

The Environment (Protection) Act, the plastic Waste Management Rules, and the Solid Waste Management Rules are some of the laws that governs environmental governance in India. These frameworks set reduction as a primary goal and offers a legal foundation for single-use plastic regulation. States within this national structure modify and execute policies in accordance with their administrative settings.

State-level institutions in Kerala such as the Suchitwa Mission and the Haritha Keralam Mission serve as intermediaries to translate policy into action. The Green Protocol serves as an institutional mechanism to reduce the use of plastics in public spaces by a combination of rules, behavioural reinforcements and administrative practices.

School is an especially important context for single-use plastic reduction strategies because schools are structured environments that shape and reinforce habits on a daily basis, and schools can influence behaviour through formal rules s well as behavioural interventions. The present study explores how schools implement Green Protocol measures and how these influence student behaviour.

3.2 Reduction within the Waste Hierarchy

The waste hierarchy, an internationally recognized paradigm that ranks acts according to their environmental efficacy, is frequently the foundation of approaches to controlling plastic trash. Reduction is at the top of the hierarchy, with reuse, recycling, recovery, and disposal coming in last. This framework represents the knowledge that managing garbage after it has entered the system is less economical and sustainable than preventing waste formation.

Figure 3.2 Waste Hierarchy showing preferred order of waste management practices

Source: Clean Management (n.d.)

Reduction is especially important when it comes to single-use plastics because they are made for quick disposal and brief use. Once produced, single-use plastic garbage puts strain on disposal facilities, recycling infrastructure, and collection systems – many of which are already overburdened. Contamination, low recovery value, and the technological challenges of processing some plastics – particularly thin and multi-layered materials – limit recycling, despite its importance. Because of this, a significant number of single-use plastics eventually wind up in landfills or the environment.

Reduction is significantly different from downstream waste management techniques. Reduction tackles the issue at its root by preventing plastic from entering cycles of consumption, whereas recycling and disposal concentrate on decreasing the environmental impact of garbage. Reduction directly lowers the amount of waste produced and lessens reliance on waste processing facilities by discouraging the use of disposable plastics and encouraging alternatives.

Therefore, the focus on reduction is essential to sustainable plastic management, especially in institutional contexts like schools. Food packaging, bottles, and event-related materials are among the predictable and recurrent types of plastic garbage that schools produce. Instead of depending only on segregation or disposal methods, institutions can minimize waste generation in these situations by focusing on reduction through policies, alternatives, and behavioural norms.

Reduction is preferred in policy frameworks since it takes behavioural and environmental factors into account. Reduction urges people to reevaluate their regular consumption habits while also minimizing ecological harm. Prioritizing reduction causes focus to move from controlling waste outputs to changing behaviours and routines that result in waste production. For educational institutions, where long-term attitudes and behaviours towards sustainability are created, this change is particularly crucial.

Therefore, putting reduction at the center of single-use plastic policies offers a solid conceptual basis for assessing institutional behaviours. The analysis of how schools implement and maintain plastic reduction measures in practice is framed by the understanding that reduction is the most preferred approach within the waste hierarchy. This understanding sets the stage for the examination of institutional roles, behavioural interventions, and policy tools in later sections.

3.3 Policy Approaches to Single-Use Plastic Reduction

To combat the environmental effects of single-use plastics, governments all around the world have implemented a variety of legislative strategies. To cut down on plastic consumption, most nations use a mix of institutional, economic, and regulatory tools rather than just one. These methods acknowledge that convenience and behavioural patterns, in addition to availability and cost, affect the usage of single-use plastics.

The implementation of legislative prohibitions and limitations on particular single-use plastic products is one popular strategy. These prohibitions are intended to directly restrict the manufacture and use of plastics that are thought to be detrimental to the environment, especially those that have a high potential for littering and are difficult to recycle. Although prohibitions transmit a clear policy message, their efficacy frequently hinges on the availability of reasonably priced substitutes and reliable enforcement methods.

Economic tools have been used in addition to prohibitions to deter the use of single-use plastics. Single-use plastics become more expensive due to the pricing mechanisms like fees on plastic carry bags or throwaway items, which affects customer choice. Following the implementation of such fees, a number of nations have reported decreases in the usage of plastic, suggesting that price signals can have a significant impact on changing consumer behaviour.

The deposit-refund system is another policy tool that is being used more and more in some areas, especially for plastic bottles and containers. Customers pay a little extra fee at the time

of purchase under this arrangement, which is reimbursed when the used item is returned for recycling. While deposit-refund schemes which combines financial incentives with behavioural motivation is frequently utilized in nations like Germany to increase collection and recycling rates, pricing methods like plastic bag taxes have been implemented in a number of European countries.

The concept of Extended Producer Responsibility (EPR) has become more prominent in national policy frameworks. EPR transfers accountability for managing plastic trash from consumers and government agencies to manufacturers, importers, and brand owners. EPR seeks to promote design modifications, cut down on superfluous packaging, and enhance recycling systems by holding manufacturers responsible for the post-consumer phase of plastic items.

Although the breadth and design of various policy measures vary, they all share the premise that awareness efforts alone are not enough to reduce the consumption of single-use plastics. When combined with institutional capacity and behavioural interventions, bans, price mechanisms, deposit-refund schemes, and producer responsibility frameworks function well. In national, state, and institutional contexts, including educational institutions like schools, these methods offer the policy framework that reduction tactics are conducted against.

3.4 Awareness, Behaviour, and the Limits of Regulation

In order to reduce the use of single-use plastics, environmental policies and educational programs have long placed a strong emphasis on raising awareness. Schools frequently run awareness campaigns, programs, and guidelines emphasizing the detrimental effects of plastic on the environment and human health. However, a number of studies show that raising knowledge does not always lead to long-term behavioural change, especially when it comes to regular consumption habits.

Behavioural economics research has shown that people frequently make decisions based more on routines, habits, and contextual cues than on conscious thought. The *World Development Report (2015)* emphasizes that social norms, cognitive constraints, and habitual patterns impact human behaviour, which explains why information-based initiatives by themselves often fail to bring about long-lasting change. This realization is particularly pertinent in institutional contexts like schools, where daily routines have a significant impact on behaviour.

This viewpoint is also supported by research on teenage environmental behaviour. According to research on This viewpoint is also supported by research on teenage environmental behaviour. According to research on young people's attitudes and behaviours regarding the environment, awareness needs to be bolstered by supportive surroundings, institutional reinforcement, and peer pressure in order to result in consistent action (Productivity Council, 2021). Environmentally conscious behaviour frequently stays symbolic rather than habitual in the absence of such support.

Similar to this, *Thaler and Sunstein's Nudge theory* emphasizes how minor, thoughtfully planned modifications to the choice environment can have a big impact on behaviour without the need for stringent regulations or enforcement. By lowering effort and dependence on self-control, nudges including visual cues, default settings, reminders, and readily available alternatives assist people in making better decisions. These behavioural strategies work especially well at forming habitual behaviour, which is essential for lowering students' usage of single-use plastics.

Additionally, behavioural interventions work best when paired with institutional behaviours, according to empirical research on plastic waste management. Research on plastic waste and environmental governance in poor nations has shown that when monitoring mechanisms, institutional accountability, and well-organized alternatives to plastic use are added to awareness efforts, behavioural change is more sustainable (DAC, 2017; CDS, 2019).

This behavioural approach becomes particularly important in educational settings. Instead of making intentional decisions, students frequently use single-use plastics out of habit or convenience. Strategies that go beyond knowledge and ban to change routine behaviours are needed to address this. By incorporating plastic reduction into everyday routines, visual signals, frequent reminders, supervision, the availability of non-plastic substitutes, and positive reward help turn behaviour into habit over time.

Consequently, awareness is not enough on its own, even if it is still a crucial part of single-use plastic reduction measures. To achieve long-term reductions, awareness must be combined with behavioural understanding and institutional support. This knowledge offers the theoretical basis for analyzing institutional and behavioural tactics used by schools in accordance with the Green Protocol and evaluating how well they affect student behaviour.

3.5 Indian Legal and Policy Framework for Single-Use Plastic Reduction

India's legal and regulatory framework, which is centrally structured, governs the country's approach to waste management and environmental protection. States operate within this framework, putting context-specific policies into practice. State-level initiatives in India are governed by national laws, regulations, and guidelines created by the central government because environmental governance is not entirely federal in nature. Thus, it is important to consider the reduction of single-use plastics in establishments like schools in the context of this larger Indian legal and regulatory framework.

The overarching law environmental regulation in India is the Environment (Protection) Act, 1986. The Act gives the central government the authority to regulate activities that endanger the environment and to take action to protect and improve the quality of the environment. The legal foundation for regulating plastic trash is provided by the specific waste management regulations and notices issued under this Act.

Among these, the Solid Waste Management Rules and the Plastic Waste Management Rules are important legislative tools that deal with plastic pollution. These regulations place a strong emphasis on responsible management of plastic trash, waste generation minimization, and source segregation. Because of their short lifespan, minimal recycling capability, and significant contribution to litter and environmental deterioration, single-use plastics are considered a major concern. As a result, the regulations aim to control the production, distribution, and disposal of plastic items while prioritizing reduction.

The implementation of Extended Producer Responsibility (EPR) is a key component of India's plastic waste regulation. EPR holds manufacturers, importers, and brand owners accountable for collecting and managing plastic trash from their products in an environmentally responsible manner. EPR seeks to lessen wasteful plastic packaging and improve recycling processes by moving some of the responsibility from consumers and public entities. In an attempt to reduce at the source, government announcements have also designated certain single-use plastic products for phase-out or limitations.

Plastic pollution has been acknowledged as a major contributor to environmental deterioration and climate issues in recent policy talks, including the Economic Survey. India's population size and waste management issues lead to significant plastic pollution, even if the country's per capita plastic usage is still lower than that of wealthy economies. In order to reduce unmanaged and littered plastic waste, the Economic Survey emphasizes the need of the Plastic

Waste Management Rules, 2016, the prohibition on some single-use plastic products starting in July 2022, and the introduction of Extended Producer Responsibility.

The waste hierarchy, which prioritizes reduction above reuse, recycling, recovery, and disposal, Is in line with India's governmental approach. National waste management regulations acknowledge that the extent of plastic contamination cannot be addressed by downstream waste management alone. Research on waste management in developing nations shows that the use of collection and disposal systems without effective reduction strategies results in significant financial and environmental consequences (DAC, 2017).

State governments are in charge of carrying out this national framework. State-level policy documents like the Kerala State Environment Policy and the State Policy on Solid Waste Management serve as guidelines for waste management and plastic reduction policies in Kerala. These regulations place a strong emphasis on source-level reduction, institutional accountability, and decentralized waste management, especially in public institutions.

According to research methods in Kerala, institutional capacity and behavioural compliance are just as important to the success of plastic reduction as regulatory frameworks (CDS, 2019). As a result, specialized organizations and missions that convert state and national policies into operational strategies have been involved. Initiatives like the Green Protocol appear as institutional mechanisms in this policy climate with the goal of lowering single-use plastics by combining organizational practices, behavioural interventions, and regulations.

Reduction is therefore established as a fundamental principle of plastic waste management in India's legislative and policy framework, and it is operationalized in particular settings by state-level laws and organizations. Examining how single-use plastic reduction methods are applied in schools and how they fit with more general national and state sustainability goals requires an understanding of this framework.

3.6 Institutional Framework for Single-Use Plastic Reduction in Kerala

In Kerala, a network of state-level organizations and missions that convert national and state policies into workable programs supports the implementation of single-use plastic reduction measures. Particularly at public institutions like workplaces, schools, and event venues, these institutional processes are essential to operationalizing reduction-oriented goals.

The Suchitwa Mission serves as the States's point of contact for trash management, sanitation, and plastic reduction programs. With a focus on waste reduction and source-level interventions,

it offers local organizations and institutions technical help, coordination support, and monitoring frameworks. Instead of depending just on downstream waste management, the mission encourages practices that minimize the generation of single-use plastics through guidelines, advisories, and program support.

In addition to this function, the Haritha Keralam Mission employs a more comprehensive sustainability-focused strategy that combines trash management with institutional responsibility and public involvement. The mission promotes environmentally conscious methods across industries, decentralized waste management, and behavioural change. It strengthens the policy preference for stopping waste generation at the source by encouraging reduction-focused norms and institutional accountability.

By integrating state policies on plastic reduction into regular organizational and administrative procedures, these institutional structures facilitate their actual implementation. The missions prioritize continuity, monitoring, and institutional ownership over considering plastic reduction as a one-time regulatory assignment. This method acknowledges that constant reinforcement through organizational policies, oversight, and behavioural cues is necessary for sustained reduction.

These institutions have a particularly important function in the context of schooling. Schools are good places to implement reduction-oriented initiatives since they work in organized environments and adhere to state agency rules. Institutional support guarantees that schools be directed in using useful tactics that promote students' long-term behavioural change rather than just being told to follow plastic restrictions.

The operational basis for putting single-use plastic reduction efforts into practice at the local level is thus provided by Kerala's institutional system. The state establishes the framework for the successful introduction, oversight, and maintenance of reduction-focused initiatives – like the Green Protocol – in educational institutions by connecting policy goals with institutional procedures.

3.7 Green Protocol as a Strategy for Single-Use Plastic Reduction

Kerala has implemented the Green Protocol as a major institutional effort to lower the amount of single-use plastic used in institutions and public areas. The Green Protocol, which was introduced as part of the state's larger environmental and waste management measures, aims to reduce trash generation at the source by promoting sustainable alternatives and discouraging

the use of disposable plastics. The Green Protocol places a strong emphasis on prevention and reduction as its guiding principles, in contrast to traditional waste management techniques that mostly concentrate on segregation and disposal.

Institutions are urged by the Green Protocol framework to refrain from using single-use plastic goods, such as single-use cutlery, plastic bottles, decorations, and packaging materials, especially during events, regular business operations, and official functions. The technique focuses on behavioural change by changing routines rather than depending only on enforcement or punishments. The Green Protocol aims to establish environmentally responsible behaviour as the standard in institutional settings by combining regulations with workable alternatives.

The Green Protocol's emphasis on behavioural and organizational interventions is one of its distinguishing characteristics; measures like visual cues, permanent reminders, guidelines for plastic-free events, promotion of reusable alternatives, and institutional monitoring are frequently implemented. These interventions closely align with behavioural insights that emphasize the significance of cues, repetition, and supportive environments in shaping habitual behaviour. The Green Protocol functions through guidance, participation, and collective responsibility rather than imposing strict controls.

The Green Protocol's implementation heavily relies on state-level organizations like the Suchitwa Mission and the Haritha Keralam Mission. These organizations offer institutions implementing the protocol monitoring assistance, awareness materials, and operating guidance. Their participation guarantees uniformity in execution while permitting flexibility to modify procedures in accordance with institutional capacity and circumstances. The viability and sustainability of reduction-focused projects are improved by this institutional support.

The Green Protocol takes on additional significance in educational institutions, especially schools. Schools are places where daily behavioural patterns are developed and reinforced. Schools adopt Green Protocol standards to execute strategies including banning plastic-wrapped food, encouraging reusable containers, limiting plastic use during festivities, and putting up conspicuous reminders throughout campus. These methods facilitate students' gradual internalization of plastic reduction standards by combining behavioural cues with regulatory components.

As a result, the Green Protocol serves as an integrated reduction strategy that incorporates institutional regulations, behavioural treatments, and participatory practices rather than just a

collection of prohibitions. The Green Protocol offers an appropriate framework for assessing how schools operationalize single-use plastic reduction programs in practice by emphasizing source-level reduction and habit building. An essential part of the current study is evaluating its implementation, which enables an evaluation of both institutional commitment and behavioural outcomes.

3.8 Implementation of Single-Use Plastic Reduction Strategies in Schools

Due to their organized settings, consistent schedules, and impact on student conduct, schools are essential institutional settings for putting single-use plastic reduction strategies into practice. Schools are good places to translate policy objectives into day-to-day action because, in contrast to larger public contexts, they permit consistent reinforcement of rules, practices, and behavioural cues. Schools use a variety of tactics to cut single-use plastic usage at the source within the framework of state-level programs like the Green Protocol.

Reduction strategies are usually implemented in schools using a combination of behavioural interventions, practical alternatives, and regulatory actions. Regulations include limiting the use of plastic at school events and celebrations, prohibiting the bringing of food products wrapped in plastic, and discouraging the use of single-use bottles and utensils. These regulations provide forth precise guidelines for appropriate behaviour in educational settings.

Schools use a variety of behavioural approaches to support plastic reduction efforts in addition to rules. Students are constantly prompted to adhere to plastic-free standards by visual reminders, signs, announcements, and instructor supervision. Repetition of these cues in the classroom facilitates the integration of reduction techniques into everyday routines, progressively changing behaviour from conscious compliance to habitual action.

Another crucial component of implementation is offering options that are easily available. For events and activities, schools encourage the use of cloth bags, steel or glass containers, reusable water bottles, and non-plastic items. Schools lessen reliance on single-use plastics and diminish resistance to behavioural change by guaranteeing the availability and acceptability of alternatives.

Sustaining implementation also depends heavily on institutional oversight and monitoring. The task of monitoring compliance and prompting involvement is frequently shared by teachers, school administrators, eco-clubs, and student volunteers. Regular observation and informal

monitoring help to detect implementation issues and reinforce expectations, even when formal quantification of plastic reduction may not always be carried out.

The impact and effectiveness of these initiatives differ across schools dependent on institutional capability, administration commitment, and student participation. While some schools focus more on awareness campaigns or specific limitations, others use all-encompassing strategies that regularly incorporate regulations, behavioural cues, and alternatives. These differences emphasize the necessity of methodically investigating the ways in which various schools employ reduction techniques and the ways in which these methods affect student conduct.

Therefore, the practical junction of policy, institutional support, and behavioural change is represented by the adoption of single-use plastic reduction methods in schools. The present study's evaluation focus is based on an understanding of these implementation techniques, which are crucial for evaluating the success of reduction-oriented programs.

3.9 Rationale for Evaluation of Single-Use Plastic Reduction Strategies

Although institutional mechanisms, behavioural treatments, and policy frameworks offer an organized way to reduce single-use plastics, their efficacy cannot be presumed without methodical assessment. Under more general initiatives like the Green Protocol, schools execute a arrange of reduction strategies; however, disparities in student involvement, institutional capacity, and implementation techniques may result in different outcomes. Therefore, assessing these tactics is crucial to comprehending their true effects.

Initiatives focused on reduction frequently depend on behavioural change, which happens gradually and isn't necessarily evident right away. In contrast to infrastructure-based interventions, behavioural techniques need supportive contexts and constant reinforcement to be implemented over time. Without assessment, it is difficult to determine whether observed behaviours are the result of long-term compliance motivated by regulations or oversight or true behavioural change.

Additionally, the absence of comprehensive assessment may mask gaps between policy purpose and on-ground implementation. Although schools may claim to follow reduction principles, there can be wide variations in how much these recommendations affect students' everyday behaviour. Effective techniques, implementation issues, and areas in need of further assistance or adjustment are all identified with the aid of evaluative assessment.

Assessment must take into account both institutional arrangements and perceived behavioural outcomes because reduction techniques in schools include behavioural cues, practical alternatives, and regulatory measures. Examining facilities, monitoring systems, and stakeholder involvement with behavioural responses provides a more thorough understanding of efficacy.

Thus, an evaluation approach is important to analyze how single-use plastic reduction techniques perform in practice within school environments. Establishing this logic enables the accompanying study to transcend beyond descriptive accounts and systematically analyze the extent to which reduction-oriented programs influence behaviour and reduce reliance on single-use plastics. This sets the foundation for the empirical analysis offered in the following chapter.

CHAPTER IV

DATA ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter presents the analysis and interpretation of data collected from 60 schools through a structured schedule. Section A and Section B were answered by teachers to assess the existing green practices and implementation of single-use plastic reduction strategies. Section C was answered by one student from each school to help understand students' perceptions and behavioural changes resulting from these strategies. The data collected has been analyzed using Percentage Analysis and Mean Score Calculations. The findings are organized based on the objectives of the study and presented in a systematic manner using tables and appropriate statistical tools.

4.2 Analysis of Section A – Existing Green Facilities and Practices in Schools

This section examines the existing green protocol facilities and practices in selected schools (n=60), with a focus on institutional facilities, communication mechanisms, and administrative prioritization of green protocol implementation**.**

Table 4.2 Existing Green Protocol Facilities, Groups and Practices in Schools (n=60)

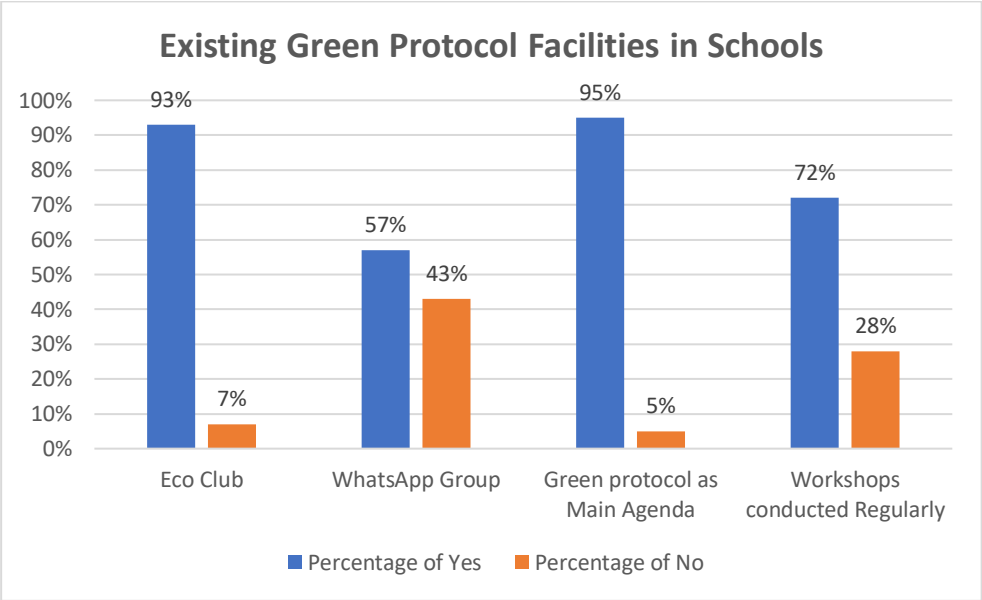
Facility/Practice	Yes	No	Percentage of Yes	Percentage of No
Eco Club	56	4	93%	7%
WhatsApp Group	34	26	57%	43%
Green protocol as Main Agenda	57	3	95%	5%
Workshops conducted regularly	43	17	72%	28%

Source: Primary Data

Table 4.2 shows that 93% of the schools selected have established Eco Clubs, indicating widespread institutional engagement in environmental activities. Majority of schools (95%) consider Green Protocol as their main agenda, reflecting strong administrative commitment. However, only 57% maintain WhatsApp communication groups, suggesting that digital

communication support is comparatively weaker. Additionally, 72% of schools conduct workshops regularly, showcasing moderate implementation of awareness-driven initiatives.

Figure 4.2 Existing Green Protocol Facilities, Groups and Practices in Schools



Source: Primary Data

Figure 4.2 represents the percentage of schools that have adopted various green protocol facilities. The chart highlights the strong functioning of Eco Clubs and the prioritization of Green Protocol as a main agenda, while comparatively lower adoption is observed in regular workshops and digital communication mechanisms such as WhatsApp groups.

Table 4.3 Nature of Responsibility for Green Protocol Implementation (n=60)

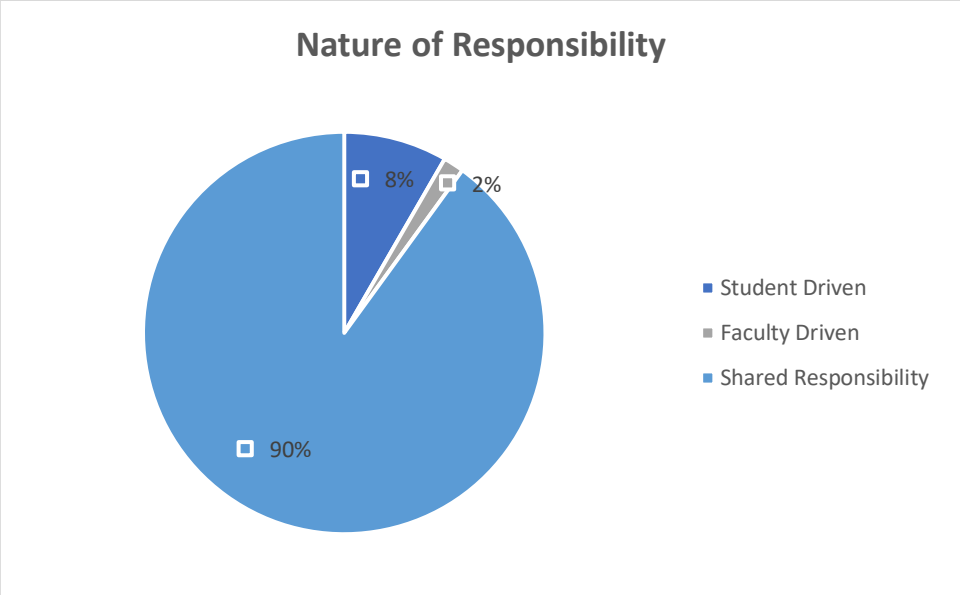
Type of Responsibility for Green Protocol Activities	Frequency	Percentage
Student Driven	5	8%
Faculty Driven	1	2%
Shared Responsibility	54	90%

Source: Primary Data

Table 4.3 shows that majority of schools (90%) consider implementation of green protocol activities as a shared responsibility between the students and faculty. Only 8% of schools identified the initiatives as primarily student-driven, while a very small proportion (2%) viewed them as faculty-driven. This suggests that green protocol practices in most of these schools are collaborative efforts rather than being controlled by a single group. The strong preference

towards shared responsibility shows institutional cooperation and collective accountability in implementing sustainable practices.

Figure 4.3 Nature of Responsibility for Green Protocol Implementation



Source: Primary Data

Figure 4.3 represents how the adoption of green protocol activities is often seen as a shared responsibility between students and faculty. Only a small percentage of schools view it as either student-driven (8%) or faculty-driven (2%), highlighting an effective strategy for green initiatives.

4.3 Analysis of Section B – Strategies Implemented in Schools

This section examines the various strategies adopted by the selected schools to reduce single-use plastics and evaluates their sufficiency.

Table 4.4 Implementation and Sufficiency of SUP Reduction strategies (n=60)

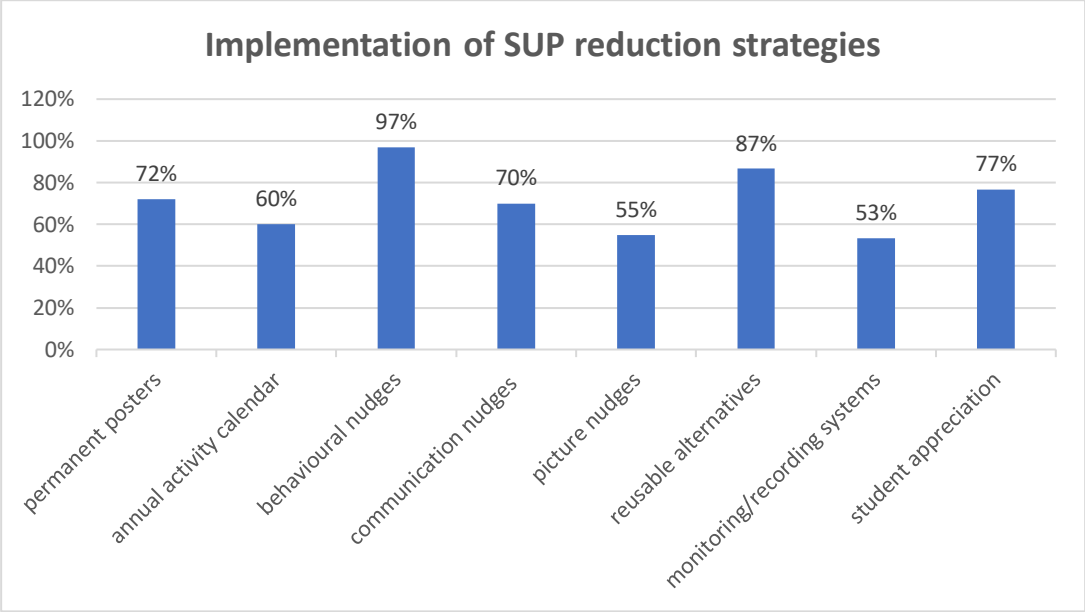
Strategy Implemented	Yes	Yes(%)	No	No(%)	Sufficient(%)	Somewhat Sufficient(%)	Not Sufficient(%)
permanent posters	43	72%	17	28%	56%	42%	2%

annual activity calendar	36	60%	24	40%	61%	39%	0%
behavioural nudges	58	97%	2	3%	67%	33%	0%
communication nudges	42	70%	18	30%	71%	21%	7%
picture nudges	33	55%	27	45%	58%	39%	3%
reusable alternatives	52	87%	8	13%	71%	25%	4%
monitoring/recording systems	32	53%	28	47%	63%	34%	3%
student appreciation	46	77%	14	23%	72%	22%	7%

Source: Primary Data

Table 4.4 shows that behavioural nudges (97%) and reusable alternatives (87%) are the most widely implemented strategies across the selected schools, whereas monitoring systems (53%) and picture nudges (55%) have comparatively lower adoption rates. In relation to sufficiency, student appreciation initiatives (72%), communication nudges (71%) and reusable alternatives (71%) are considered as the most sufficient. However, comparatively lower sufficiency levels are observed in picture nudges (58%) and permanent posters (56%). This indicates that while schools widely adopt plastic reduction strategies, the level of sufficiency differs depending on the nature of the approach used.

Figure 4.4 Implementation and Sufficiency of SUP Reduction strategies



Source: Primary Data

Figure 4.4 represents the level of implementation of various single-use plastic reduction strategies across the selected schools. The chart highlights that behavioural nudges and reusable alternatives have the highest adoption rates, while monitoring systems and picture nudges show comparatively lower levels of implementation.

Table 4.5 Types of Visual Cues used in Schools(n=18)

In addition to implementation status, respondents were also asked to specify the types of visual cues used in their schools.

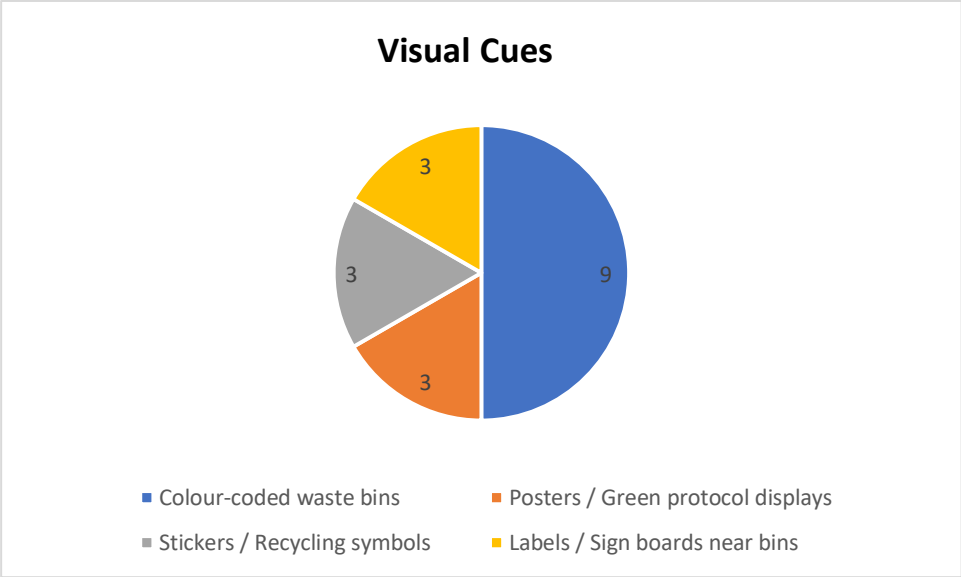
Type of Visual Cue	Frequency
Colour-coded waste bins	9
Posters / Green protocol displays	3
Stickers / Recycling symbols	3
Labels / Sign boards near bins	3

Source: Primary Data

Table 4.5 shows the types of visual cues identified by the respondents. The most commonly observed cue is colour-coded waste bins (9), followed by posters, stickers, and labelled sign

boards (3 each). This shows that schools often rely on visual segregation mechanisms to reduce single-use plastic wastes.

Figure 4.5 Types of Visual Cues used in Schools



Source: Primary Data

Figure 4.5 illustrates the distribution of different types of visual cues used in the selected schools, with colour-coded bins constituting the largest percentage, while posters, stickers, and labelled sign boards represent smaller but equal shares.

4.4 Analysis of Section C – Student Perception and Behavioural Change

This section examines students' perceptions regarding the effectiveness of implemented green protocol strategies and assess the extent of behavioural change influenced by these initiatives.

Table 4.6 Student Perception on Effectiveness of Green Protocol Strategies (n=60)

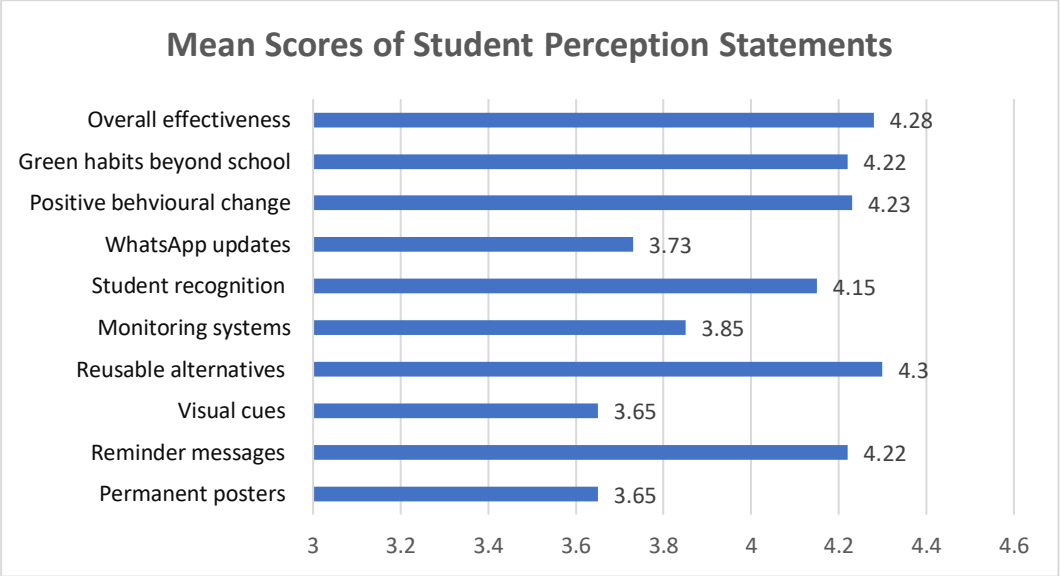
Statement	SD (1)	D (2)	N (3)	A (4)	SA (5)	Mean
Permanent posters help reduce plastic use	4	8	12	17	19	3.65
Reminder messages before events help me follow green protocol	2	1	7	22	28	4.22
Visual cues influence my behaviour	4	7	12	20	17	3.65

Reusable alternatives encourage avoidance of SUP	1	1	8	19	31	4.30
Tracking/monitoring systems reinforce green habits	1	6	13	21	19	3.85
Student recognition/appreciation motivates participation	1	3	7	24	25	4.15
WhatsApp messages/updates improve awareness	4	5	15	15	21	3.73
Strategies have brought positive change in my behaviour	1	2	9	18	30	4.23
I practice green habits beyond school	0	4	10	15	31	4.22
Overall strategies are effective	1	2	7	19	31	4.28

Source: Primary Data

Table 4.6 shows students' perceptions regarding the effectiveness of green protocol strategies using a five-point Likert scale. The mean scores indicate a generally positive perception towards the implemented strategies, with all statements showing values above the neutral midpoint (3.00). Higher mean scores are observed for statements related to reusable alternatives (4.30), overall effectiveness of strategies (4.28), positive behavioural change (4.23), reminder messages (4.22), and practicing green habits beyond school (4.22), suggesting strong agreement among students regarding the impact of these initiatives. Comparatively lower mean scores are observed for statements related to permanent posters (3.65) and visual cues (3.65). However, these values still remain above the neutral midpoint, suggesting moderate agreement rather than disagreement. Overall, the results suggest that students perceive the implemented green protocol strategies as effective in promoting awareness and sustainable behaviour.

Figure 4.6 Mean Scores of Student Perception Statements



Source: Primary Data

Figure 4.6 illustrates the comparative mean scores of student perception statements. The chart shows stronger agreement for reusable alternatives and overall effectiveness, while comparatively lower agreement is observed for permanent posters and visual cues.

To conclude, the analysis indicates that green protocol practices are widely implemented across the selected schools, with varying levels of sufficiency. The findings also reflect shared responsibility in implementation and a generally positive student perception towards the effectiveness of these strategies. These observations provide the basis for the findings discussed in the next chapter.

CHAPTER V

SUMMARY AND CONCLUSIONS

5.1 Introduction

This chapter presents the major findings of the study based on the analysis conducted in the previous chapter. It presents the background of the study, objectives, major findings, conclusions drawn, suggestions and scope for future research.

5.2 Background of the Study

Since single-use plastics have a negative effect on ecosystems, waste management systems and long-term sustainability, their growing use has become a major environmental concern. In order to effectively reduce plastic pollution, institutional commitment and behavioural change are necessary, despite the introduction of numerous national and state-level policies. The Green Protocol is a crucial institutional tool in Kerala for lowering the use of single-use plastics in public establishments such as schools. Evaluating the effectiveness of Green Protocol strategies in educational settings is crucial because schools serve as structured environments where behavioural patterns are developed and reinforced.

The goal of the current study was to assess the effectiveness and implementation of single-use plastic reduction strategies implemented by selected schools under Cochin Municipal Corporation.

5.3 Objectives of the Study

The objectives of the study were:

1. To examine the existing Green Protocol related facilities, groups and practices in schools.
2. To study the implementation of single-use plastics reduction strategies adopted by schools under the Green Protocol.
3. To assess the effectiveness of these strategies in influencing students' behaviour and reducing single-use plastic use.

5.4 Major Findings of the Study

5.4.1 Findings on Existing Green Protocol Facilities and Practices in Schools

- A large section of the selected schools (93%) has Eco Clubs, indicating effective institutional involvement in Green Protocol activities.
- Most schools (95%) consider Green Protocol implementation as a main agenda, reflecting high administrative commitment towards sustainability.
- Only 57% of the selected schools maintain WhatsApp communication groups related to green protocol activities, indicating comparatively lower adoption of digital communication mechanisms.
- Around 72% of selected schools conduct workshops regularly, showing moderate emphasis on awareness-based initiatives.
- Green Protocol implementation is viewed as a shared responsibility in 90% of schools, indicating joint participation between students and faculty rather than being driven by a single group.

5.4.2 Findings on Implementation and Sufficiency of Single-Use Plastic Reduction Strategies

- A significant majority of the selected schools (97%) implement behavioural nudges, making it the most widely implemented strategy.
- Reusable alternatives are adopted in 87% of the selected schools, showing strong focus on reduction at source.
- Student appreciation mechanisms are implemented in 77% of the selected schools, suggesting recognition-based motivation strategies.
- Permanent posters are used in 72% of schools, indicating considerable reliance on awareness-based visual communication.
- Communication nudges are implemented in 70% of the selected schools, showing moderate use of reminder-based behavioural tools.
- Monitoring and recording systems (53%) and picture nudges (55%) indicate comparatively lower levels of implementation in selected schools.
- In terms of sufficiency, student appreciation initiatives (72%), reusable alternatives (71%) and communication nudges (71%) are considered as the most adequate strategies.
- Permanent posters (56%) and picture nudges (58%) show relatively lower sufficiency levels, suggesting that visual methods alone may not be fully adequate in influencing student behaviour.

- Colour-coded waste bins were the most frequently identified type (9) among the schools that reported using visual cues (n=18), followed by posters, stickers, and labelled sign boards (3 each), showing a greater reliance on segregation-based visual mechanisms.

5.4.3 Findings on Student Perception and Behavioural change

- All the statements obtained mean scores above the neutral midpoint (3.00), indicating an overall positive student perception towards Green Protocol strategies.
- Reusable alternatives (Mean = 4.30) recorded the highest mean score, suggesting strong student agreement that availability of reusable alternatives helps in reducing single-use plastics.
- The overall effectiveness of strategies (Mean = 4.28) and positive behavioural change (Mean = 4.23) also recorded high mean values, indicating that students perceive these initiatives as impactful.
- Reminder messages before any events (Mean = 4.22) and practicing green habits beyond school (Mean = 4.22) suggests strong agreement that behavioural influence extends outside the institutional setting.
- Student recognition and appreciation (Mean = 4.15) indicate that motivation-based strategies positively influence participation in sustainable practices.
- Tracking and monitoring systems (Mean = 3.85) and WhatsApp updates (Mean = 3.73) show moderate agreement regarding their effectiveness.
- Permanent posters (Mean = 3.65) and visual cues (Mean = 3.65) obtained comparatively lower mean scores, indicating moderate agreement rather than strong agreement.
- Overall, the findings suggest that behaviour-oriented and participatory strategies show stronger perceived impact in influencing students behaviour compared to awareness-based initiatives.

5.5 Conclusions Drawn

This study examined the effectiveness of various Green Protocol strategies implemented by selected schools in Kerala for reducing single-use plastics. The findings show that the majority of schools have put in place institutional mechanisms like Eco Clubs and reflect a strong administrative commitment to sustainability through shared responsibility models. There are differences in the effectiveness and impact of various strategies used in different schools. When compared to static awareness-based strategies, behaviour-oriented and participatory strategies

have been shown to have a greater impact on student's behavioural change. Additionally, the positive student perception reflected through mean score analysis further indicates that planned and reinforced strategies contribute to reducing reliance on single-use plastics within school environments. Overall, the study indicates that regular behavioural reinforcement, institutional support and policy execution are necessary for an effective reduction in single-use plastics in schools. These results imply that awareness campaigns alone are insufficient to achieve a sustainable reduction in single-use plastics in schools. Students long-term environmentally conscious habits are largely shaped by active institutional engagement, readily available alternatives, and consistent behavioural reinforcement. By integrating these elements, schools can both lower the amount of single-use plastic used on campus and contribute to broader behavioural change beyond the school environment.

5.6 Suggestions

- Schools may strengthen monitoring and recording systems under the Green Protocol, as comparatively lower levels of implementation were observed in this area. Improved monitoring can enhance accountability and ensure consistency in plastic reduction practices.
- Since permanent posters and picture nudges recorded comparatively lower sufficiency levels, greater focus may be given to improving their effectiveness. Visual communication methods may be redesigned to be more interactive and behaviour-oriented.
- Improving digital communication mechanisms such as WhatsApp groups may support stronger and more continuous implementation of Green Protocol strategies, as this area showed comparatively lower implementation among the selected schools.
- Schools may periodically assess gaps between implementation and perceived sufficiency of certain strategies to ensure better alignment between policy objectives and actual outcomes.

5.7 Scope for Future Research

- In order to enable comparative analysis across various districts or municipalities, future research may increase the sample size beyond Cochin Municipal Corporation.
- Students' long-term behavioural changes may be investigated through longitudinal research.

- To support empirical analysis, future research may include quantitative measurements of actual plastic waste generation and reduction.
- Research comparing rural and urban schools could shed more light on contextual variations in implementation.

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APPENDIX - I

FIELD SURVEY QUESTIONNAIRE

SECTION A — GENERAL SCHOOL PRACTICES

This section collects basic information about the school's existing green protocol facilities and systems. The purpose is to understand what structures, groups, and tools are already present before evaluating their effectiveness. (To be answered by Teacher/Coordinator).

1. Does the school have an Eco-Club / Nature Club / Green Action Group?

- **Yes**
- **No**

2. Does the school have a WhatsApp group to promote environment activities

- **Yes**
- **No**

3. Is green protocol or reduction of SUPs a main agenda of your institution?

- **Yes**
- **No**

4. Green protocol activities in your school are mainly:

- **Student-driven**
- **Faculty-driven**
- **Shared responsibility**

5. Are workshops or awareness sessions on sustainability conducted regularly?

- **Yes**
- **No**

SECTION B — IMPLEMENTATION OF SUP REDUCTION STRATEGIES

This section is to be answered by the teacher or the school coordinator in charge of green protocol activities. It assesses whether the key SUP reduction strategies are being implemented in the institution and whether these efforts are sufficient.

1. Does your school display permanent reminders such as posters, notice boards, or wall signs related to SUP reduction?

- Yes / No

If yes: Are these reminders sufficient?

- Sufficient / Somewhat / Not sufficient

2. Does your school maintain an annual activity calendar for sustainability or SUP reduction?

- Yes / No

If yes: Is the activity calendar sufficient and well-implemented?

- Sufficient / Somewhat / Not sufficient

3. Does your school provide behavioural reminders such as announcements, class-to-class messages, or short written notes before events (nudges)?

- Yes / No

If yes: Are these behavioural reminders sufficient?

- Sufficient / Somewhat / Not sufficient

4. Does your school use WhatsApp or similar social platforms to send reminders, updates, or instructions related to green protocol activities (communication nudges)?

- Yes / No

If yes: Is this communication system sufficient?

- Sufficient / Somewhat / Not sufficient

5. Does your school use visual cues such as symbols, stickers, colour markings, or icons near waste bins and refill stations (picture nudges)?

- Yes / No

If yes: Are these visual cues sufficient?

- Sufficient / Somewhat / Not sufficient
- Please give a brief description of the cues

6. Does your school provide reusable alternatives such as glass/ steel bottles, tumblers, or washable plates to reduce single-use plastics?

- Yes / No

If yes: Are these alternatives sufficient in number and availability?

- Sufficient / Somewhat / Not sufficient

7. Does your school record or monitor the use of reusable alternatives (such as registers, checklists, or monitoring sheets)?

- Yes / No

If yes: Is this recording/monitoring system sufficient?

- Sufficient / Somewhat / Not sufficient

8. Does your school recognise or appreciate students who follow green protocols (such as announcements in assembly, certificates, or public appreciation)?

- Yes / No

If yes: Is this recognition sufficient and consistent?

- Sufficient / Somewhat / Not sufficient

SECTION C — STUDENT PERCEPTION & BEHAVIOUR CHANGE

This section gathers students' perspectives on the strategies used in the school. It measures how these strategies influence their awareness, behaviour, motivation, and personal habits regarding single-use plastic reduction.

1. Permanent posters displayed in the school help me remember to reduce single-use plastics.

- **Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree**

2. Reminder messages or announcements before events will help me to follow green protocols.

- **Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree**

3. Visual cues such as stickers, symbols, or colour markings near waste bins or refill stations influence my behaviour.

- **Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree**

4. Reusable alternatives provided by the school encourage me to avoid using single-use plastics.

- **Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree**

5. Tracking systems or monitoring methods used in the school help reinforce my green habits.

- **Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree**

6. Recognition or appreciation given to students who follow green protocols motivates me to take part in sustainable practices.

- **Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree**

7. WhatsApp updates or messages regarding green protocol activities help me stay aware and involved in reducing plastic use.

- **Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree**

8. These strategies have brought positive changes in my behaviour towards plastic usage.

- **Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree**

9. I follow green habits learned at school in my home, neighbourhood, or community events.

- **Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree**

10. Overall, the strategies implemented in my school are effective in reducing plastic waste.

- **Strongly Disagree / Disagree / Neutral / Agree / Strongly Agree**

APPENDIX – II

LIST OF SAMPLE SCHOOLS

1. ACS EMHSS Kaloor
2. GGHSS Mattancherry
3. GHSS Panampilly
4. Sacred Hearts Cmi Public School
5. OLGGHS Palluruthy
6. PIUS GHS Edapally
7. EMHSS Veli, Fort Cochin
8. EMGLPS Veli, Fort Cochin
9. EMCHSS Veli, Fort Cochin
10. St. George's High School Edapally
11. St. Mary's AIGHS Fort Cochin
12. St. John De Britto Anglo Indian High School, Fort Cochin
13. Govt Model Nursery School, Pallimukku
14. Teresa Spinelli Public School
15. CCPLM Anglo Indian Higher Secondary School, Perumanur
16. St. Juliana's Public school
17. St. Thomas CGHSS, Thevara
18. St. Joseph's HS, Chathiath
19. Greets Public School
20. St. Paul's Public School
21. SDPY BHSS Palluruthy
22. GVHSS Govt High School Kunnumpuram
23. St. Louis HS Mundamveli
24. The Delta Study
25. St. Antony's HSS, Kacheripady
26. GLPS Vennala
27. SRV LP School
28. GGHSS Panayapilly

29. GUPS Amaravathy
30. Kendriya Vidhyalaya No.2 (Naval Base)
31. SDPY GNHSS Palluruthy
32. Kendriya Vidhyalaya, Kadavanthra
33. GLPS, Willingdon Island
34. Bhavan's Adarsha Vidyalaya
35. St. Rita's Public School
36. Santa Maria English Medium School
37. SRV GHSS, Ernakulam
38. GHS, EdaCochin
39. GHSS Elamakkara
40. GHS LP School, Mattancherry
41. Govt UPS, Palluruthy
42. St. Albert's HSS
43. Govt HS Willingdon Island
44. GHSS Vennala
45. GHSS LPS, South, Ernakulam
46. Vyasa Vidyalaya
47. HEHMMO HSS Mattancherry
48. Rajagiri Christujayanthi Public School
49. Al Huda Public School
50. Nalanda Public School
51. Govt Girls HSS, Ernakulam
52. LMCCHS CKM, Pachalam
53. Dawn Public School
54. Jnanodayam Public School, EdaCochin
55. GHS Edapally
56. GLPS Central Calvathy
57. Govt UPS Edapally
58. Govt UPS, Thamarapparambu
59. GHSS Central Calvathy
60. Bhavans Vidhya Mandir, Elamakkara

APPENDIX – III

PHOTOGRAPHIC EVIDENCE OF GREEN PROTOCOL IMPLEMENTATION IN SELECTED SCHOOLS

Photo 1 – Used Pen Collection and Recycling Drop Box at Bhavans Vidhya Mandir, Elamakkara

Source: Field Survey (2026)

Photo 2 – Segregated Waste Collection Bins (Paper and Plastic) at GHS, EdaCochin

Source: Field Survey (2026)

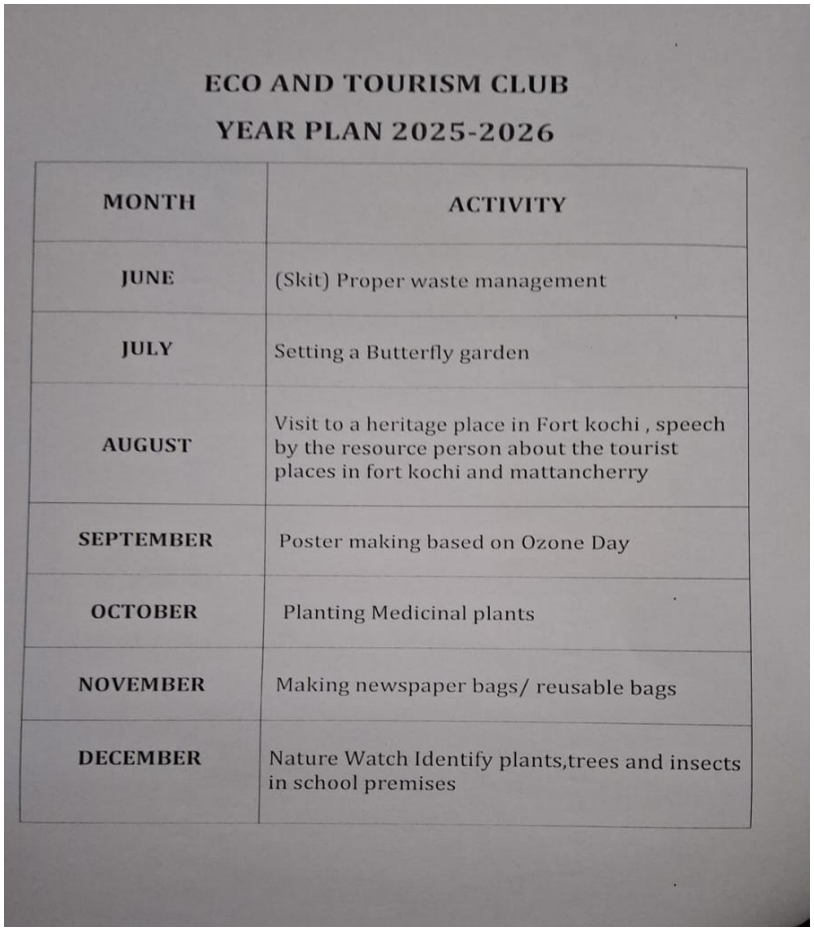
Photo 3 – Use of Reusable Steel Cooking Utensils at PIUS GHS, Edapally

Source: Field Survey (2026)

Photo 4 – Poster making activity promoting Environmental awareness at St. John De Britto Anglo Indian High School, Fort Cochin

Source: Field Survey (2026)

Photo 5 – Eco and Tourism Annual Activity Plan (2025-2026) at St. Paul's Public School



ECO AND TOURISM CLUB

YEAR PLAN 2025-2026

MONTH	ACTIVITY
JUNE	(Skit) Proper waste management
JULY	Setting a Butterfly garden
AUGUST	Visit to a heritage place in Fort kochi , speech by the resource person about the tourist places in fort kochi and mattancherry
SEPTEMBER	Poster making based on Ozone Day
OCTOBER	Planting Medicinal plants
NOVEMBER	Making newspaper bags/ reusable bags
DECEMBER	Nature Watch Identify plants,trees and insects in school premises

Source: Field Survey (2026)