DETERMINANTS OF ENVIRONMENTAL AWARENESS, PRO-ENVIRONMENTAL BEHAVIOUR, CLIMATE CHANGE PERCEPTION AND ATTITUDE TOWARDS SUSTAINABLE DEVELOPMENT AMONG STUDENTS OF KASHMIR VALLEY, JAMMU AND KASHMIR.

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in

Environmental Science

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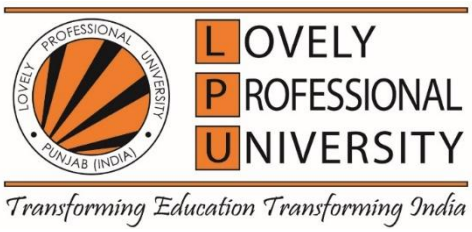
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2026

DECLARATION

I, hereby declared that the presented work in the thesis entitled " **Determinants of Environmental Awareness, Pro-environmental Behaviour, Climate Change Perception and Attitude towards Sustainable Development among students of Kashmir Valley, Jammu and Kashmir.**" in fulfilment of degree of **Doctor of Philosophy (Ph. D.)** is outcome of research work carried out by me under the supervision of **Dr Pratima Wadhwani**, working as Associate Professor, in the School of **Chemical Engineering and Physical Sciences** of **Lovely Professional University, Punjab**, India and co-supervision of **Dr Ab Qayoom Mir,** working as Associate Professor, **Jammu and Kashmir Higher Education Department, Jammu and Kashmir, India**. In keeping with the general practice of reporting scientific observations, due acknowledgements have been made whenever work described here has been based on findings of other investigators. This work has not been submitted in part or in full to any other University or Institute for the award of any degree.



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CERTIFICATE

This is to certify that the work reported in the Ph. D. thesis entitled, "**Determinants of Environmental Awareness, Pro-environmental Behaviour, Climate Change Perception and Attitude towards Sustainable Development among students of Kashmir Valley, Jammu and Kashmir**" submitted in fulfillment of the requirement for the award of degree of **Doctor of Philosophy (Ph.D.)** in the **Environmental Science**, is a research work carried out by **Rouoof Habib Ganie (42000350),** is bonafide record of his original work carried out under my supervision and that no part of thesis has been submitted for any other degree, diploma or equivalent course.





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Abstract

The present research was undertaken to examine the impact of socio-demographic factors on four key variables: Environmental Awareness, Pro-environmental Behaviour, Climate Change Perception, and Attitude towards Sustainable Development. It also investigated how environmental awareness, climate change perception, and attitude towards sustainable development collectively influence and predict pro-environmental behaviour among students. The study was motivated by the global realisation that environmental degradation, climate instability, and unsustainable patterns of growth pose unprecedented challenges to humanity's collective future. In the context of the Kashmir Valley, a region of exquisite natural beauty but with ecological fragility, these challenges assume even greater urgency. Over the last few decades, the Valley has witnessed rapid deforestation, unplanned urbanisation, water pollution, waste mismanagement, glacial melting, and shifting weather patterns. These developments, intensified by anthropogenic pressures, have not only disrupted the ecological balance but have also threatened the livelihoods and well-being of local communities. Against this backdrop, young people, especially undergraduate students, represent a critical demographic whose environmental consciousness and behavioural dispositions will decisively influence the region's trajectory toward sustainability. However, despite the growing global and national emphasis on sustainability education, the understanding of how students in such ecologically sensitive regions perceive, internalise, and respond to environmental and climate-related issues remains limited. This study, therefore, sought to provide an empirical understanding of how environmental awareness, attitude towards sustainable development and climate change perception collectively shape and predict students' pro-environmental behaviour.

To achieve these aims, the study employed a quantitative, descriptive, and cross-sectional survey design involving a representative sample of 1,200 undergraduate students selected from twenty Government Degree Colleges spread across ten districts of the Kashmir Valley. The colleges from various districts were selected using purposive sampling, and the sample was obtained through the convenience sampling technique to ensure equitable representation across gender, locale, academic streams, etc. Data collection relied on four well-established instruments: the Environmental Awareness Ability Measure (Jha, 1998), the pro-environmental behaviour scale (Mertig, 2003), the Climate Change Perception Scale (Alan, 2015), and the Attitude towards Sustainable Development Scale (Biasutti and Frate, 2017), tailored to the regional and educational context. The reliability and construct validity of the tools were confirmed through pilot testing and statistical validation procedures. Data were analysed using

descriptive statistics (mean, standard deviation, percentages), inferential statistics including t-tests and ANOVA to examine group differences, and correlation and multiple regression analysis to determine interrelationships and predictive influences among variables. Cohen's *d*, Cohen's *f*, eta squared (η^2), and partial eta squared (ηp^2) were calculated to determine the magnitude of observed effects, thereby providing an estimate of the practical significance of group differences and associations beyond mere statistical significance. The findings showed that students had a fairly sound understanding of environmental issues, ecological interdependence, and conservation ethics. This cognitive awareness did not, however, always result in behavioural action; this pattern is consistent with the substantial gap between environmental cognition and actual behavioural practice that has been noted in the literature on environmental psychology. Both awareness and pro-environmental behaviour were statistically significantly influenced by gender and academic stream, with female and science students showing higher levels of participation in eco-friendly behaviour. Perception of climate change was also rather strong, especially when it came to local effects like food shortages and glacier melting. Students' engagement in low-carbon behaviours (LCB) was moderate, despite their positive attitudes toward sustainable development, which included support for gender equality, environmental protection, and inclusive policies. Many students exhibited awareness of issues such as pollution control, waste segregation, renewable energy, and biodiversity conservation, but showed limited personal participation in activities like recycling, energy-saving habits, and community clean-up drives. The perception of climate change among students was found to be generally favourable; however, significant variations emerged across demographic categories. Female students and those from urban backgrounds displayed stronger concern and higher perception levels compared to their male and rural counterparts, respectively, while science and social science students demonstrated greater conceptual understanding of climate change phenomena compared to students from arts and commerce streams.

To investigate the theoretical framework on environmental awareness, perceptions of climate change, and attitudes toward sustainable development in predicting eco-friendly behaviour among students in the Kashmir Valley, the study used a structural equation model, or SEM, which demonstrated that pro-environmental conduct is not statistically significantly impacted by environmental awareness or perceptions of climate change. However, attitudes toward sustainable development exhibit a strong positive influence, indicating that value-based attitudes rather than a merely cognitive comprehension of environmental challenges are the deeper roots of behavioural change. These results mirror the broader findings in environmental psychology that emphasise the "knowledge-action gap," where awareness does not

automatically manifest as action. The study's outcomes thus underline the necessity of moving beyond mere knowledge dissemination toward experiential and participatory forms of environmental learning that engage both affective and behavioural dimensions. The findings also reveal that contextual and demographic factors significantly mediate students' environmental orientation. Gender, locality, and academic exposure were found to significantly shape individuals' perceptions of and responses to environmental challenges, suggesting the need for context-specific pedagogical and policy strategies. Findings also reveal strong sustainability awareness, with students prioritising environmental protection over unchecked development. Science students exhibit higher sustainability awareness, while male students show slightly more favourable attitudes. However, female students demonstrate stronger engagement in PEB. Urban students display higher PEB levels than their rural counterparts, likely due to better access to environmental education and infrastructure. Academic progression enhances sustainability awareness, with senior students showing greater engagement. Students adopt low-effort behaviours like energy and water conservation, but participate less in activism and civic engagement. Recycling and eco-friendly purchasing receive moderate attention, though external barriers such as inadequate facilities and affordability influence engagement. Parental education and occupation do not significantly impact PEB, but higher household income correlates with stronger sustainability attitudes. It is therefore essential to reinforce environmental and sustainability education within higher education institutions. Universities and colleges in the Kashmir Valley must act as dynamic platforms for cultivating ecological sensitivity, responsible behaviour, and sustainability-oriented values among youth.

In light of these findings, the study recommends that environmental and sustainability education be integrated more holistically across undergraduate curricula, not only as isolated courses but as interdisciplinary modules embedded in diverse disciplines. Experiential learning through field projects, nature clubs, and community-based environmental initiatives should be institutionalised to bridge the gap between awareness and action. Teacher education programmes must include sustainability pedagogy to empower educators with the tools to inspire and guide students toward environmentally responsible practices. Furthermore, higher education institutions should adopt green campus policies, including waste reduction systems, water and energy conservation measures, and sustainable procurement, to model sustainability in practice. Policy-level interventions are also crucial: government agencies, educational boards, and local authorities must strengthen institutional frameworks supporting environmental research, youth engagement, and curriculum innovation in sustainability education. The study contributes valuable empirical evidence to both national and global

sustainability discourse, particularly by highlighting how youth in an ecologically vulnerable region like Kashmir conceptualise and enact environmental responsibility. By situating environmental awareness and behavioural orientation within the socio-cultural and ecological realities of the Valley, this research provides insights into the sociodemographic determinants of sustainable development attitudes in developing-country contexts. It concludes that achieving sustainability requires not only intellectual awareness but also emotional resonance, moral commitment, and collective participation. Education, when oriented toward sustainability, can become a transformative force capable of nurturing generations of environmentally conscious, ethically grounded, and socially responsible citizens. Strengthening the triad of awareness, behaviour, and perception among youth will be essential for steering the Kashmir Valley, and indeed, societies everywhere, toward a resilient, equitable, and sustainable future.

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CHAPTER 1
INTRODUCTION

Chapter 1: Introduction

1.1 Background of the Study

The modern world is experiencing a growing ecological crisis that threatens the very foundations of life on Earth. People have done things that have never happened before to hurt the environment in the last hundred years, especially since the Industrial Revolution. Climate change, loss of biodiversity, deforestation, pollution, and the misuse of natural resources are all signs of this damage (Steffen et al., 2015). Many scientists and groups now refer to these problems as a "planetary emergency" because they are worsening rapidly and on a large scale (Ripple et al., 2020). Climate change is the most significant and widespread of all these problems. The Intergovernmental Panel on Climate Change (IPCC, 2021) states that since the middle of the 20th century, the main cause of global warming has been greenhouse gas emissions from anthropogenic activities. These gases are mostly carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). The average temperature of the Earth's surface has already gone up by about 1.1°C since before the Industrial Revolution. According to the IPCC (2021), this has caused sea levels to rise, glaciers to melt, the ocean to become more acidic, and more severe weather events like floods, droughts, wildfires, and storms. These changes have an impact on the economy and the environment, but the people who are most affected are the ones who are most vulnerable in developing countries (Stern, 2008). Biodiversity loss is another big problem for the planet. Some people call it the "sixth mass extinction" (Ceballos et al., 2017). Human-made problems like habitat loss, overexploitation, pollution, invasive species, and climate change are speeding up extinction rates by 100 to 1,000 times what they would be naturally (Pimm et al., 2014). The Living Planet Report 2022 from the World Wildlife Fund (WWF) said that the number of vertebrate species on Earth dropped by an average of 69% between 1970 and 2018. Biodiversity is important for more than just keeping ecosystems in check. It also helps with keeping diseases in check, making sure there is enough food, managing water, and preserving cultural identity. Deforestation is another big problem for the environment, especially in tropical areas. Forests are important because they store carbon, protect biodiversity, and provide jobs for millions of people. But farming, logging, mining, and building new roads and other infrastructure are still destroying

them at an alarming rate. The world lost more than 10 million hectares of forest every year from 2015 to 2020 (FAO, 2020). For instance, the Amazon rainforest is getting close to a catastrophic tipping point, after which it might become a savanna-like ecosystem. This would have terrible effects on the balance of carbon in the world (Lovejoy & Nobre, 2018). Pollution is bad for both people and the Earth in all its forms. The World Health Organisation (WHO) says that air pollution is linked to heart and lung diseases and kills about 7 million people every year. Plastics, industrial waste, and agricultural runoff are all getting into bodies of water and harming aquatic ecosystems and the health of millions of people. Researchers have recently found microplastics in human blood and placentas, which is very worrying because we don't know what the long-term effects will be (Leslie et al., 2022). It's also scary that we are using up natural resources in ways that won't last. The Earth can only rebuild its ecosystems 1.7 times faster than people are using its natural resources right now (Global Footprint Network, 2023). "Earth Overshoot Day" is a great example of how people are using up more of the planet's resources than it can handle, earlier and earlier each year. We are at risk of food insecurity, economic instability, and war between countries if we lose fresh water, arable land, fossil fuels, and minerals. One of the primary causes of this issue is the unsustainable production and consumption patterns prevalent in wealthier countries, which put significant pressure on the environment. Materialism, dependence on fossil fuels, and disposable lifestyles all contribute to a consumerist society that uses too much carbon, waste, and energy (Jackson, 2009). On the other hand, developing countries usually have the most trouble with environmental problems, even though they don't emit as many greenhouse gases. This shows how environmental problems affect morality and justice (Roberts & Parks, 2007). The Paris Agreement and the United Nations Framework Convention on Climate Change (UNFCCC) are two big steps toward working together as a world. The Sustainable Development Goals (SDGs), especially SDG 12 (Responsible Consumption and Production), SDG 13 (Climate Action), and SDG 15 (Life on Land), stress how important it is to take action that is both connected and open to everyone to protect the world. There are a lot of policy frameworks and public statements, but real action is still inconsistent, and there is still a gap between knowing and behaving in a sustainable way (UNEP, 2021). In this case, it's very important to look into and change how people think about and feel about

climate change, being aware of the environment, and doing things that are good for the environment. As a way to make society better, these things are becoming more important in environmental psychology and education (Kollmuss & Agyeman, 2002; Clayton & Myers, 2015). People who understand environmental issues, feel concerned about them, and genuinely care about making a difference are more likely to take actions that protect nature and support a sustainable future. Young people, especially students, are some of the most likely people to make this kind of change happen. Their knowledge, attitudes, and actions toward the environment will have a big impact on the future of sustainable development because they will be leaders, customers, and decision-makers. People learn about their beliefs, ideas, and behaviours in college and university settings. Colleges and universities are not just places where people learn new things, but they are also important places to teach people how to be responsible citizens and ethical leaders (Cortese, 2003). If institutions want to make a strong and lasting future, they need to teach kids about the environment and how to act properly (Stevenson et al., 2014).

1.2 Conceptual Framework of Variables

Sustainable development gained global focus due to the alarming rise in environmental issues like climate change, loss of biodiversity, and increasing consumption patterns (Steffen et al., 2015). Solving such complex and interwoven issues calls for a considerable shift in human values and consciousness shift as well as technology and policy changes (Hines et al., 1987). Understanding people's perception and response to environmental issues becomes essential as the world strives for sustainability (Whitmarsh, 2009). In this sense, critical variables such as climate change perception, pro-environmental behaviour, environmental awareness, and attitudes towards sustainability tell us how people perceive and react to their environment and the extent to which they are willing to participate in, or enable, sustainable practices (Stern, 2000; Kollmuss & Agyeman, 2002).

These constructs are not separate; rather, they are connected and shaped by a variety of contextual, educational, cultural, social, and cognitive factors (Steg et al., 2014). Pro-environmental behaviour is acting in an environmentally beneficial manner, while

Environmental awareness entails possessing knowledge and insight into ecological issues and recognising the consequences of human actions on the natural environment (Barr, 2007; Bamberg & Moser, 2007). The way individuals think and feel about climate change greatly shapes their perception of it (Leiserowitz, 2006). Biasutti and Surian (2012) define an individual's broad attitude as the equilibrium between environmental sustainability and social and economic development, as the attitude towards sustainable development. All of these factors combined provide a comprehensive explanation of the principles and the psychology of environmental and sustainability behaviour in the youth (Chawla & Cushing, 2007). In this regard, students are, indeed, a crucial demographic.

Over the next few decades, these students will, as professionals, educators, community leaders, and even as legislators, inform the course of sustainable development (Shephard, 2008). As pointed out by Lozano et al. (2013) concerning universities, "educational institutions are crucial to the development of these attitudes and competencies," and they will only be successful if they are aware of the specific determinants of students' attitudes and behaviour. Thus, as pointed out by Mochizuki and Fadeeva (2010), "designing and targeting" environmental education and engagement initiatives can be greatly enhanced by understanding these factors.

1.2.1 Environmental Awareness

Environmental awareness refers to the knowledge, understanding, and concern an individual possesses about environmental issues, including causes, effects, and possible solutions (Hungerford & Volk, 1990). Ecological issues, including the depletion of natural resources, air and water pollution, loss of biodiversity, and global warming, have emerged as pressing concerns in the 21st century (Lorey, 2003). In light of the critical state of the environment, environmental awareness and democracy have emerged as determining factors of behavioural and policy change, as well as public opinion (Zafar et al., 2024). It determines how people engage with information about environmental issues, their ecological thinking, and their sustainable behaviour and serves as a condition and driving force for achieving sustainable development (Harris, 2004). Environmental awareness moves beyond understanding the issues; it's made up

of attitudes, emotions, ethics, and action-oriented plans related to the environment and the whole living world (Aguilar-Luzon et al., 2014). Environmental awareness as a form of knowledge changes due to policy actions, media, socioeconomic conditions, culture, and education. It follows then that environmental awareness is a social and psychological problem and a multi-disciplinary phenomenon involving communication, sociology, politics, education, environmental studies, and psychology (Zhou, 2008).

Environmental science plays a vital role in building awareness by showing how deeply connected our natural systems are—and how human actions can disrupt their balance. When people understand issues like pollution, climate change, and ecological damage through a scientific lens, they're better prepared to grasp the roots of environmental problems and think critically about how to solve them (Guerrero & Sjöström, 2025). Education is key here. Whether it happens in a classroom or through hands-on experiences in nature, both formal and informal learning help shape our understanding and concern for the environment. In schools and colleges, lessons, outdoor activities, real-world projects, and sustainability initiatives all contribute to developing a sense of ecological responsibility (Hopkinson et al., 2008). Education for Sustainable Development (ESD) goes even further; it encourages students to see the bigger picture, linking environmental issues with social justice and economic sustainability, helping them grow into informed and conscientious global citizens (Semerikov, 2024).

Being aware of the environment isn't just about facts; it's also about how we think, feel, and act. What we know, what we value, and what we believe all affect our minds. Our feelings of worry, anxiety, or empathy also have a big effect on how we deal with environmental problems (Frick et al., 2004). Theories such as the Theory of Planned Behaviour, the Value-Belief-Norm Theory, and Environmental Identity Theory help explain how people's awareness of environmental issues can shape their values, beliefs, and sense of identity, ultimately motivating them to take meaningful action for the planet. (Steg & Vlek, 2009). From a sociological point of view, the things around us matter too. Our cultural background, the groups we belong to, and the rules we follow all affect how much we care about the environment. People often look to their communities for guidance on how to think about and act on environmental issues

(Brieger, 2019). Peer values, social norms, and the creation of group identities all have an effect on and motivate people to act in ways that are good for the environment. Public policy and governance are also very important. Taxes, laws, incentives, and public campaigns don't just change how people act; they also change how people think. Also, public opinion and people's actions can make governments and organisations rethink and change their environmental policies. This creates a loop where society and policy affect each other all the time, changing how we all think about and act on the environment (Shwom & McCright, 2011). Traditional and digital media and communication technologies are effective means of disseminating information about the environment. Through framing, storytelling, and images, they not only spread information but also influence people's perspectives. Opportunities and difficulties for raising public awareness of environmental issues increase along with the growth of digital platforms (Jain & Meena, 2024).

Environmental awareness is not something that just happens. It is influenced by a wide range of environmental, political, social, cultural, and personal factors. Understanding these drivers is necessary to create interventions, policies, and teaching strategies that effectively increase awareness and encourage behavioural change (Duroy, 2005). Education is one of the best measures of environmental consciousness. People with higher levels of education tend to know more about environmental issues and are more likely to take actions that help the environment (Meyer, 2015). However, the quality and subject matter of education are equally significant. When students are exposed to environmental science, sustainability issues, and critical thinking in the classroom, their awareness is significantly raised. Access to informal education resources, such as movies, social media, and community events, improves formal education even more (Subires-Mancera & Delgado-Pena, 2022).

Socioeconomic conditions have an impact on both the capacity and the desire to act on environmental information. People with higher incomes are more likely to value environmental preservation and often have easier access to sustainable solutions (e.g., public transportation, organic food, and green technologies (Qadri et al., 2025). However, marginalised groups may prioritise their immediate survival needs over their environmental consciousness, and they may lack the resources or institutional support

needed to adopt sustainable practices (Adams et al., 2019). Thus, tackling structural injustices is a necessary part of raising environmental consciousness.

Cultural beliefs and traditions play a powerful role in shaping how people relate to the environment. For example, many Indigenous communities possess deep ecological knowledge, rooted in spiritual beliefs and a close relationship with nature (Bhattacharya & Panda, 2024). In contrast, societies that prioritise industrial growth or consumerism often view nature more as a resource for profit than as something to be protected (Gunderson, 2017). Religious teachings, ancestral wisdom, and shared cultural memory also influence how people form their environmental values and ethics. This highlights the importance of understanding environmental awareness within its specific cultural context (Nepal, 2024).

Emotions are just as important as thoughts when it comes to environmental awareness. Feelings like sadness over environmental loss, hope for a better future, guilt over inaction, or fear about the future can strongly motivate—or discourage—people from engaging with environmental issues. Environmental psychology increasingly recognises the significance of experiences like climate anxiety, ecological grief, and environmental hope in shaping people's attitudes and actions (Ojala et al., 2021). Factors such as a person's values—like concern for others or the planet—how much control they feel over their actions, and how closely they identify with nature are all strong indicators of both awareness and willingness to act (Van der Werff et al., 2013). This helps explain why two people with the same knowledge may still respond very differently to environmental challenges. The media, too, play a major role in shaping public understanding. Environmental campaigns, news stories, social media trends, and influencers can raise awareness and spark collective action—but they can also spread misinformation or encourage denial (Gibson et al., 2022). The way environmental issues are communicated—whether they emphasise risks, solutions, costs, or moral responsibility—greatly affects how people perceive and respond to them (Song et al., 2025). That's why true environmental awareness goes beyond just access to information—it also requires the ability to critically interpret and navigate media messages.

Institutional trust and political beliefs also have a big impact on environmental consciousness. Studies have shown that those who identify as liberal or progressive tend to care more about the environment. Conversely, more conservative individuals may value economic growth, individual liberty, or a mistrust of laws more than environmental concerns (Cruz, 2017). Equally important is the extent to which people trust institutions, be they government agencies, non-governmental groups, or scientists. If people don't trust the source of environmental information, they are less likely to believe it or act upon it. Therefore, the degree to which people hold strong and honest attitudes about the environment can be significantly impacted by political division (Myers et al., 2017). Our surroundings also influence our consciousness. Rural residents may see firsthand the effects of deforestation, water scarcity, or soil degradation, whereas city dwellers are more likely to experience smog, noise pollution, and waste management issues (De Jesus, 2024). These commonplace encounters with environmental challenges have the power to shape people's priorities and views of ecological issues. In fact, being directly exposed to environmental dangers like floods, wildfires, or other natural calamities can change your life. These interactions have the potential to be "teachable moments," bringing environmental risks to life and encouraging reflection, behaviour change, and more involvement (Haney, 2021).

In a time of worldwide environmental disasters, from ocean acidification and biodiversity loss to climate change and deforestation, environmental consciousness has emerged as a critical element of the global reaction to ecological degradation (Iizuka, 2000). According to Littledyke (2008), environmental awareness is a cognitive and emotional construct that encompasses an individual's or society's understanding of environmental issues, the emotions they evoke, and their willingness to embrace sustainable actions. Environmental awareness seeks to bridge the gap between information and action, despite the significant advancements in scientific understanding of environmental challenges (Sinha & Annamdevula, 2025). Understanding the complex relationships between ecosystems and the human forces that are disrupting them requires awareness, according to environmental scientists (Carson, 2015). The dissemination of ecological knowledge, such as the consequences of greenhouse gas emissions, deforestation, and unsustainable consumerism, forms the scientific basis of

environmental consciousness (Steffen et al., 2015). If these principles are not understood, efforts to promote sustainable behaviour will not have the empirical basis necessary to guide effective action (Dietz et al., 2009). Therefore, environmental literacy is more than just studying facts; it is about cultivating an ecological consciousness that sees humans as an integral part of the planet.

Two popular approaches to operationalising environmental awareness in educational settings are environmental education and education for sustainable development (Tilbury, 1995). These pedagogical frameworks aim to teach the knowledge, critical thinking skills, and values that promote sustainable behaviour. There are still disparities in results, emphasis, and accessibility even though environmental topics are now more common in elementary, secondary, and university education curricula (Ferguson & Bramwell-Lalor, 2024). Since research indicates that early environmental education can have a lasting impact on attitudes and behaviours, both formal and informal learning contexts are crucial for raising awareness (Chawla, 1999). Psychology contributes to our understanding of environmental awareness through theories of behaviour, emotion, and cognition. Concepts like environmental identification, risk perception, cognitive dissonance, and moral reasoning are essential to understanding why people act—or do not act—in a pro-environmental way (Gifford, 2014). The Value-Belief-Norm Theory, along with models of climate anxiety and ecological grief, affirms that personal values, beliefs, emotions, and a sense of agency actively shape how individuals become aware of and respond to environmental challenges. (Clayton, 2019). Understanding these processes can help create interventions and awareness campaigns that are more effective.

Additionally, environmental consciousness is essential in forming government and public policy. Environmental laws and regulations are frequently shaped by public awareness and concern in democracies (Dietz et al., 1998). For policies like carbon pricing, conservation efforts, and environmental regulations to succeed, people must understand them, support them, and feel their voices are part of the process (Nisbet & Myers, 2007). However, policies can also be used as a tool to increase knowledge through public awareness campaigns, environmental impact assessments, and eco-labelling. The feedback loop between policy and awareness emphasises how crucial

institutional openness and civic participation are (Bostrom et al., 2015). It is impossible to overestimate the influence of media, both digital and conventional, in raising environmental consciousness. Environmental awareness is often shaped by powerful communication channels such as news media, documentaries, social media platforms, and interactive technologies, tools that don't just inform, but engage people directly in learning and action. But there are drawbacks to the internet age as well, such as false information, denial of climate change, and the polarisation of environmental discourse (Boykoff & Boykoff, 2007). Thus, critical thinking and media literacy become crucial skills for negotiating the environmental communication ecosystem. Also, new technologies like virtual reality, data visualisation, and artificial intelligence are being leveraged to make compelling and engaging experiences that raise awareness. Artificial intelligence is very useful for analysing huge amounts of environmental data, predicting climatic patterns, customising instructional content, and even simulating the effects of policy actions. This makes it a great tool for informing the public and encouraging sustainable behaviour. (Lehmann & Fiese,2020).

Globally, people's awareness of environmental issues varies. How communities view and react to environmental challenges is influenced by historical events, socioeconomic status, religious ideals, and cultural views. For example, in contrast to Western technocratic paradigms, Indigenous knowledge systems frequently exhibit a profound ecological awareness (Davidson-Hunt & Berkes, 2003). Similar to this, communities in the Global South may put short-term economic survival ahead of long-term environmental concerns, not because they are ignorant, but rather because of systemic injustices. Therefore, these many worldviews and circumstances must be taken into consideration in an inclusive understanding of environmental consciousness (Robinson, 2004).

1.2.2 Pro-environmental behaviour

In recent decades, the world has faced an escalating series of environmental challenges that jeopardise both ecosystem stability and human well-being. Issues such as climate change, resource depletion, deforestation, and pollution have become pressing global concerns, emphasising the urgent need for collective and proactive efforts to protect

and preserve the environment (Steffen et al., 2015; IPCC, 2021). Pro-environmental behaviour refers to the intentional actions taken by individuals to minimise environmental degradation and contribute to environmental sustainability (Kollmuss & Agyeman, 2002). Green behaviour, which encompasses actions such as reducing energy consumption, recycling, promoting sustainable practices, and minimising waste, has become a central component of global sustainability efforts. Individuals' engagement in PEB is crucial in mitigating environmental harm and fostering sustainable living (Kollmuss & Agyeman, 2002). Among the various demographic groups, university students, particularly undergraduates, represent a significant segment of society that can influence environmental attitudes and behaviours through education, social interactions, and advocacy (Dunlap & Jones, 2002).

Pro-environmental behaviour does not occur in a vacuum. It is influenced by a range of sociodemographic factors such as age, gender, educational background, socio-economic status, and place of residence (Kollmuss & Agyeman, 2002). Research has shown that these factors can have a direct impact on how individuals perceive environmental issues and their willingness to engage in actions that support sustainability (Stern, 2000). For example, studies have found that females tend to display higher levels of pro-environmental concern and engage in more sustainable behaviours compared to males (McCright, 2010). Similarly, educational level and socioeconomic status are positively correlated with environmental knowledge, which in turn can lead to more environmentally responsible actions (Schultz, 2001).

Pro-environmental behaviours are deeds and choices that prioritise environmental stewardship and aim to lessen detrimental impacts on the environment (Steg & Vlek, 2009). These behaviours include things like conserving energy, reducing trash, recycling, choosing sustainable products, and taking part in environmental conservation-related activities (Whitmarsh & O'Neill, 2010). Since the students' actions and attitudes have the power to affect not just their futures but also the well-being of their communities and the wider world, they must embrace environmentally responsible behaviours (Yavetz et al., 2009).

The importance of fostering pro-environmental behaviours among young people lies in their potential to become lifelong advocates for sustainability (Chawla & Cushing, 2007). During adolescence and school years, students are at a critical stage of developing their values, beliefs, and habits. Encouraging environmentally responsible actions at this stage can lead to a lasting commitment to sustainability, influencing their decisions as future consumers, community members, and global citizens (Tilbury, 1995). Moreover, engaging in pro-environmental behaviours has been linked to both personal and social well-being, as students often find meaning and a sense of shared purpose through collective action for the environment (Haller & Hadler, 2006).

Educational institutions play a crucial role in cultivating these behaviours by integrating environmental education into the curriculum and creating opportunities for experiential learning (Becker & Lauterbach, 2007). Effective strategies include learner-centred activities, outdoor programs, educational games, and the promotion of green lifestyles within schools (Jensen & Schnack, 1997). By equipping students with knowledge, skills, and positive attitudes toward the environment, institutions help lay the foundation for a more sustainable and responsible society (Bennett & Haase, 2006). Previous studies have shown that the presence of environmental education, cultural context, and local ecological concerns significantly shape individuals' pro-environmental behaviour (Steg & Vlek, 2009).

1.2.3 Climate Change

Climate change perception refers to how individuals understand, interpret, and emotionally react to the causes, effects, and seriousness of climate change (Leiserowitz, 2006). Climate change itself is defined as long-term shifts in temperature, rainfall patterns, and other atmospheric conditions. These changes are driven by a mix of natural factors and human activities, such as industrial growth, deforestation, and alterations in land use (Hussain, 1987). Although many causes of climate change have been identified, experts continue to debate which ones are most significant (Budyko, 1974; Hansen et al., 2010; Liarakou et al., 2011; Jamal & Ahmad, 2020). Natural influences like El Niño, ocean currents, and solar variations can cause both short- and long-term climate shifts. For example, El Nino, one form of natural climate fluctuation,

redistributes heat across the Earth's climate system, often resulting in higher global temperatures. However, beyond these natural forces, human actions have increasingly altered the planet's climate balance. Humans have changed the Earth's energy flow in several ways: by clearing forests, draining wetlands, irrigating large areas of land, and emitting large amounts of greenhouse gases into the atmosphere (ICSU, 1985). Other major contributors include the burning of fossil fuels, cement production, agricultural practices, bushfires, and even the use of natural gas (Hickman et al., 2021). Research shows that human activity has now become the dominant force behind climate change, surpassing natural variability (ICSU, 1985; Pachauri & Spreng, 2011). The consequences of climate change are widespread and affect nearly every aspect of life. These impacts can be grouped into several categories: agriculture, the economy, ecosystems, public health, and social systems. For instance, Ikeme (2005) noted that climate shifts are expected to dry out tropical regions, which could severely affect energy generation and distribution. Similarly, Busalacchi et al. (2005) pointed out that while the science behind human-driven climate change continues to evolve, many questions remain about how natural and human factors interact. The Intergovernmental Panel on Climate Change (IPCC, 2000) warned that without a clear understanding of climate change, the world will face severe challenges like increased flooding and droughts, food insecurity, the spread of new diseases, and rising global temperatures. Supporting this, Ayandele and Jegede (2016) emphasised that climate change will touch every part of human life, from the natural environment we depend on to the social and economic systems that support our communities.

Compared to underdeveloped nations, industrialised nations are more cognizant of climate change (ICSU 1985, Ikeme 2005). In contrast, climate change remains a relatively low priority in several emerging regions, such as Africa, the Middle East, and parts of Asia (McIntosh & Thom 1973, Kilinc et al., 2011, Mandleni & Anim, 2011, Mustafa et al., 2019). Environmental issues have not been prioritised by the countries in these regions (Ikeme, 2005; Mandleni & Anim, 2011). But according to USAID (2007), people in developing nations might be more impacted by climate change than those in developed nations. A shift in the local climate and weather would directly affect productivity levels and lower the means of subsistence for the impoverished, who often

depend on climate-sensitive economic sectors like forestry and agriculture. Furthermore, there are advantages and disadvantages to the changing global climate. People and society can therefore take advantage of opportunities and reduce risk by understanding, anticipating, and adjusting to a changing environment (Sarkar & Padaria, 2010). Therefore, integrating the study of climate change into curricula across all educational levels will foster a deeper understanding of its environmental consequences, especially those stemming from anthropogenic activities such as fossil fuel consumption and deforestation, which significantly elevate the concentration of greenhouse gases in the atmosphere. This highlights the significance of including climate change studies in the national curriculum at all educational levels (Agboola & Emmanuel, 2016).

Regional climatic variances have affected ecosystem changes through increasing temperatures, devastating floods, recurrent droughts, changing precipitation patterns, and melting glaciers (Houghton, 2004). According to the IPCC (2001), scientific evidence shows that the average global temperature increased by 0.6°C over the past century, with records indicating that the last fifty years have been the warmest in the past six centuries (IPCC, 2007; Dijkstra & Goedhart, 2012). An estimated 2-3°C warming is predicted by the end of the century (Houghton, 2004). According to Leiserowitz (2006), greenhouse gas emissions are expected to cause more significant and unpredictable climate changes in the twenty-first century than they did in the twentieth century.

Given the information in the literature, it is essential to understand the dynamics of climate change, paying particular attention to temperature and precipitation extremes, floods, and droughts, as well as the detrimental effects they have on people's lives and the welfare of entire communities (Crona et al., 2013). Additionally, it is emphasised that people's views and understanding vary both within and between areas (McIntosh & Thom, 1973; IPCC, 2000; Mandaleni & Anim, 2011). Ikeme (2005) and Ogunsola et al. (2018) emphasised that the best method to get people to care about critical environmental issues and change their behaviour in response to climate change and global warming is to teach environmental education to students of all ages. Researchers all throughout the world have looked into how students think about and are affected by

climate change (IPCC, 2001; Leiserowitz, 2006; Environment Bureau, 2010; Deressa et al., 2011; Álvarez-Nieto et al., 2022). Ogunsola et al. (2018) say that the average temperature in the Himalayas went up by 1.5 °C from 1982 to 2006. Even places close by saw temperatures rise by 1.7 °C from 1981 to 2010 (Crona et al., 2013). Students, whether consciously or unconsciously, draw upon experiences from their parents, peers, personal lives, curriculum, and teachers to shape their opinions (Taber & Taylor, 2009). It can be said that students reflect the prevailing environmental culture of the region, as they often share similar views on environmental issues (Crona et al., 2013).

1.2.4 Attitudes toward Sustainable Development

People's attitudes toward sustainable development are based on their values, beliefs, and predispositions toward the core principles of sustainability, which include protecting the environment, practising financial responsibility, and promoting social justice (Corral-Verdugo & Frías-Armenta, 2006). Population expansion and the expanding commercialisation of human activities in modern, urbanised life are the main reasons why environmental problems become worse (Rockstrom et al., 2009). Also, even if exploitation is still bad for the environment, the economy, and society, the consumption of resources is rising without any regulation. This leads to unwanted effects on the environment, such as more carbon emissions, pollution around the world, deforestation, food scarcity, and other issues (Diamantopoulos et al., 2003). The way society is set up and the state of the economy today have made social inequality and division worse. It is now important to know how social, economic, and environmental factors affect both natural and human systems (Spangenberg, 2002). For something to be sustainable, social, economic, and environmental systems must all be connected. The idea of education for sustainable development is always changing. It uses all areas of public awareness, education, and training to help people understand how the issues of sustainable development are connected (Sterling & Orr, 2001). It also wants to instil the values, beliefs, skills, and knowledge that will allow people of all ages to take the lead in creating and enjoying a future that is good for everyone. Teaching the next generation is the first step toward changing social norms to favour sustainability (Tilbury, 2002). The idea of sustainable development has become more important in academic, government, and societal conversations as environmental damage,

socioeconomic inequality, and climate-related risks have grown around the world. The World Commission on Environment and Development (Brundtland Commission, 1987) defines Sustainable development as "*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*". To reach sustainable development, we need to find a way to balance social justice, economic progress, and protect the environment. It calls for a complete change in how people think, behave, and make policies to safeguard human health and the environment (Hopwood et al., 2005). Education, especially higher education, is very important for teaching people about sustainability and how to live in a sustainable way. One of the most essential parts of transformative education is changing students' feelings about sustainable development. Attitudes are defined as evaluative dispositions toward ideas, issues, or actions. They have a big effect on how people behave and make decisions over time (Ajzen, 1991). So, to make sure that sustainability is a part of future societies, we need to know what makes people think this way. In 2015, 193 nations signed the United Nations' 2030 Agenda for Sustainable Development, which has 17 SDGs. This has made the focus on sustainability even stronger around the world. These goals deal with the economic, social, and environmental aspects of sustainability (Saner et al., 2019; Zwickle et al., 2014). Leal Filho et al. (2016) highlight that caring for both people's health and the environment is crucial for the future, especially for young people in college. By understanding these issues, students can play a meaningful role in helping the world achieve the SDGs by 2030. Education for Sustainable Development (ESD) is one technique to get a lot of people to understand the ideas and principles of sustainable development. (Kopnina & Meijers, 2014). These goals show how important it is to make sure that all of the country's schools follow the principles of sustainability (UNGA, 2015). Educational institutions have a big job to do when it comes to teaching students about climate change and sustainability. This is especially true because of SDG 4, which says that everyone should have access to quality education and opportunities for lifelong learning, and SDG 13, which says that we need to take quick action to fight climate change and its effects. (Wals & Corcoran, 2012; Filho et al., 2023). The different subjects, beliefs, and worldviews that students learn about in college impact their values and conduct (Bengtsson & Ohman, 2017). Undergraduate students can have a big impact on the consequences of sustainable

development through their future jobs, community service, and personal choices. By fostering sustainable thinking among college students, institutions can nurture a generation that is mindful of both environmental and social well-being (Lozano et al., 2015; Sterling, 2010). People don't just come up with ideas on sustainable development on their own. A lot of things affect them, like their habits, how much they know about the environment, how they feel about climate change, how aware they are of the environment, and their sociocultural background (Steg & Vlek, 2009; Kollmuss & Agyeman, 2002). Looking into these aspects can help schools and policymakers figure out how to get students to care more about sustainability. The Kashmir Valley is a very important place in India for its ecology, geology, and culture. It lies in the northernmost portion of the country. The area is a cultural example of living sustainably and has a lot of natural resources and many different kinds of plants and animals, including forests, rivers, and glaciers. It is also home to traditions that have been around for hundreds of years about living in peace with the environment (Qadri, 2015; Dhar, 2010; Khan & Ahmad, 2012). In the past few decades, though, the valley has had to deal with a lot of environmental problems, such as uncontrolled tourism, urbanisation, climate change, water pollution, and deforestation. All of these things have hurt the area's biological balance (Rashid & Nazir, 2016; Wani et al., 2019; Qadri & Majeed, 2014). The region's unique history and complicated politics have also had an effect on environmental governance and development planning (Bhat & Teli, 2019). Given these circumstances, the role of education in enhancing awareness of sustainability assumes critical importance. Undergraduate students in Kashmir represent a population situated within a socio-cultural context characterised by strong cultural traditions, yet confronted with significant environmental vulnerabilities. They are a good group to investigate the basic ideas behind sustainable attitudes (Wani & Sofi, 2021).

1.2.5 Theories Supporting the Study

The present study is anchored in three major theoretical frameworks: the Theory of Planned Behaviour, the Value-Belief-Norm Theory, and Environmental Identity Theory. The Theory of Planned Behaviour posits that human behaviour is predicted by behavioural intentions, which are shaped by attitudes, subjective norms, and perceived behavioural control (Ajzen, 1991). In the present context, environmental awareness and

climate change perception contribute to the development of favourable attitudes towards sustainable development, which in turn strengthen intentions to engage in pro-environmental behaviour. The Value-Belief-Norm Theory explains that individuals' values influence their ecological beliefs, including awareness of consequences and ascription of responsibility, which activate personal norms and subsequently pro-environmental behaviour (Stern, 2000). Thus, environmental awareness and climate change perception operate as belief components that foster moral obligation and positive attitudes towards sustainable development. Furthermore, Environmental Identity Theory suggests that when environmental concerns become integrated into an individual's self-concept, they are more likely to display consistent pro-environmental behaviour and supportive attitudes toward sustainability (Clayton, 2003). Collectively, these theories provide an integrated framework linking environmental awareness and climate change perception (cognitive factors) with attitude towards sustainable development (affective orientation) and pro-environmental behaviour (behavioural outcome), thereby offering strong theoretical support for the hypothesised relationships in the study.

1.3 Scientific Consensus and the Growing Call for Sustainable Practices

Over the past few decades, scientists around the world have reached a strong consensus about the seriousness of environmental degradation—especially when it comes to climate change and the disruption of ecosystems. The IPCC, founded in 1988 by the World Meteorological Organisation and the United Nations, is regarded as one of the most reliable sources for climate-related research. In its Sixth Assessment Report (AR6), the IPCC (2021) made a clear and urgent statement: human activity is undeniably responsible for warming the atmosphere, oceans, and land. This human influence has triggered widespread and rapid changes in Earth's climate system. The report also delivers a sobering warning—unless we drastically cut down greenhouse gas emissions, global temperatures are likely to rise beyond 1.5°C or even 2°C within this century. These temperature thresholds are not just numbers—they represent critical tipping points. Crossing them could lead to severe and possibly irreversible consequences for both natural ecosystems and human societies across the globe.

Climate scientists agree over the fact that humans are responsible for climate change, as over 97% of peer-reviewed scientific studies agree that human actions- burning fossil fuels and unsustainable land use- are the main cause of climate change, as shown in a key study by Cook et al. (2016). This widespread agreement highlights the need for all parts of society to take quick, big steps together.

Amid escalating environmental challenges, both the scientific community and policymakers worldwide have increasingly acknowledged the imperative of embracing sustainable development. A seminal milestone in this discourse was the publication of the Brundtland Report, *Our Common Future*, in 1987, which articulated the now universally endorsed definition of sustainable development. The World Commission on Environment and Development (WCED) defined it as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." This conceptual framework has since profoundly influenced a multitude of international treaties, environmental strategies, and policy frameworks. Among the most comprehensive and ambitious manifestations of this paradigm are the SDGs, launched in 2015 as part of the United Nations' 2030 Agenda for Sustainable Development. Comprising seventeen interlinked objectives, the SDGs address a broad spectrum of global challenges, with several goals explicitly targeting environmental sustainability. Notably, Goal 12 (Responsible Consumption and Production), Goal 13 (Climate Action), Goal 14 (Life Below Water), and Goal 15 (Life on Land) underscore the urgency of preserving ecological integrity. According to the United Nations (2015), the SDGs are designed to safeguard biodiversity, optimise the utilisation of natural resources, mitigate pollution, and enhance adaptive capacity to climate change, all while advancing social equity and fostering inclusive economic growth. Collectively, they epitomise a global consensus and commitment to cultivating a future in which human societies and the natural environment can coexist and flourish in tandem.

Despite these efforts, progress remains uneven and often falls short of the targets. The UNEP, in its *Emissions Gap Report 2022,* highlighted that current national commitments under the Paris Agreement are insufficient to limit warming to below 2°C, let alone 1.5°C (UNEP, 2022). The gap between awareness and action is increasingly recognised as a central barrier to achieving sustainability, pointing to the

importance of individual behaviour change and the role of education, perception, and awareness in environmental transformation (UNESCO, 2020).

Educational institutions, particularly those at the tertiary level, are therefore being called upon to instil eco-consciousness and promote green behaviour among youth. Students represent a key demographic that will shape future policies, industries, and consumption patterns. Their attitudes towards sustainable development and perception of climate change can influence not only their personal choices but also broader societal norms (Leiserowitz et al., 2010). Consequently, understanding the determinants of these variables is vital for designing effective educational interventions and public policies that aim to foster environmental stewardship and global sustainability.

1.4 Addressing Environmental Degradation through Behavioural Change

The unprecedented speed and extent of environmental damage have made it necessary for society to make major changes at many levels. Institutional and technological changes are still very important, but more and more people are realising that changing people's behaviour, both individually and as a group, is important for solving the root causes of environmental crises (Stern, 2000; Kollmuss & Agyeman, 2002). Climate change, pollution, overconsumption, and resource depletion are all major environmental problems that are caused by people, either through their choices about how they live, what they buy, or the rules of society. Changing the way people and communities interact with the environment is therefore essential to reaching sustainability goals.

Greenhouse gas emissions, damage to ecosystems, and pollution all happen when people do things like waste water, consume too much meat, travel in ways that aren't good for the environment, and throw away trash without thinking about it (Gifford, 2011). Many of these habits are shaped by culture or economics, but research shows that they may be changed by raising awareness, teaching people, changing societal norms, and offering individuals incentives (Steg & Vlek, 2009). For example, research has shown that people who care more about the environment and have strong ecological values are more likely to do things that are good for the environment, like recycling, saving energy, taking public transportation, and supporting environmental policies

(Bamberg & Möser, 2007). Also, you can't express enough about how strong it is to work together. People's actions may seem small when they join together, start movements, or employ institutional structures, but they can have a big impact on the environment. Cooperative farming, local clean-up activities, tree-planting drives, and participatory water management (Pretty, 2003) are all community-based methods that have helped fix the environment and get people involved. Changing people's minds, convincing governments to make environmental laws stronger, and having businesses pay for what they do all depend on people working together (Ostrom, 2010). The COVID-19 pandemic showed how the health of people and the health of the environment are linked. It also revealed that altering habits quickly, including travelling less, buying different goods, and being more aware of health risks, can help the environment grow better. Carbon emissions went down a lot during the first lockdowns, and air and water quality got better all around the world (Le Quere et al., 2020). These results didn't last long, but they did show how changing behaviour may have a big effect and how everyone can help the environment by working together. People will still modify their behaviour over time if you raise awareness and teach them. People learn the information, skills, attitudes, and motivation they need to make good choices and act morally through environmental education (UNESCO, 2020). This kind of education is very important for young people, especially college and university students, because what they do and select will have an effect on the environment in the future. Colleges and universities are very important places to teach students about climate change, the environment, and how to live in a way that is good for the planet. The fact that time is running out to act makes the need for change stronger. To prevent global warming from reaching 1.5°C, the IPCC says that carbon emissions around the world need to be cut in half by 2030 and reach net-zero by 2050. To reach such high goals, many people will have to change how they act and how other people act. Policymakers, teachers, employers, and the general public all need to work together to support behavioural interventions that are based on science, are appropriate for many cultures, and are available to everyone. To sum up, new technology and changes to policies are important, but they won't lead to long-term growth unless people change the way they act. We need to take personal responsibility and work together to fix the damage we've

done to the ecosystem. Values like stewardship, fairness across generations, and being conscious of the environment should be the basis for this (Stern, 2000).

1.5 India's Vulnerability to Environmental Issues

India is one of the most populous and ecologically diverse countries in the world. Because of this, it is very vulnerable to the harmful impacts of climate change and environmental degradation. Being heavily dependent on climate-sensitive sectors such as agriculture, water, and forestry, it is highly susceptible to both gradual and sudden environmental shocks (World Bank, 2021). The Global Climate Risk Index 2021 identified India as one of the ten nations most severely impacted by extreme weather events in recent years (Eckstein et al., 2021). Floods, droughts, air pollution, and glacier melting are just a few examples of how these weaknesses show up. All of these things have a big impact on people's health, the economy, and the environment.

India has a lot of flooding that happens more and more often because of changing monsoon patterns, more people moving to cities, and poor drainage systems. According to the National Disaster Management Authority (NDMA, 2020), about 12% of India's land is at risk of flooding, which affects millions of people every year. The floods in Kerala in 2018 and the floods that happen again and again in Assam and Bihar show how heavy rain and unplanned development can hurt infrastructure, people's lives, and ecosystems (Singh, 2020). Climate models show that global warming will probably make monsoon irregularities and heavy rainfall events happen more often and in ways that are hard to predict (IPCC, 2021).

On the other hand, droughts are becoming increasingly frequent and severe, especially in India's semi-arid and arid states like Maharashtra, Rajasthan, and parts of Andhra Pradesh. According to the Composite Water Management Index by NITI Aayog (2019), nearly 600 million people in the country are living under high to extreme water stress, and lives are lost each year due to a lack of access to safe drinking water. This growing water crisis is being fuelled by multiple factors, including overextraction of groundwater, unpredictable rainfall, outdated and inefficient irrigation systems, and widespread pollution of rivers and lakes. On top of that, climate change is making things worse. It's disrupting rainfall patterns and higher rates of evaporation, further straining

already limited water resources. Together, these challenges are painting a worrying picture for India's water future.

India also has a big problem with air pollution. Major cities like Delhi, Kanpur, and Kolkata often have air quality that is dangerous to health. The World Air Quality Report 2023 revealed that many Indian cities were among the most polluted in the world (IQ Air, 2023). Burning crop residue, construction dust, and emissions from cars are all things that can pollute the air. Air pollution is now the second biggest risk factor for disease in India, causing more than 1.67 million deaths in 2019 alone (Institute for Health Metrics and Evaluation [IHME], 2020). This is a serious health issue. Studies also show that high levels of particulate matter can hurt farming and cause clouds to form. This directly links air pollution to climate-related effects (Burney & Ramanathan, 2014).

In the northern part of the country, especially in the Himalayas, glacier retreat is becoming a bigger problem. The Himalayas, which are sometimes called the "Third Pole," have the most glaciers outside of the polar regions. They are also the source of important rivers like the Ganga, Brahmaputra, and Indus. But studies show that Himalayan glaciers are melting faster than ever before, losing ice mass twice as quickly in the last few decades as they did in the previous century (Maurer et al., 2019). This retreat threatens long-term water availability, raises the risk of glacial lake outburst floods (GLOFs), and harms the fragile mountain ecosystems that millions of people rely on.

Rapid and often unplanned urbanisation has made environmental problems even worse. Cities are growing into areas that are important for the environment, which is causing deforestation, the loss of wetlands, and improper waste management. Many Indian cities now have urban heat islands, too much groundwater extraction, and trash that isn't disposed off properly. Climate change makes these problems worse, making cities places where the environment is especially degraded to its highest level (TERI, 2022).

Agriculture, which is the main source of income for almost 58% of people in India (Ministry of Agriculture & Farmers Welfare, 2022), is very sensitive to climate change. Rising temperatures, changing rainfall patterns, less fertile soil, and more pest

outbreaks all threaten the productivity of farms and the security of food. The Economic Survey of India (2020–21) said that climate change could cut farmers' incomes by up to 25% each year, especially for small and marginal farmers. India's environmental problems have big effects on society and the economy, and they hurt the most vulnerable groups the most, like the poor, women, indigenous communities, and people who live in remote areas. When ecosystems like forests, wetlands, and mangroves are damaged, the country is also less able to deal with climate change. This makes the cycle of vulnerability and damage worse (UNDP, 2022).

In short, India's path of development has a lot to do with how vulnerable it is to environmental problems. We need more than just fixes to our technology and infrastructure to solve these hard problems. We also need to change the way people and organisations act. India's plan for long-term growth includes important steps like making people more aware of the environment, building climate resilience, and getting young people to live in a way that is good for the environment.

1.6 Ecological Sensitivity of the Kashmir Valley

The Kashmir Valley, located in the northwestern Himalayas, is one of the most biodiverse and environmentally fragile places in South Asia. Its unusual position, diversified terrain, and weather patterns make it an important biological hotspot. But during the past few decades, the area has been under more and more stress from the environment, both from natural processes and from things people have done. Political instability and a lack of progress have made this worse. The Western Himalayan biodiversity hotspot, where Kashmir is located, is noted for having a variety of different flora and animals. There are many distinct habitats in the area, such as alpine meadows, temperate forests, marshes, and lakes with fresh water. The Hangul (Kashmir stag), Himalayan black bear, snow leopard, musk deer, and many indigenous plants are some of the uncommon and endangered species that live in these environments (Dar et al., 2014). The Valley is also a major stop for birds that are migrating. Hokersar and Wular Lake are wetlands that are home to thousands of birds that migrate from Central Asia and Siberia every year (Kumar et al., 2015). This variety is good for jobs, traditional

knowledge systems, and food security in the area, as well as helping to keep the ecology in balance.

The Greater Himalayan glaciers in the north and northeast of the Valley serve as crucial freshwater sources for major rivers like the Chenab, Indus, and Jhelum. These glaciers, along with others in the Himalayas, are shrinking due to rising temperatures and shifting rainfall patterns (Bahuguna et al. 2014). The melting glaciers put the region's seasonal water supply and long-term water stability at risk. The Indian Space Research Organisation (ISRO) reports significant ice loss from several Kashmiri glaciers over the last two decades. This increases the likelihood of glacial lake outburst floods (GLOFs) and leads to reduced downstream water availability (ISRO 2016). Kashmir's forests, which once covered over half the land, are deteriorating due to illegal logging, land encroachment, new roads and infrastructure construction, and tree cutting for fuel. Global Forest Watch (2021) reports that Jammu and Kashmir lost over 5% of its tree cover from 2001 to 2020. This deforestation has not only harmed biodiversity, but also worsened soil erosion, landslides, carbon sink loss, and the breakdown of traditional agroforestry systems.

Over the past few years, quick and unmanaged city growth near Srinagar, Anantnag, and Baramulla has strained the area's fragile ecosystem. Expanding populations, road systems, and business structures have taken over wetlands, farms, and forest buffers. Dal Lake, once a stunning water body and Kashmir's cultural symbol, has shrunk due to pollution, sewage, and excess nutrients (Pandit et al. 2020). Wetlands like Hokersar and Hygam have also deteriorated, threatening bird habitats, flood control, and water purification. Poor trash management, car emissions, and the discharge of sewage into natural waters have impacted urban ecosystem health. Kashmir now experiences more weather changes, including unusual snowfall timing in later winters, less snow compared to rain, odd temperature spikes, and shifting farming seasons (Zaz et al. 2020). These changes undermine agricultural practices and pomological activities, the predominant economic sustenance of the Valley, while concurrently perturbing ecological equilibria, disrupting biodiversity cycles, and altering hydrological regimes.

Compounding these ecological challenges is the political instability and governance vacuum that have often led to environmental neglect. Decades of conflict, limited policy attention, inadequate environmental planning, and institutional inertia have left conservation efforts fragmented and underfunded. Environmental issues often take a backseat to security concerns, and public participation in environmental governance remains minimal. Local stakeholders, including youth and educational institutions, are seldom involved in sustainability discourse, despite their crucial role in shaping environmentally conscious societies (Dar & Bhat, 2022). The combination of climate stress, ecological fragility, unsustainable development, and governance challenges makes the Kashmir Valley a highly vulnerable region. Studying the environmental awareness, pro-environmental behaviour, and perception of climate change among students in this region is not only academically valuable but also practically imperative for shaping adaptive, youth-driven sustainability strategies. While environmental education is becoming more and more important globally, there is still little research on sustainability views in India, especially in areas like Kashmir that are environmentally susceptible and sensitive to conflict (Rather & Ahmad, 2020). Therefore, by examining the variables that influence undergraduate students' awareness about sustainability in the Kashmir Valley, this study seeks to close this gap.

The rationale for this study rests on three key justifications. First, despite the abundance of national and international research on sustainability education, relatively few studies look at the factors that influence these variables in developing and conflict-prone areas (Misra, 2017). The Kashmir Valley is still neglected in this conversation, despite its ecological vulnerability and significance for education (Ahmad & Hussain, 2020). Second, the impact of factors including climate change perception, attitude towards sustainable development, and environmental awareness on students' pro-environmental behaviour needs to be experimentally evaluated. Such knowledge can support undergraduate-level sustainability outreach programs, teacher preparation programs, and curriculum design (Kollmuss & Agyeman, 2002; Lee, 2008; and Yavetz et al., 2009). Third, Policymakers, educators, and institutional stakeholders seeking to align their initiatives with the Sustainable Development Goals (SDGs) may derive significant insights from the practical implications of this research (Leal Filho et al., 2016).

Targeted interventions can be created to produce graduates who are concerned about sustainability and able to advance sustainable development goals in their communities and professions by determining which factors have the greatest influence on students' attitudes (Schultz, 2011).

Despite the growing significance of sustainable development on a worldwide scale, students' knowledge, attitudes, and dedication to its tenets vary widely (Lee, 2012). Understanding what influences students' sustainability is crucial in the Kashmir Valley, where environmental challenges are becoming more noticeable. Without this understanding, instructional tactics might not effectively engage students or cultivate the values necessary for long-term decision-making (Wals, 2010). Therefore, the main issue is the dearth of empirical data regarding the factors influencing undergraduate students' opinions on environmental awareness, pro-environmental behaviour, climate change perception and attitude towards sustainable development in this particular sociocultural and ecological context.

Higher education students can better grasp sustainability by using theoretical frameworks for strategy and leadership (Bezbatchenko, 2010). The institution's dedication and leadership are essential. One of the most important factors in deciding the course of higher education institutions is leadership (Emanuel & Adams, 2011). Institutional dedication and leadership have an impact on sustainable results. A growing number of Higher Education Institutions (HEIs) are realising their importance in society and the need to contribute significantly to sustainability and sustainable development (Tilbury et al., 2011). Through the training of future generations, the encouragement of research, and the collection of collective knowledge, higher education institutions are propelling our modern societies into their future (Lozano et al., 2006). HEIs have the power to change the group of youth who are using education and action to change the world. The objectives of education in HEIs are to help and sustain a knowledgeable public, educate young minds, and use research to solve problems (Cortese, 2003).

1.7 The Role of Awareness, Perception, and Attitudes in Shaping Environmentally Responsible Behaviour

Addressing the environmental crises of the 21st century requires not only technological innovations and policy reforms but also significant changes in individual and collective behaviour. Increasingly, scholars and practitioners emphasise the importance of psychological and cognitive factors—such as environmental awareness, perception of environmental issues, and attitudes toward sustainability—in motivating environmentally responsible actions (Kollmuss & Agyeman, 2002; Stern, 2000).

Environmental awareness refers to the level of knowledge and understanding individuals have about environmental issues, their causes, and consequences. It is widely regarded as a foundational element for developing a sense of responsibility toward nature (UNESCO, 2020). Individuals who are more informed about environmental degradation, pollution, biodiversity loss, and climate change are more likely to support and adopt behaviours that mitigate these problems (Mostafa, 2007). For instance, awareness of water scarcity can encourage water conservation, while knowledge of plastic pollution can reduce single-use plastic consumption. However, awareness alone is often insufficient—there must be corresponding changes in values and behaviour for real impact to occur.

Closely linked to awareness is environmental perception, particularly the perception of climate change and its risks. Perception involves how individuals interpret, emotionally respond to, and prioritise environmental problems (Leiserowitz et al., 2006). Studies have shown that individuals who perceive climate change as a serious and immediate threat are more likely to engage in adaptive and mitigative behaviours, such as reducing energy use, supporting environmental policies, and preparing for climate-related hazards (van der Linden, 2015). Moreover, cultural, geographic, and socio-economic contexts strongly influence perception. In regions like the Kashmir Valley, where ecological fragility and climate variability are directly experienced, perceptions can be powerful drivers of behavioural adaptation.

Individuals' perceptions of sustainability and the environment serve as critical indicators of their underlying attitudes toward these issues. These attitudes are shaped

by a person's values, beliefs, feelings, and social factors (Ajzen, 1991). When people think positively about sustainable development, they are more likely to make choices that are good for the environment, like buying eco-friendly products, saving energy, supporting conservation efforts, and working on environmental projects in their neighbourhoods (Bamberg & Moser, 2007). Education is very important for changing these mindsets. It helps people think critically, make moral decisions, and grasp how humans and the natural world are all connected.

There are a number of psychological, social, and structural factors that play a role in the shift from awareness and attitudes to pro-environmental behaviour. According to Ajzen's Theory of Planned Behaviour (TPB), intentions have the biggest effect on behaviour. These intentions are shaped by attitudes, perceived norms, and perceived behavioural control. Stern's (2000) Value-Belief-Norm (VBN) theory also says that values (such as altruism and concern for the environment), beliefs about the environment, and personal moral norms are all important for getting people to do things that are good for the environment. Researchers, on the other hand, say that there is a persistent value-action or knowledge-action gap. This is when people say they care or know but don't do anything because of things like convenience, economic problems, lack of infrastructure, or social norms (Kollmuss & Agyeman, 2002). Accordingly, endeavours to modify individual behaviour necessitate not only an appraisal of cognitive and affective dimensions, but also a critical examination of the broader constellation of structural, contextual, and socio-ecological determinants that either enable or inhibit behavioural enactment. Young people, especially those in college and university, are very important for making the world more sustainable. They are still figuring out what they believe and how they see the world, which makes them more open to new ideas, getting involved in their communities, and taking responsibility for the world (O'Brien et al., 2018). Their knowledge, opinions, and attitudes about the environment have a big impact on the direction of sustainable development, so it is important to talk about these issues with students, especially in places like the Kashmir Valley, where the environment is very important. This understanding is necessary for making targeted and effective environmental education programs and policy changes that can bring about real and lasting change.

1.8 Significance of Students as Change Agents for Environmental Sustainability

Youth, particularly those enrolled in institutions of higher education, constitute a crucial segment of society in advancing the shift toward a more sustainable and environmentally responsible future. As educated, socially aware, and technologically proficient individuals, university students are uniquely positioned to influence environmental values, behaviours, and policy directions at both local and global levels (UNESCO, 2019). They are not only future leaders, professionals, and policymakers but also active participants in the current socio-political and ecological landscape. Students' values, sense of social duty, and style of thinking really start to take shape during their college and university years (Tilbury, 2011). A lot of students start to look at things, think about what they believe, and define the rules that will help them make decisions in the future around this time. Educational institutions are crucial on this road. They don't just teach kids about school courses; they also teach them how to care about the environment, live in a way that is good for the environment, and learn the skills they need to solve problems that affect society and the environment. According to UNESCO (2020), when colleges and universities teach and study with Education for ESD, they provide students with the knowledge and skills they need to make good decisions and accomplish things that are good for the economy, the environment, and society as a whole.

Young people tend to be more open to change, receptive to innovation, and quick to adopt sustainable technologies and practices, from eco-friendly transportation and renewable energy use to waste reduction and ethical consumption (Organisation for Economic Co-operation and Development (OECD), 2020). Their active presence on digital platforms allows them to disseminate environmental messages, mobilise climate campaigns, and influence peer behaviour more effectively than traditional top-down approaches. Youth-led environmental movements—such as Fridays for Future, Youth Climate Strikes, and numerous campus sustainability initiatives—demonstrate the power of young voices in shaping public discourse and pushing for systemic reforms (Hayward et al., 2015).

The younger generations today are shouldering the significant weight of the environmental issues that previous generations have left for them. As the future caretakers of our planet, they have a personal stake in advocating for sustainable policies that ensure the well-being of people both now and in the years to come. According to the IPCC in its 2018 special report, we must act swiftly and decisively this decade to avoid crossing critical ecological thresholds that could become irreversible. This timeline closely mirrors the realities and futures of today's youth (IPCC, 2018). As awareness of the long-term risks of climate change grows, many young people are stepping up as moral leaders. They understand the consequences of inaction and are actively pushing for change by inspiring their friends, communities, and even lawmakers to embrace more eco-friendly values and practices. Their voices are becoming increasingly significant in the global conversation surrounding environmental justice and sustainable development. This makes it more crucial than ever to grasp their thoughts, feelings, and actions.

Students engage in the acquisition of environmental literacy and subsequently contribute to peer and community-level knowledge dissemination. Studies suggest that when young people learn more about environmental challenges, they often change how their parents, friends, and communities think and act. Lawson et al. (2019) call this ripple effect the intergenerational transfer of environmental concern. Young people play a very crucial role in more traditional or rural communities where environmental information may not always be available through mainstream media or policy discussions. They help fill in information gaps, question old ways of doing things, and come up with new ways to live sustainably.

In the context of the Kashmir Valley, where environmental degradation is compounded by socio-political instability and developmental neglect, youth engagement becomes even more critical. Undergraduate students in this region are directly exposed to ecological challenges, such as shrinking water bodies, deforestation, pollution, and climate variability, which affect agriculture, livelihoods, and quality of life. Given their lived experiences, educational exposure, and potential for civic engagement, Kashmiri students constitute a powerful demographic for fostering environmental stewardship and promoting sustainable development in the region.

1.9 Higher Education Institutions: Nurturing the Next Generation of Sustainability Advocates

In the face of escalating environmental challenges, higher education institutions (HEIs)—including universities and colleges- are increasingly recognised as key drivers of sustainable development. Beyond their traditional roles of knowledge generation and skill development, these institutions serve as transformative spaces where sustainability-related values, worldviews, and lifelong behaviours are formed, particularly among youth (Cortese, 2003; Lozano et al., 2013). As centres of learning, critical inquiry, and social engagement, HEIs hold immense potential to foster environmentally literate, ethically grounded, and action-oriented graduates who are equipped to address complex ecological and societal challenges.

One of the most direct ways that universities influence sustainability is through curriculum design and pedagogical practices. Environmental education that integrates interdisciplinary perspectives helps students understand the interlinkages between ecological systems, economic structures, and social equity (Tilbury, 2011). Courses in environmental science, climate studies, sustainable development, and green technologies not only improve environmental literacy but also encourage systems thinking, critical analysis, and solution-oriented mindsets (UNESCO, 2020). Furthermore, active learning methods—such as problem-based learning, service learning, and experiential fieldwork—enhance students' ability to connect theory with real-world sustainability challenges (Wals, 2015).

Beyond formal knowledge, universities play a vital role in shaping students' values, ethical orientations, and personal identities. Research indicates that the tertiary education stage constitutes a formative developmental period wherein individuals' identities and value systems are consolidated, thereby exerting a profound influence on their long-term orientations toward environmental stewardship, social responsibility, and civic engagement (Levine & Dean, 2012). Institutional culture, campus norms, peer influence, and faculty role models all contribute to the development of pro-environmental values and habits. Universities thus serve as socialisation environments

where students begin to internalise concepts such as ecological justice, intergenerational equity, and the importance of planetary health (Orr, 2004).

The physical and operational practices of universities also serve as powerful tools for promoting sustainable habits. Initiatives such as green campus infrastructure, waste segregation, energy-efficient buildings, rainwater harvesting, bicycle-friendly pathways, and organic food programs demonstrate sustainability in action and shape daily behaviours (Lozano, 2006). Students who study and live in such environments are more likely to develop personal habits aligned with sustainability principles—such as recycling, energy conservation, and sustainable transportation (Emanuel & Adams, 2011). These campus practices thus act as living laboratories that foster behavioural change through modelling and immersion.

Many universities support student-led environmental clubs, sustainability committees, and green events that provide platforms for youth to engage actively with sustainability issues. These spaces empower students to lead awareness campaigns, conduct research projects, and participate in policy dialogues—thereby enhancing their confidence, leadership skills, and civic engagement (Rowe, 2007). Participation in such initiatives has been shown to have a lasting impact on students' pro-environmental behaviours and career choices (Barth et al., 2014). Moreover, experiential engagements—exemplified by initiatives such as the celebration of World Environment Day—foster transformative learning by cultivating a sense of agency and ownership, thereby enabling students to construct their identities as active contributors to environmental solutions rather than passive recipients of knowledge.

As respected societal institutions, universities also serve as bridges between academia, policy, and community. By partnering with local governments, civil society, and industry, HEIs can influence sustainable policy-making and foster community-based environmental initiatives. This is especially relevant in ecologically fragile and politically complex regions such as the Kashmir Valley, where universities can help connect academic research with local environmental management and grassroots action (Dar & Bhat, 2022).

In sum, universities and colleges are not merely sites of academic instruction; they are crucial incubators for sustainability transformation. By fostering environmental knowledge, shaping values, encouraging behaviour change, and enabling community engagement, they are instrumental in cultivating a generation of citizens who are not only conscious of environmental challenges but also equipped and motivated to tackle them effectively.

1.10 Rationale of the Study

The urgency of the global environmental crisis, evident through climate change, biodiversity loss, deforestation, pollution, and ecosystem degradation, has sparked significant academic interest in understanding how people think about and respond to environmental issues. A growing body of international research emphasises the role of psychological and socio-cultural factors, such as environmental awareness, perception, values, and attitudes, in shaping pro-environmental behaviour (Stern, 2000; Kollmuss & Agyeman, 2002). However, much of this research has been conducted in Western, urban, or industrialised settings, often overlooking the complex realities of more vulnerable regions. There exists a pronounced necessity for localised and context-contingent inquiry, particularly within ecologically precarious and politically volatile regions such as the Kashmir Valley. Here, environmental degradation is accelerating, and the socio-political landscape adds further complexity to how individuals perceive and engage with sustainability. Exploring these dynamics in the Kashmiri context is essential for developing locally relevant strategies for environmental education and policy.

The Kashmir Valley, located in the northwestern Himalayas, is an ecologically vulnerable region facing numerous environmental pressures, including glacial retreat, deforestation, air and water pollution, and erratic climate patterns (Zaz et al., 2020; Pandit et al., 2020). These issues are compounded by political instability, developmental neglect, and weak environmental governance (Dar & Bhat, 2022). Despite the valley's visible exposure to environmental change, limited empirical research exists on how the local population, particularly youth, perceives and responds to these challenges. A deeper understanding of the factors influencing environmental

awareness, climate change perception, and sustainable attitudes is urgently needed to design context-appropriate solutions.

Undergraduate students represent a crucial demographic for studying environmental psychology and sustainability. As educated and impressionable individuals, they are at a life stage where values, perceptions, and behavioural patterns are being formed. They are also potential change agents capable of influencing family, community, and policy domains (Hayward et al., 2015). While global studies have explored environmental concern among youth populations (O'Brien et al., 2018), there is a glaring paucity of such research focused on students in Kashmir. Given the region's unique socio-ecological dynamics, it is inappropriate to assume that findings from other contexts are directly transferable. This underlines the necessity of conducting context-specific research that reflects the lived realities, cultural values, and environmental experiences of students in Kashmir.

Although previous studies have addressed concepts such as environmental awareness and sustainable behaviour in broader Indian or South Asian contexts (Sharma & Gupta, 2019; Mostafa, 2007), very few have holistically examined the interplay between awareness, perception, attitudes, and behaviour in fragile mountain ecosystems. Most studies focus on isolated constructs rather than an integrated understanding of what drives sustainability-related behaviours. Moreover, they often neglect the influence of demographic and socio-cultural variables—such as gender, subject stream, parental education, and rural-urban background—which are crucial for designing targeted interventions. This study, therefore, aims to fill this empirical gap by exploring the determinants of environmental awareness, pro-environmental behaviour, climate change perception, and attitudes toward sustainable development among undergraduate students in the Kashmir Valley. By applying a multi-dimensional approach, it seeks to uncover the socio-psychological and demographic factors that influence environmental responsibility in this critical population group.

The results of this study carry important implications for policy development, curriculum design, and the implementation of behavioural interventions. Understanding how students perceive environmental issues and what influences their behaviour can

help educational institutions in Kashmir to design contextually grounded sustainability curricula, aligned with UNESCO's goals of ESD. Policymakers and NGOs can use these insights to develop youth-centric environmental awareness programs, green campus initiatives, and community-based adaptation strategies. In a region as environmentally fragile and politically sensitive as Kashmir, youth engagement in climate action is not just desirable; it is imperative.

Thus, this study is both theoretically significant and practically relevant. It contributes to the academic field of environmental psychology and education while also offering actionable insights for stakeholders working on sustainability and climate resilience in Jammu and Kashmir.

1.11 Statement of the Problem

In recent decades, the global community has witnessed an alarming escalation of environmental challenges. These crises have stimulated increased awareness and concern, especially among the youth population, who are expected to bear the long-term consequences of environmental degradation. Despite rising levels of environmental awareness, a persistent gap remains between environmental knowledge and environmentally responsible behaviour—a phenomenon often referred to as the value–action or knowledge–action gap (Kollmuss & Agyeman, 2002; Bamberg & Moser, 2007). This disjunction accentuates the necessity of scrutinising not merely the extent of individuals' environmental awareness and their engagement in pro-environmental behaviours, but also the intricate sociodemographic determinants that may act as structural moderators or mediators, shaping the interplay between environmental cognition, attitudinal dispositions, and the enactment of sustainable practices. In the context of undergraduate students, who are both educated and socially influential, this issue becomes particularly significant. Research indicates that although students may express concern about environmental problems and articulate support for sustainable practices, their actual engagement in pro-environmental behaviours—such as energy conservation, waste reduction, or climate advocacy—is often inconsistent (Emanuel & Adams, 2011; Vicente-Molina et al., 2013). Such discrepancies may arise from various mediating factors, including personal attitudes, perceived behavioural

control, social norms, risk perception, and structural barriers (Ajzen, 1991; Stern, 2000). Within India, and particularly in the Kashmir Valley, this problem is magnified by the region's fragile ecological condition, characterised by glacial retreat, deforestation, erratic weather, pollution of freshwater ecosystems, and increasing climate variability (Pandit et al., 2020; Zaz et al., 2020). However, very limited research has been conducted to assess the environmental psychology and sustainable behaviour of students in this socio-ecologically sensitive region. The scarcity of context-specific studies is especially striking given the importance of local perceptions and behaviours in determining the effectiveness of environmental policies and education programs (Dar & Bhat, 2022). Most environmental behaviour studies in India either focus on urban populations, specific environmental issues, or general attitudes, with Kashmir remaining underrepresented in the empirical literature.

Furthermore, existing research often overlooks how demographic variables (such as gender and age), socio-economic factors (like family income, parental education, and occupation), and educational background (such as stream of study or academic exposure) influence students' environmental values and actions. Studies have shown that such factors significantly affect climate change perception, willingness to adopt sustainable practices, and readiness to engage in environmental activism (O'Brien et al., 2018; Mostafa, 2007). Without understanding the role of these determinants in a region like Kashmir, where environmental degradation is compounded by political instability, limited civic engagement, and fragile institutional frameworks, any attempt to promote sustainable development may fall short.

Therefore, the present study seeks to investigate the determinants of environmental awareness, pro-environmental behaviour, climate change perception, and attitudes toward sustainable development among undergraduate students in the Kashmir Valley. By identifying which demographic, socio-economic, and educational factors shape these variables, this research aims to bridge both theoretical and empirical gaps. The insights derived from this study will be instrumental for educators, curriculum designers, NGOs, and policymakers in crafting evidence-based, youth-focused interventions for environmental awareness and sustainable action in the Kashmir region.

1.12 Significance of the Study

The present study holds multidimensional significance across academic, policy, educational, and societal domains, particularly within the fragile ecological and socio-political context of the Kashmir Valley. By examining the determinants of environmental awareness, climate change perception, pro-environmental behaviour, and attitudes towards sustainable development among undergraduate students, the study aims to generate context-specific insights that can inform theory, practice, and policy.

This study adds empirical depth to the growing field of environmental psychology and education, especially within the Indian and Kashmiri context, which remains underexplored in scholarly literature. While global research has extensively examined environmental attitudes and behaviour (Stern, 2000; Kollmuss & Agyeman, 2002), there is limited data from regions like Kashmir, where ecological fragility intersects with political volatility. By integrating socio-demographic and educational factors, this study provides a deeper understanding of how contextual variables shape sustainability-related behaviours. It also addresses the knowledge–action gap among students, a recurring concern in environmental education literature (Bamberg & Moser, 2007). Hence, this study will serve as a valuable reference for future researchers interested in behavioural determinants of environmental action in similar ecologically vulnerable settings.

For policymakers and governmental agencies, the study provides crucial evidence for designing targeted sustainability interventions aimed at youth. With climate change becoming an urgent national and global concern, there is a need for data-driven environmental policy that aligns with the cognitive, attitudinal, and behavioural realities of the region's population. Insights from this study will support the formulation of region-specific youth policies, help prioritise climate communication strategies, and promote youth engagement in environmental governance in Jammu and Kashmir. Given the state's unique ecological challenges, the findings can inform the State Action Plan on Climate Change (SAPCC) and National Education Policy (NEP 2020) provisions related to environmental awareness and experiential learning.

The study offers substantial practical value for universities and colleges, especially in terms of curriculum development and environmental pedagogy. With UNESCO (2020) advocating for ESD, the findings of this research will help institutions assess the effectiveness of their current environmental education strategies and identify gaps in student engagement, awareness, and action. The study will provide evidence-based recommendations to help educators design interdisciplinary, participatory, and action-oriented sustainability programs, integrate environmental thinking into various subject streams, and build green campus cultures that reinforce pro-environmental behaviour among students (Tilbury, 2011).

At the societal level, the study aims to empower youth as informed, responsible, and proactive environmental stewards. The youth, particularly students, are not only among the most vulnerable to future climate impacts but also critical agents of change capable of influencing peers, families, and communities (O'Brien et al., 2018; Lawson et al., 2019). By identifying the behavioural, perceptual, and attitudinal patterns of undergraduate students in Kashmir, the study provides a roadmap for fostering environmental citizenship, encouraging collective responsibility, and enhancing climate resilience at the grassroots level. In doing so, it supports the broader global agenda of building a sustainable, equitable, and environmentally conscious society, aligned with the United Nations Sustainable Development Goals (SDGs)—especially SDG 4, SDG 12, and SDG 13.

1.13 RESEARCH OBJECTIVES

A global movement towards sustainable development has become increasingly necessary in recent years due to growing environmental concerns, including climate change, biodiversity loss, pollution, and resource depletion. In light of this, education has taken on a more crucial role in producing environmentally conscious individuals who possess the values, knowledge, and skills necessary to address these problems. It is impossible to overestimate the importance of raising youth understanding of environmental issues, supporting pro-environmental behaviour, and cultivating a positive attitude toward sustainability, especially in the Kashmir Valley. Undergraduate students are an essential group for comprehending and influencing sustainable practices

since they will be future leaders, legislators, and engaged citizens. Therefore, this study aims to systematically examine the complex interrelationships among undergraduate students in the Kashmir Valley, encompassing environmental awareness, pro-environmental behaviour, climate change perceptions, and attitudes toward sustainable development. The study seeks to provide the inquiry with a targeted direction by defining specific and quantifiable research objectives, guaranteeing that every aspect of the research is in line with its main goal. Beyond bridging existing gaps in the literature, these objectives are designed to yield empirically grounded insights that can guide the refinement of curricula, shape evidence-based educational policies, and inform the implementation of community-oriented sustainability initiatives. The precise research objectives are listed below in accordance with this intention.

1. To evaluate the level of Environmental awareness among undergraduate college students of the Kashmir Division with respect to their social and demographic attributes.

2. To study the pro-environmental behaviour among the undergraduate college students of the Kashmir Division in light of their social and demographic attributes.

3. To investigate the relationship between Environmental Awareness and Pro-Environmental behaviour among the undergraduate students of the Kashmir Division.

4. To analyse the approach of undergraduate college students of the Kashmir Division towards Climate Change.

5. To evaluate the attitude of undergraduate college students towards Sustainable Development.

CHAPTER 2
REVIEW OF LITERATURE

Chapter 2: REVIEW OF LITERATURE

Over the past few decades, growing environmental concerns have drawn attention across numerous academic disciplines, prompting researchers to explore how human beings interact with their natural surroundings. As ecological crises such as climate change, biodiversity loss, and pollution become increasingly urgent, understanding the psychological, social, and educational factors that shape environmental behaviour has never been more critical. Scholars around the world have emphasised the need to raise environmental awareness, promote pro-environmental behaviour, and foster positive attitudes and perceptions toward sustainability and climate change (Kollmuss & Agyeman, 2002; Stern, 2000). The present study positions itself within this broader context, focusing on the Kashmir Valley—a region uniquely affected by both environmental and sociopolitical challenges. By examining the factors that influence students' environmental awareness, climate change perception, pro-environmental behaviour, and attitudes toward sustainable development, this research aims to contribute to a deeper understanding of how young people engage with pressing environmental issues. A comprehensive review of existing literature is therefore essential to establish the theoretical grounding and guide the direction of the present investigation. In this context, the review of literature about the individual variables has been delineated separately, while studies elucidating the interrelationships among these variables have been synthesised under a distinct thematic heading.

2.1 Research on Environmental Awareness

Boermans et al. (2024), in their study of environmental awareness and sustainable behaviour, emphasised how cultural and developmental factors affect ecological awareness in different nations and generations. Disparities in sustainable participation highlighted the necessity of customised approaches to address issues such as waste management, eco-labelling, and greenwashing.

Doddapanen et al. (2024) evaluated environmental education, awareness, and ethics among pre-university students in Mysore and found that around 80% of students responded positively, demonstrating a strong commitment to environmental protection.

The study concluded that fostering environmental awareness among students benefits sustainability and helps reduce pollution.

Mohamad et al. (2020) explored how well school administrators understand environmental issues. Through a survey, they found that while administrators had a strong sense of environmental responsibility and positive attitudes, their actual knowledge and behaviours related to environmental issues were only moderate. This suggests a gap between awareness and action, highlighting the need for further education and training to translate their enthusiasm into meaningful environmental practices.

Kaur (2019) studied how students' experiences, knowledge, and emotions shape their attitudes toward environmental education. Her research emphasised that schools play a crucial role in fostering environmental awareness through both academic subjects and extracurricular activities. By incorporating hands-on experiences, schools can strengthen students' connection to the environment, encouraging more responsible behaviours in their daily lives.

Rogayan and Nebrida (2019) surveyed 100 science students at a public high school in Zambales, Philippines, to understand how well they grasped environmental issues. Their findings revealed that while students believed they had a solid understanding of environmental concepts and current ecological challenges, their actual participation in environmental actions varied. This highlights the importance of moving beyond theoretical knowledge and encouraging more active engagement in sustainability efforts.

Medhi (2018) studied environmental awareness among high school students in Guwahati City, Kamrup District, and explored how factors like gender and school type influence their understanding of environmental issues. They found that boys and girls showed similar levels of awareness, suggesting that education and exposure play a much bigger role in shaping environmental consciousness than gender does.

Raj et al. (2018) conducted an extensive review of research on students' environmental attitudes, analysing 109 published studies. By using text-mining techniques such as word clouds and clustering, they identified key themes in environmental education research. Their study suggested that policymakers should

prioritise studies on environmental participation, eco-friendly technology, and ethics to better guide future sustainability initiatives.

Anees et al. (2017) studied how female college students in the Kashmir Valley engage with environmental issues. They found that most students relied on public media as their main source of environmental information. Interestingly, rural students showed greater concern for environmental issues than their urban peers. However, only a small percentage (2.25%) of students were actively involved in environmental organisations, indicating a need for more structured opportunities to translate awareness into action.

Aral et al. (2017) used Structural Equation Modelling to analyse the relationship between environmental awareness, attitudes, self-esteem, and life happiness among high school students in Turkey. They discovered that students who had higher environmental awareness and positive attitudes toward nature also tended to have greater self-esteem and overall happiness. This suggests that environmental education could have broader psychological benefits beyond sustainability.

Bhartiya (2017) assessed the environmental consciousness of Assamese citizens through a descriptive survey. The study found that Assamese women were more environmentally aware than men, highlighting a gender-based difference in ecological consciousness. This suggests that targeted initiatives could help raise awareness among men to balance the overall level of environmental concern in society.

Bordhan (2017) examined environmental awareness among secondary school students in Assam and found significant differences based on gender, location, and language medium. Girls showed greater environmental awareness than boys, urban students were more informed than their rural counterparts, and Assamese-medium students were more knowledgeable than English-medium students. These findings highlight the need for more inclusive environmental education strategies that bridge these gaps.

Chelliah et al. (2017) investigated international students' awareness of green campus initiatives at the University of Sains Malaysia (USM). Their study found that environmental knowledge, concern, and material incentives played a significant role in shaping students' awareness and engagement with sustainability efforts on

campus. This suggests that universities should incorporate both educational and incentive-based strategies to encourage eco-friendly behaviours.

Dhanya and Pankajam (2017) examined environmental awareness among secondary school students in Coimbatore, Tamil Nadu, and showed no discernible variation in students' levels of environmental awareness, suggesting the need for more effective engagement tactics to help students integrate sustainability into their everyday lives.

Gupta (2017) investigated environmental awareness among urban and rural school students in Raipur, Chhattisgarh, using the Environmental Awareness Scale. The study found that regardless of gender or location, students exhibited similar levels of environmental awareness. This suggests that educational interventions should focus on reinforcing existing awareness while promoting action-oriented sustainability practices.

Islam and Razzak (2017) compared environmental awareness among college students studying arts and sciences at AMU. Using the Environmental Awareness Ability Measure (EAAM), they found that while all students had a generally positive attitude toward environmental issues, science students demonstrated slightly higher awareness levels. This suggests that exposure to scientific concepts may enhance students' understanding of environmental concerns.

Padmanabhan et al. (2017) investigated environmental consciousness among instructors and students in higher education at Himachal Pradesh University. According to their findings, only 64.28% of pupils showed high awareness levels of environmental issues, indicating that teachers understood them better than students. This demonstrates the necessity of more thorough environmental education at the collegiate level in order to close the knowledge gap between teachers and students.

Bhat et al. (2016) examined college students' attitudes and awareness of environmental education in the Kashmir Valley, Jammu & Kashmir. Their findings showed that while students had a high level of awareness, their environmental practices were only moderate. Gender differences also played a role in how students engaged with environmental activities. The study emphasised that students need more practical knowledge and skills to address environmental challenges effectively.

Hooda (2016) explored college students' attitudes toward environmental

pollution in Faridabad, Haryana, using two established awareness scales. The findings revealed that students at private colleges had a more favourable attitude toward environmental awareness than those at government colleges. This suggests that institutional policies and curricula play a role in shaping students' perspectives on sustainability.

Patial (2016) studied environmental awareness among secondary school students in Kangra district, Himachal Pradesh. The results indicated that overall awareness levels were low, with noticeable differences based on students' age groups. This suggests that environmental education needs to be reinforced at multiple stages of schooling to ensure long-term understanding and engagement.

Singh (2015) used the Environmental Awareness Ability Scale to analyse how undergraduate students' environmental knowledge varied based on their field of study and place of residence in Ambala district. The results showed significant differences in awareness levels depending on students' backgrounds, highlighting the need for targeted environmental education programs that cater to different groups.

2.2 Research on Pro-environmental behaviour

Bhat et al. (2024) studied awareness about environmental laws among college students in Kashmir and revealed that most respondents lacked awareness of environmental laws, which are essential for a healthy society. They also found that no significant difference in pro-environmental practices was observed between arts and science students, and thus suggested promoting legal literacy on environmental laws to foster a fairer society and enhance environmental protection and response to global challenges.

Mago et al. (2024) explored how environmental understanding shapes eco-friendly behaviour and found that knowledge alone isn't enough—attitude and sensitivity toward the environment play key roles in turning awareness into action. They found that people with greater environmental knowledge were more likely to engage in sustainable behaviours, but this link was strengthened when they also had a positive attitude toward nature and a heightened sensitivity to environmental issues. However, they found no significant gender differences in this process, suggesting that fostering

environmental awareness and action depends more on mindset and education than on gender.

Neurohr et al. (2024) explored adolescents' interest in nature, their participation in outdoor activities, and their pro-environmental behaviour (PEB). Studying German school students, they found a concerning trend—interest in nature, time spent in nature, and eco-friendly behaviours all declined between grades 5 and 9. However, the study also revealed a strong link between these factors: students who were more interested in nature were more likely to engage with it and adopt sustainable habits. They highlighted the need for environmental education programs that actively nurture curiosity and connection with nature, ensuring that young people remain engaged and inspired to care for the environment.

Piao and Managi (2024), using large-scale data from 37 countries, investigated the relationship between green behaviour and various determinants of environmental sustainability. Their study confirmed a positive association between pro-environmental behaviour and factors including subjective well-being, environmental knowledge, education, life satisfaction, mental health, and positive emotions. However, the study also identified heterogeneous effects across determinants, including education, income, family structure, and emotional well-being. The results suggested that higher knowledge, education, and well-being contributed to stronger pro-environmental behaviour, supporting the development of an eco-surplus society.

Rahmawati et al. (2024) explored what influences Indonesian students to behave in environmentally friendly ways by applying the Theory of Planned Behaviour (TPB). They focused on how students' attitudes, the influence of people around them (subjective norms), and their confidence in their ability to act (perceived behavioural control) shape their intention to engage in pro-environmental actions. The study showed that all three factors, attitude, social pressure, and a sense of control, significantly encouraged students to form strong intentions to act sustainably. These intentions, in turn, were key in predicting whether students actually followed through with eco-friendly behaviour. In short, the research highlights that students are more likely to care for the environment when they feel positively about it, believe others expect them to

act responsibly, and feel capable of making a difference. These findings suggest that schools and policymakers can encourage sustainable behaviour by nurturing positive attitudes, promoting supportive social norms, and empowering students to feel confident in their actions.

Saulick et al. (2024) examined secondary and higher education students in Mauritius' readiness to adopt pro-environmental behaviour using the Transtheoretical Model of behaviour Change and revealed that demographic factors such as gender, education level, and age influence pro-environmental behaviour. They also found that although most participants had a positive attitude towards PEB, only a small percentage actually adopted it.

Zhao et al. (2024) examined how nature-based environmental education influences students' pro-environmental behaviour. Their study found that direct contact with nature through environmental education has a significant positive impact on encouraging environmentally responsible actions among students. Importantly, the research highlighted that environmental attitudes and a sense of responsibility serve as key links between nature-based learning experiences and eco-friendly behaviour. This suggests that fostering a personal connection to nature, along with cultivating awareness and responsibility, can be powerful tools in promoting sustainable behaviour.

Apaolaza et al. (2022) studied how mindfulness influences pro-environmental behaviour. Their findings revealed that people who practice mindfulness are more likely to engage in green actions due to increased climate awareness and cognitive reappraisal (the ability to rethink situations and make more sustainable choices). However, for individuals who already feel deeply connected to nature, mindfulness had a smaller impact. This suggests that promoting mindfulness practices could be particularly beneficial for individuals who have not yet developed a strong environmental consciousness.

Berger and Wyss (2021) presented the Carbon Emission Task (CET), an innovative instrument aimed at assessing individuals' reactions to financial incentives and environmental impacts. The findings indicated that when individuals observe the

tangible effects of their actions on the environment, they are more inclined to participate in environmentally friendly behaviours. Nonetheless, the introduction of financial incentives can lead individuals to prioritise personal gain at the expense of sustainability. The analysis highlights the importance of meticulously crafting policies and incentives to truly foster enduring environmental stewardship.

Chaudhuri (2021) studied the impact of human actions on the environment, highlighting the urgent need for sustainable practices and emphasising the importance of adopting environmentally responsible behaviours and policies to mitigate the damage and ensure a balance between progress and ecological preservation.

Sharpe et al. (2021) examined whether people's motivation to support environmental policies translates into real-world pro-environmental behaviour. Their research found a strong link between support for environmental policies and eco-friendly actions, but when motivation was taken into account, this link weakened. This suggests that while people may support environmental causes in theory, real-world actions often depend on factors beyond motivation, such as convenience, cost, and social influences.

Bhattacharyya et al. (2020) studied what drives future business leaders to adopt sustainable behaviours. Their research showed that personal values, social norms, and moral obligations play a significant role in shaping environmentally responsible decision-making. The study suggested that business schools should integrate sustainability topics into their curricula to equip future managers with the knowledge and ethical mindset needed to tackle climate change and promote corporate responsibility.

Diaz (2020) explored the psychological factors that influence people's willingness to adopt sustainable behaviours. The study revealed that a person's knowledge of climate change, their attitudes toward the environment, their confidence in their ability to make a difference, and their trust in information sources all shape their actions. They suggested that real change happens when people feel inspired and empowered, and thus policymakers and educators should focus on offering practical,

personalised solutions that make sustainability feel achievable and relevant to daily life, turning awareness into meaningful action.

Lone and Bhat (2020) explored the pro-environmental orientation among tribal and non-tribal adolescents in the Srinagar District of Jammu and Kashmir using the Pro-Environmental Orientation Scale (PEOS) and found a significant difference in pro-environmental orientation between tribal and non-tribal adolescents, with non-tribal students exhibiting a higher level of environmental consciousness. The findings highlighted the need for targeted ecological education programs to enhance awareness and engagement among tribal adolescents, ensuring more inclusive environmental responsibility.

Ramkissoon (2020) suggested that being confined to a particular place, such as during a pandemic, can encourage positive behaviours at home, benefiting both the planet and personal well-being. The study highlighted how small, mindful actions, such as turning off the tap while brushing teeth or starting a home garden, can foster a sense of connection and purpose. These simple practices not only enhance mental health by reducing anxiety but also provide financial and health benefits, demonstrating how pro-environmental habits can enrich daily life.

Shafiei and Maleksaeidi (2020) studied how university students' attitudes and motivations influence their eco-friendly behaviours. They found that students were more likely to engage in sustainability efforts when they had strong environmental attitudes and a sense of personal responsibility. However, perceived costs and rewards also played a role—students were more motivated to act sustainably when they saw tangible benefits. The study suggests that offering incentives and emphasising the personal advantages of sustainable actions could encourage more students to adopt eco-friendly behaviours.

Yusliza et al. (2020) explored what drives students to adopt pro-environmental behaviour at a Malaysian training centre. Their study found that students who were committed to the environment, had a strong awareness of sustainability, and embraced a green lifestyle were more likely to engage in eco-friendly actions. Additionally, students with high green self-efficacy—confidence in their ability to make a

difference—were more proactive in adopting sustainable behaviours. The findings highlight the role of education, government, and private organisations in fostering environmental responsibility through learning programs and practical initiatives.

Capstick et al. (2019) developed a survey tool to analyse how people justify their environmental behaviours across seven countries. They found that individuals often rationalise unsustainable actions with "compensatory beliefs"—such as thinking that recycling offsets driving a gas-guzzling car. They also discovered that many people believe their eco-friendly actions will inspire more sustainable behaviour in other areas of life. Their findings stress the need to better understand how these psychological justifications influence long-term environmental habits.

Fatoki (2019) explored how employees' connection to nature influences their pro-environmental behaviour in small and medium-sized businesses. The study found that employees who felt a strong personal bond with nature were more likely to engage in eco-friendly workplace behaviours, while environmental knowledge alone had little impact. This underscores the need to cultivate a stronger emotional bond with the environment, rather than depending only on informational campaigns.

Lange and Dewitt (2019) explored the best ways to study pro-environmental behaviour (PEB). They found that while controlled lab experiments help researchers understand the psychological mechanisms behind PEB, real-world studies provide a clearer picture of how people act in their daily lives. They emphasised the need for well-designed, validated research tools to improve our understanding of what drives sustainable behaviours and how interventions can be made more effective.

Runhaar et al. (2019) examined how education helps students develop critical thinking skills about environmental issues. They found that beyond classroom learning, the overall school environment—including interactions with teachers and peers—shapes students' eco-friendly attitudes and behaviours. Their study suggests that fostering an environmentally conscious school culture is just as important as the curriculum itself in promoting sustainability.

Jusoh et al. (2018), in their study on environmental awareness among university students in Malaysia, highlighted the critical role of environmental education in shaping sustainable attitudes and behaviours. Their findings revealed that environmental education not only helps individuals comprehend the consequences of their actions on the planet but also motivates them to adopt practical strategies to maintain clean and green surroundings.

Liu et al. (2018) explored the motivational factors that drive Mongolian college students to take part in environmentally friendly public actions. Their research uncovered a clear pattern: students who held strong altruistic values—those who cared about the well-being of others and the planet—were significantly more likely to engage in pro-environmental behaviours. In contrast, those with more egoistic or self-centred values were less likely to participate in such activities, suggesting that personal value systems play a crucial role in shaping environmental behaviour. One of the study's most striking findings was the significant role of personal responsibility. Students who recognised their personal responsibility in environmental protection were much more inclined to take action. This sense of accountability acted as a key motivator, often overriding other factors. The implications of these findings are especially relevant for educators and policymakers. By cultivating a sense of shared responsibility and reinforcing altruistic values through targeted education and awareness campaigns, institutions can nurture a more engaged and environmentally conscious student population. Ultimately, the study underscores that empowering young people to see themselves as agents of environmental change is vital to building a sustainable future.

Ningrum and Herdiansyah (2018) investigated the environmental awareness of college students in Jakarta, Indonesia. They found that both male and female students were generally well-informed about environmental issues and exhibited positive attitudes toward sustainability. However, differences emerged in how consistently each group put their awareness into practice, pointing to the need for targeted programs that encourage hands-on environmental involvement.

Palupi and Sawitri (2018) reviewed existing research to understand how teenagers and young adults develop environmentally friendly habits. Their analysis

emphasised that pro-environmental behaviour stems from both personal values and social norms. They found that students who are encouraged to think critically and receive quality environmental education are more likely to adopt sustainable behaviours, suggesting that schools and universities play a vital role in shaping a more environmentally conscious generation.

Shrivastava (2018) examined how college students in Bhopal perceive environmental issues and engage in eco-friendly behaviours. The study discovered that students pursuing science degrees tend to be more aware of environmental concerns and practice more sustainable behaviours than those studying commerce or arts. This suggests that exposure to scientific education can foster a deeper understanding and commitment to environmental stewardship.

Akkor and Gunduz (2017) examined the environmental attitudes of students, focusing on gender differences in environmental sensitivity, and revealed that female students exhibit higher environmental awareness and are more sensitive to environmental issues compared to their male counterparts. This highlights the importance of integrating environmental education into curricula to foster greater environmental responsibility among all students. They also suggested that targeted educational strategies are necessary to enhance environmental consciousness across different demographic groups.

Dutta (2017) investigated the level of environmental awareness among college students in the Dhakuakhana Sub-Division and revealed that students demonstrate a high level of environmental awareness, highlighting the need for further enhancement of environmental consciousness through educational initiatives and awareness programs. The researcher stressed the importance of integrating sustainability topics into the curriculum to ensure a more profound understanding of environmental issues and responsible behaviour among students.

Hidayah and Agustin (2017) examined the eco-friendly habits of high school students, focusing on recycling, energy conservation, and sustainable transportation. Their study found that science students were more likely to engage in pro-environmental behaviour, likely due to their exposure to environmental topics in the

classroom. Additionally, participation in extracurricular activities played a key role in encouraging sustainability. The study highlighted the importance of both formal education and hands-on experiences in shaping students' environmental habits.

Kalkan and Demirbas (2017) revealed a strong correlation between the demographic backgrounds of private school managers and teachers and their degree of environmental knowledge, attitudes, and behaviours. They stressed that institutions are urged to embrace transformative teaching strategies that advance knowledge and foster a stronger commitment to sustainability rather than depending solely on conventional, lecture-based teaching techniques. So that the approaches shape a generation that actively contributes to a more sustainable future by integrating the concepts of environmental responsibility into educators' everyday actions and core beliefs.

Kaul (2017) studied the role of media in shaping public perception and awareness of environmental issues and explored how acts of environmental degradation are frequently highlighted in media coverage, bringing serious attention to various ecological concerns. The researcher revealed that the media plays a crucial role in informing and influencing public attitudes toward environmental protection by providing continuous updates on environmental challenges, policies, and solutions, thereby acting as a bridge between scientific research and societal action. The study emphasised the need for responsible and accurate reporting to foster greater environmental consciousness among individuals and communities.

Orellana-Ríos (2017) explored how students in schools near protected natural areas perceive environmental education. The findings showed that integrating environmental topics into the curriculum can significantly raise students' awareness of local issues, like water conservation. The study emphasised that making environmental education a core part of the curriculum can foster a more profound respect for nature and inspire proactive environmental behaviour in young people.

Bhat et al. (2016) examined the awareness, attitudes, and participation of college students in environmental activities and revealed that while students recognise environmental challenges such as population explosion, resource depletion, and pollution, they lacked sufficient awareness and problem-solving skills to effectively

address these issues. This emphasises the need for enhanced environmental education programs to equip students with the necessary knowledge and skills for identifying and resolving environmental problems, and integrating practical approaches into the curriculum could foster a more proactive and responsible attitude toward environmental conservation.

Ali (2015) explored individuals' tendencies to engage in pro-environmental behaviour through two primary means: financial contributions and active participation, and found that people demonstrate environmental responsibility by either supporting sustainability initiatives financially or directly engaging in environmental conservation activities, emphasising the need for policies and educational programs that encourage individuals to contribute effectively.

Buzov (2014) explored how the digital generation engages with environmental issues through social media. The study found that students prefer using social networking sites (SNSs) to learn about sustainability rather than relying on traditional textbooks. This suggests that educational institutions should embrace digital platforms as a tool for environmental education, making learning more engaging and relevant for today's tech-savvy students.

Gifford and Nilsson (2014) delved into the myriad factors that shape our environmental concerns and behaviours. They found that our actions toward the environment are influenced by a wide array of personal experiences, such as childhood memories, education, and even our political views. Social factors like cultural norms, community values, and access to green spaces also play a role. Interestingly, they noted that many people engage in eco-friendly practices not out of concern for the planet but for practical reasons like saving money or improving health.

Harju-Autti and Kokkinen (2014) created a novel Environmental Awareness Index (EAI) and utilised it in a cross-national study encompassing 57 countries. The study examined six hypotheses to investigate the relationship between environmental awareness and several critical national factors, such as national wealth, environmental conditions, post-materialist values, self-transcendence and self-enhancement values, as well as gender equality. The results indicated that, across numerous nations, there is a

perception of the environment deteriorating. The study notably revealed that adopting a more comprehensive method for assessing environmental awareness, incorporating motivation, knowledge, and practical skills, produces more robust correlations with national indicators compared to conventional approaches that solely emphasise concern for the environment. These findings highlight the necessity for thorough frameworks in evaluating and enhancing environmental awareness on a global scale.

Ull (2014) explored the perceptions and attitudes of teacher-training students toward environmental issues and sustainability by analysing students' knowledge, concerns, and commitment to sustainability, highlighting the factors influencing their attitudes, and suggested that while many students recognise the importance of environmental education, gaps remain in their practical engagement and implementation strategies. This stressed the need for integrating sustainability more effectively into teacher training programs to enhance environmental responsibility and action.

Kee (2013) studied how young people engage with the Earth Hour campaign and whether it inspires long-term sustainable habits. The study found that people who had switched off their lights for Earth Hour in the past were more likely to do so again, showing that past actions strongly shape future intentions. However, those who viewed Earth Hour as just a symbolic gesture tended to have a more sceptical outlook. The study highlighted the importance of shifting environmental campaigns from one-time events to lasting behavioural change.

Eilam and Trop (2012) explored the differences between changing attitudes and changing behaviours when it comes to environmental responsibility. Their research suggested that while traditional education methods are effective in altering behaviour (such as encouraging recycling), they are less successful in shifting deeply held attitudes. Their findings challenge the common belief that individual eco-friendly actions alone can lead to large-scale policy changes, suggesting that broader systemic interventions are necessary in environmental education for the construction of attitudes.

Sahin et al. (2012) investigated how media exposure and gender affect college students' perceptions of sustainability. According to their research, female students

were more receptive to sustainability-related media messages and tended to have greater pro-environmental beliefs. Furthermore, students who engaged in outdoor activities, such as hiking or birdwatching, had a higher likelihood of forming sustainable behaviours. According to these results, colleges may play a significant part in encouraging students to interact with nature more and in advancing sustainability through efficient media and communication platforms.

Steg and Vlek (2009) examined how our everyday actions impact the environment and proposed a practical framework for fostering eco-friendly habits. They suggested starting by identifying harmful behaviours and understanding their root causes. From there, interventions can be designed to encourage positive changes, with ongoing assessments to measure their success. Their research underscored the valuable role of environmental psychology in creating lasting, sustainable behaviours.

Willuweit (2009) examined environmental behaviour in Abu Dhabi and found that people who felt a strong sense of responsibility and control over environmental issues were more likely to make eco-friendly choices. However, overall engagement in sustainable behaviour was low, particularly among younger individuals and those from developing regions. The study suggested that policies should focus on changing societal attitudes toward the environment while also tailoring interventions to different demographic groups to maximise their impact.

2.3 Research on Attitude towards Sustainable Development

Guan et al. (2025) examined the impact of COVID-19 on public attitudes toward sustainability and found a significant negative correlation between pandemic severity and support for sustainable development, particularly among employees, women, younger individuals, and those with higher education. However, government interventions positively influenced attitudes, while media trust mediated the relationship between media exposure and sustainability support.

Abdullah et al. (2024) explored how ESD shapes the behaviour of university students in Somalia. Their study found a strong positive link: students who engaged with ESD were more likely to adopt environmentally responsible habits. They

emphasised that for sustainability to become a lasting cultural norm, it needs to be deeply embedded in higher education. By integrating ESD into university curricula, institutions can empower students to make environmentally friendly choices, not just in theory but in their daily lives and communities.

Leal et al. (2024) explored higher education students' perceptions of sustainable development and found that their comprehension of sustainability substantially shapes their behaviour toward sustainability-related concerns, with attitudes toward sustainability serving as a partial mediating factor. The study underscores the urgent need to enhance education on sustainable development and the Sustainable Development Goals across all disciplines and levels of higher education.

Nunez et al. (2024) undertook a comprehensive study to explore how motivation, attitude, knowledge, and engagement—collectively referred to as the MAKE framework—contribute to the development of sustainability competencies among students. Their research revealed meaningful and statistically significant relationships among these four factors, with motivation emerging as the most powerful and consistent predictor of students' growth in sustainability-related competencies. In other words, more motivated students tended to show stronger development in understanding and applying sustainable practices. The study highlighted that while knowledge and engagement are essential, it is motivation, the inner drive to act, that most effectively catalyses learning and behavioural change in the context of sustainability. This insight provides practical implications for educators, curriculum designers, and policymakers. Fostering an educational environment that nurtures students' intrinsic motivation, promotes positive attitudes, encourages active participation, and deepens knowledge can better equip students to become proactive, responsible contributors to sustainable development. The MAKE framework, therefore, offers a holistic and actionable model for enhancing sustainability education in meaningful and lasting ways.

Zhang et al. (2024) used agent-based modelling to examine the connection between social sustainability and environmental consciousness in Japan's power market. According to their findings, social learning causes consumer groups with

varying electricity preferences to form, which influences the development of environmental awareness in both high- and low-carbon user groups. The study also found that market share has a significant impact on the adoption of low-carbon technology, although initial consumer variations have little bearing on the overall shift to sustainability. This emphasises how crucial market forces and group dynamics are in influencing decisions on sustainable energy.

Jillani et al. (2022) examined sustainability awareness among university students in Pakistan, revealing a significant gap between the private and public education sectors. The study found that private universities were ahead in promoting sustainability, while public institutions lagged. The findings stressed the need for both sectors to collaborate and update policies to ensure sustainability is effectively incorporated into curricula nationwide.

Ridwan et al. (2021) assessed university students' sustainability awareness and found that while most students scored highly, their actual sustainability practices remained inconsistent. Female students exhibited slightly higher awareness levels than male students. The study suggested that universities should focus not only on raising awareness but also on encouraging students to integrate sustainability into their daily behaviours.

Vasconcelos et al. (2021) conducted a study to explore how students in higher education engage with pro-environmental behaviours that support sustainable development, with particular attention to the environmental dimension. The research involved Portuguese university students and utilised a Likert scale to assess their levels of environmental knowledge, attitudes, and actual behaviours. The findings revealed a significant divergence: although many students demonstrated substantial knowledge of environmental issues and articulated favourable attitudes towards sustainability, this awareness did not consistently manifest in substantive action.

Balakrishnan et al. (2020) examined Malaysian undergraduates' attitudes toward sustainability and found that while students had positive views on environmental issues, they were less engaged with the social and economic aspects of

sustainability. The study suggested that educators should place greater emphasis on these areas to provide a more balanced approach to sustainability education.

Bask et al. (2020) analysed business students' values and attitudes toward sustainability, comparing them to those of students in other disciplines. Surprisingly, business students were just as supportive of sustainable development as their peers. The study highlighted the need for regular assessments of students' sustainability attitudes and suggested incorporating a sustainability education framework into business curricula.

Wang et al. (2020) explored sustainable development in Chinese higher education and found that students care most about their university's commitment to sustainability and its role in driving sustainable development. On the other hand, they are least concerned with sustainability-related curricula and research. Interestingly, the study also revealed a contrast between public and private university students—those in private institutions tend to place greater importance on sustainability and demonstrate a stronger awareness, attitude, and engagement in sustainable practices. They revealed that heightened awareness among private university students stems from their universities' proactive sustainability efforts and strong relationships with stakeholders, fostering a culture of active participation.

Wurjaningrum et al. (2020) carried out a comprehensive assessment of the Higher Education for Sustainability Development (HESD) program to evaluate its overall impact and effectiveness across multiple dimensions. Their analysis revealed that certain core elements, particularly institutional governance, community engagement, and innovation initiatives, played pivotal roles in promoting sustainability within higher education institutions. Among these, research and development emerged as the most influential factor, serving as a driving force for innovation and long-term sustainability efforts. The study emphasised that empowering academic research and integrating sustainability into institutional operations and community engagement are key strategies for embedding sustainable development deeply into the fabric of higher education.

Alkhayal et al. (2019) conducted a study at a major non-profit private university in Riyadh, Saudi Arabia and explored faculty members' understanding and integration of sustainability in higher education. It revealed varying levels of awareness across departments and emphasised that training and workshops could enhance sustainable teaching practices. The findings aligned with Saudi Vision 2030, underscoring the crucial role of faculty in embedding sustainability as a core institutional value. The study concluded that strengthening educators' sustainability knowledge is vital for preparing students for environmentally, socially, and economically responsible futures while positioning universities as regional leaders in sustainable development.

Bayas Aldaz and Sandoval Hamon (2019) explored how student representatives in Spanish universities perceive sustainable mobility. They found that students in mid-sized cities prioritised parking regulations, bicycle-friendly infrastructure, and pedestrian-friendly campuses, while those in larger urban universities valued policies that reduced private car use. Across all universities, financial constraints and lack of awareness were identified as major barriers to implementing sustainable transport solutions.

Guan et al. (2019) conducted a detailed study to understand how people in five major Chinese cities feel about the United Nations Sustainable Development Goals (SDGs). Their research revealed that public support for the SDGs is strongly influenced by demographic factors like age, gender, and level of education. For instance, younger and more educated individuals tended to show greater support. Interestingly, the study also found that people who associated sustainable development with economic growth—rather than viewing it purely as an environmental concern—were more inclined to back its implementation. This suggests that framing sustainable development as a strategy for economic progress may resonate more with the public and encourage broader engagement. The findings highlight the importance of tailoring sustainability messages to different segments of society to build stronger support for global goals.

Malik et al. (2019) examined how well Pakistani students understood sustainability concepts within the technology education curriculum. They found that

teaching sustainability through technology-related subjects helps students grasp how economic, social, and environmental principles can be applied in real-world scenarios. However, the study also revealed gaps in the curriculum, suggesting that a more comprehensive approach is needed to equip students with the skills required for sustainable technological development.

Msengi et al. (2019) discovered that while students recognised the importance of sustainability, many were unaware of campus initiatives promoting it. This lack of awareness stemmed from sustainability not being adequately integrated into university curricula and student programs. The study emphasised that for universities to truly embrace sustainability, they need to improve infrastructure, prioritise faculty training, and actively involve students in campus-wide sustainability projects.

Orellana-Rios (2017) took a closer look at how teaching practices in secondary schools located within natural protected areas can shape students' views about the environment. By listening to students' perspectives, the study found that when environmental topics are woven into everyday lessons—a process called curricular greening—students become more aware and engaged with environmental issues. It also showed that when teachers use eco-friendly approaches in the classroom, it enables students to gain a deeper understanding of sustainability and fosters a heightened sense of responsibility for safeguarding the planet.

Abu Bakr et al. (2016) explored students' perspectives on campus sustainability and found an interesting contrast—while students were highly aware of environmental issues, they were not actively engaged in sustainability initiatives. The lack of motivation was partly due to the limited availability of sustainability programs in key areas such as transportation, energy, and water conservation. Although some progress had been made with waste recycling and sustainable landscaping, the study highlighted a need for stronger integration of sustainability into student projects and academic courses.

Gholami et al. (2015) introduced a novel approach to sustainability education by applying the principles of Student Relationship Management (SRM), similar to how businesses manage customer relationships. They argued that SRM could serve as a

valuable teaching tool, allowing educators to track the impact of sustainability lessons on students' attitudes. By using SRM, universities could gain deeper insights into how students perceive different aspects of sustainable development and tailor their teaching strategies accordingly.

Zeegers and Clark (2014) explored how students engage with sustainability education and found that interactive and reflective learning strategies were the most effective in shaping students' views on sustainability. The study emphasised the need to move away from traditional lecture-based teaching methods in favour of more student-centred approaches.

Zwickle et al. (2014) emphasised that the next generation—especially university students—will play a pivotal role in shaping a more sustainable future. Their research highlighted the need for sustainability to be woven into higher education curricula, ensuring that students gain not only the knowledge but also the mindset and skills to tackle environmental challenges. By embedding sustainability principles across different fields of study, universities can empower students to take meaningful action—whether by addressing climate change, conserving resources, or driving sustainable development in their careers and communities. They stressed that sustainability education shouldn’t be confined to environmental science alone; instead, it should be integrated into all disciplines, fostering a holistic and interdisciplinary approach to solving global challenges.

Aziz et al. (2012) developed a structural model to assess the relationship between students' knowledge of sustainability and their attitudes toward it. Their findings revealed a strong link between understanding sustainable development and adopting a positive attitude toward it, particularly among engineering students. The study suggested that educators use this model as a guide to design lecture materials that emphasise key sustainability concepts, helping students bridge the gap between knowledge and action.

Emanuel and Adams (2011) explored how college students in Alabama and Hawaii perceive sustainability on their campuses. Their research showed that while many students were generally aware of key environmental issues such as pollution,

waste, and resource conservation, this awareness didn't always translate into action. In other words, students understood the problems but were often hesitant or unmotivated to change their behaviours accordingly. The researchers described this disconnect as a "commitment gap"—a space between knowing what should be done and actually doing it. They emphasised that universities have a crucial role to play in closing this gap by creating more meaningful opportunities for student involvement, offering clear incentives, and fostering a campus culture that makes sustainable actions accessible, rewarding, and part of daily life.

Mughal et al. (2011) argued that universities should not just integrate sustainability topics into their curriculum but should act as catalysts for broader social change. They emphasised that education for sustainable development (ESD) requires a shift from traditional lecture-based methods to more interactive, constructivist approaches. The study suggested that universities should also collaborate with businesses and communities to promote environmentally friendly technologies and policies.

Torbjornssona (2011) examined Swedish students' attitudes toward sustainability and found notable differences based on gender and educational background. Boys and students in vocational programs tended to prioritise human-centred (anthropocentric) values, while girls and students in theoretical programs leaned toward more nature-centred (biocentric) perspectives. The study suggested that these differences were becoming more pronounced over time.

Hassan et al. (2010) explored how secondary school students perceive sustainable development and found that science students demonstrated higher environmental awareness than arts students. Additionally, students in urban schools had greater sustainability knowledge than those in suburban areas. The study suggested that while students generally had positive attitudes toward sustainability, integrating sustainability education more deeply into all subjects would strengthen their understanding and commitment.

Moore et al. (2005) proposed a set of strategies for embedding sustainability into higher education. Their recommendations included making sustainability a key

factor in university decision-making, encouraging interdisciplinary collaboration, and integrating sustainability into research and teaching. They also stressed the need for universities to create spaces for reflection and innovation, allowing faculty and students to rethink traditional educational approaches.

2.4 Research on Climate Change

Castellini et al. (2024) replicated the Climate Change Risk Perception Model (CCRPM) in the Italian context to investigate whether incorporating the concept of climate change hope would strengthen the model's ability to explain public perceptions. Their findings showed that the CCRPM accounted for 49% of the variance in how people perceive climate-related risks, and the addition of hope made the model even more robust. The study identified several key factors shaping risk perception, including individuals' knowledge about climate impacts, prevailing social norms, personal values, emotional responses, and direct experiences with extreme weather events. These insights underscore the complex, multidimensional nature of climate risk perception and point to the importance of communication strategies that go beyond facts to engage emotions and lived experiences.

Cipriani et al. (2024) developed a new psychometric scale aimed at measuring how people perceive climate change on a sensory and emotional level. Their goal was to better understand how this kind of awareness can encourage sustainable behaviours, support climate-friendly policies, and even help address the growing issue of climate-related anxiety. The scale was tested on participants in the UK and revealed four key dimensions: how individuals notice temperature changes, shifts in humidity, their own emotional responses, and the level of attention climate change receives in the media. By highlighting these perceptual and psychological aspects, the study offered a valuable contribution to the emerging field of climate neuroscience, emphasising how sensory and emotional awareness can shape our responses to environmental change.

Kundariati et al. (2024) explored students' climate change perceptions. They revealed that students believe in the reality of climate change and have adopted green behaviour in energy use to tackle the crisis. Additionally, the majority of the students thought that human activity, not natural processes, was the cause of climate change.

The researchers underlined the necessity of incorporating climate change into the academic curriculum in order to raise awareness among students and motivate them to take climate-friendly actions in their daily lives.

Mbah (2024) explored how academicians' perceptions of climate change at a university in Cameroon influence climate change education and management, and revealed three key perspectives—scientific, observational, and cultural- and highlighted the role of educators in fostering critical thinking to enhance climate change awareness.

Ramos et al. (2024) investigated how Portuguese university students perceived climate change and discovered that although the majority of them were concerned about it, many of them believed they lacked the necessary knowledge and practical abilities to deal with it. A widespread lack of awareness of the effects of climate change was also found in the study. The authors suggested incorporating climate change education into teacher and student training programs in light of these findings in order to better equip them for upcoming difficulties.

Alvarez-Nieto et al. (2022) explored nursing students' perspectives on climate change, sustainability, and their integration into nursing education. Their study, conducted across seven universities, revealed that students were consistently aware of environmental challenges and supported incorporating sustainability into their curriculum. Beyond recognising the importance of these topics, the participants also highlighted the critical role of sustainability education in shaping future healthcare professionals. They emphasised how climate change negatively impacts health, reinforcing the need for nursing education to address these pressing issues.

Galway et al. (2022) explored the deep connections between land, health, and climate change and identified key themes that shape their experiences and perspectives. A central theme, "*All Our Relations"*, highlights the importance of relationships and collective wisdom in understanding and responding to climate change. The study also emphasised the community's direct observations of environmental changes, reinforcing the belief that "*healthy land means healthy people"*. However, concerns were raised about a "*lack of care and respect for Mother Earth"*, underscoring the urgency of

protecting the environment. The research also focused on the role of youth and future generations, recognising their crucial part in sustaining cultural and environmental stewardship. Finally, the connection with land and culture emerged as a vital aspect of identity and resilience, reinforcing the deep, inseparable bond between Indigenous communities and their natural surroundings.

Razali et al. (2022) developed and validated a set of game design guidelines to help developers create educational games focused on climate change. The study aimed to enhance experiential learning by incorporating elements of the carbon cycle into gameplay. Their findings provide valuable insights into how game-based learning can effectively engage players in understanding and responding to climate change.

Vecchio et al. (2022) carried out an extensive review of existing studies examining the impact of climate change on the mental health of indigenous communities globally. The findings revealed that indigenous people face direct psychological impacts due to ongoing environmental changes, with cumulative climate shifts taking a significant toll. Beyond immediate effects, the study highlighted a rise in non-clinical mental health challenges, such as stress and emotional distress, as well as the potential for clinical mental health conditions with prolonged and repeated exposure to climate-related disruptions. The review also explored the risk factors, coping strategies, and adaptive methods Indigenous communities use to navigate these challenges.

Curtis and Grilli (2021) explored how adopting renewable energy plays a vital role in addressing climate change and meeting global environmental goals. They stressed that moving away from traditional energy sources toward cleaner, more sustainable options is crucial for cutting greenhouse gas emissions and ensuring long-term environmental health. Their study also examined how supportive policies and economic incentives can speed up the transition to clean energy. Overall, they emphasised that shifting to renewables is not only key to tackling climate change but also strengthens energy security, supports economic development, and helps protect the environment.

Gautam (2021) investigated secondary school students' understanding of climate change's impact on human health in Nepal. The study revealed that only 50% of students had sufficient knowledge on the topic. To address this gap, the researcher recommended enhancing climate education by integrating more project-based learning and strengthening the curriculum to improve students' awareness and engagement.

Hickman et al. (2021) carried out a global survey to assess climate anxiety among children and young people, as well as their perceptions of governmental responses to climate change. The findings revealed that a substantial proportion of respondents expressed disappointment and disillusionment with political actions, with feelings of betrayal significantly surpassing any sense of reassurance or trust in government efforts.

Hwang (2021) examined climate change awareness across different social groups. His findings revealed that the Korean public had significantly higher awareness of early warning systems, climate change mitigation, and adaptation strategies compared to other groups. The study also highlighted that the media played the most extensive role in shaping public awareness of climate-related issues.

Jurkenbeck et al. (2021) investigated the relationship between climate change awareness and dietary choices among young people. The study found that those who were well-informed about climate change were more likely to adopt environmentally friendly diets. Interestingly, participants who were uncertain about climate change had dietary habits and perspectives that closely resembled those of climate sceptics.

Mekonnen et al. (2021) examined how climate change has affected household food security and the strategies farmers use to adapt. The study revealed that over the past 30 years, climate change has significantly undermined food security, particularly in vulnerable communities. However, the research also highlighted that improving awareness, expanding income-generating opportunities—especially for women-headed households—and enhancing current adaptation practices can play a crucial role in strengthening food security in the face of ongoing climate challenges.

Nguyen and Drakou (2021) explored the key factors influencing coffee farmers' willingness to adopt sustainable agricultural practices. The study found that farmers'

decisions were shaped by social pressure and their confidence in implementing sustainable methods. Raising climate awareness, strengthening trust in scientific information, and fostering supportive social networks were identified as essential strategies to promote sustainable farming practices.

Prasad and Mkumbachi (2021) explored how university students at the University of the South Pacific, Fiji Islands, perceive climate change, and found that students regarded it as an urgent and severe challenge with profound implications for the South Pacific region. Members of the Econesian Society characterised climate change as the "nuclear weapon of the South Pacific," citing its devastating impacts on habitats, coral bleaching, lifestyle disruptions, and the spread of non-native species in Fiji. Conversely, students from Wantok Moana linked climate change to increased weather extremes, declining fish stocks resulting from food scarcity, and escalating oceanic toxin levels. The study underscores the pressing need for robust climate action and education in the region, emphasising the pivotal role of universities in fostering awareness, understanding, and resilience among students.

Rahman et al. (2021) examined the knowledge, attitudes, and practices (KAP) related to climate change and dengue in urban and rural communities of Laos and Thailand. The study identified significant variations in climate change awareness across different age groups, educational levels, and socioeconomic strata. In Lao households, higher education levels and internet access were strongly linked to better climate change and dengue knowledge, highlighting the importance of education and digital resources in raising awareness.

Zeeshan et al. (2021) explored the determinants influencing students' perceptions of climate change in the Jammu division of Jammu and Kashmir, India. Drawing on survey data, the study revealed that 27% of respondents exhibited a high level of awareness, 60% demonstrated strong advocacy, and 88% expressed a willingness to engage in climate-related action. Paradoxically, students who acquired knowledge of climate change primarily through formal education were less inclined to participate in tangible adaptation and mitigation initiatives, thereby underscoring the imperative for pedagogical approaches that prioritise experiential and action-oriented learning.

Maiella et al. (2020) undertook a systematic review examining behaviours related to climate change mitigation and adaptation. Their analysis revealed that individuals are more inclined to engage in environmentally sustainable practices when they perceive climate change as an immediate and concrete threat. Nevertheless, some individuals took proactive measures even when they regarded climate change as remote and abstract, whereas others remained inactive despite recognising its existence. These findings underscore the nuanced and multifaceted nature of human responses to climate change, emphasising the necessity for strategically tailored communication approaches.

Oliver and Adkins (2020) examined how well-informed students are about climate change and found that engaging, content-rich science courses significantly improve climate literacy. Their study emphasised that schools and curriculum designers play a crucial role in fostering interest, awareness, and responsibility toward the environment. By making climate education both rigorous and enjoyable, educators can better equip students to become environmentally conscious citizens.

Palomar and Ingcol (2020) explored students' conceptual understanding of climate change and found gaps in their knowledge. While they had partial awareness of rising temperatures, they lacked a clear understanding of climate-related phenomena such as rainfall patterns, cyclones, droughts, and greenhouse gases. The study highlighted the need for improved climate education to ensure students develop a more comprehensive grasp of environmental issues.

Sen et al. (2020) investigated the coping mechanisms and adaptive measures employed by ethnic minority communities in the upland regions of Thua Thien-Hue province, Vietnam. Their study revealed that these communities had relatively low resilience to climate change and its impacts. To enhance their ability to cope, the researchers emphasised the need for targeted interventions that focus on increasing climate knowledge, raising awareness about associated risks, improving household income and savings, and strengthening household assets.

Van-Huynh et al. (2020) explored how the Xo Dang ethnic minority in Central Vietnam is responding to the challenges of climate change through their traditional agricultural practices. The study revealed that the Xo Dang community possesses a strong awareness of climate-related risks and actively engages in adaptive farming strategies to cope with changing environmental conditions. Two major factors—

monthly farm income and individuals' personal experiences with climate impacts—were found to significantly influence their adaptation choices. The researchers stressed the value of Indigenous knowledge in shaping more effective and locally grounded climate policies. They argued that integrating traditional practices and lived experiences into national strategies can enhance both the relevance and success of climate adaptation efforts.

Akrofi et al. (2019) examined how regional climate change effects and student participation in climate-related activities influenced their awareness and knowledge of the issue. Using a snowball sampling technique, the study found that students who engaged in climate workshops and campaigns had significantly higher knowledge levels. However, interestingly, mere membership in climate-related student clubs did not have a significant impact on their awareness.

Hundera et al. (2019) investigated small landholder farmers' awareness and perceptions of climate change in Ethiopia's Adama district. While most farmers reported being aware of climate change, their understanding of its threats, particularly its impact on agriculture, water, and energy, was found to be limited. This highlights the need for current and authentic information and communication strategies to ensure farmers are well-equipped to adapt to climate challenges.

Ogunsola et al. (2018) assessed Nigerian students' awareness of climate change using a Likert-scale questionnaire. The study found that most students recognised human activities—such as industrial emissions, gas flaring, bush burning, and deforestation—as key contributors to climate change. They also understood the consequences, including flooding, droughts, erosion, economic decline, and increased disease outbreaks. These insights highlight the importance of integrating climate education into school curricula.

Monroe (2017) carried out a systematic review to identify what makes climate change education most effective. The review highlighted two essential elements often found in successful environmental education programs: offering information that feels personally meaningful and relevant to learners, and using interactive, engaging teaching approaches. Beyond these general strategies, the study also pointed to techniques specifically useful for climate education. These included creating space for open dialogue, encouraging direct interaction with scientists, correcting common

misconceptions, and involving students in hands-on projects within schools and local communities. Together, these strategies provide practical insights for educators working to engage students with complex and at times controversial, climate-related issues.

Versteijlen et al. (2017) examined the impact of online education on carbon emissions in higher education institutions (HEIs) in the Netherlands. The study found that travel-related emissions accounted for 40–90% of the total carbon footprint of HEIs. By reducing the need for travel, online education emerged as an effective strategy for minimising carbon emissions in the academic sector.

Abid et al. (2016) explored how farmers in rural Pakistan were adapting to climate change and the factors influencing their decisions. Although farmers were aware of climate change, many had not adopted appropriate adaptation strategies due to various barriers. The study identified education, farming experience, access to advisory services, and availability of weather forecasts as crucial factors affecting adaptation. It recommended strengthening farmers' education and providing better access to farm advisory services to enhance food security.

Benoit (2015) examined how honours students at two South African universities perceived climate change. The study uncovered three key perspectives. First, students generally accepted climate change as a reality without critically reflecting on its underlying causes. Second, their views were heavily shaped by media narratives and external sources rather than independent analysis. Lastly, there was a broad tendency to view climate change solely as a negative phenomenon, with little distinction between its causes and effects. These findings underscore the need to cultivate critical thinking skills within climate education.

Dal et al. (2015) examined climate change awareness among social studies and science teachers and evaluated the impact of a professional development workshop titled “Awareness and Adaptation to Climate Change.” While teachers’ awareness levels showed no significant difference before the workshop, post-workshop analysis revealed a marked improvement in their understanding of climate change. These findings highlight the efficacy of specialised training programs in providing educators with the knowledge and skills necessary to teach climate-related subjects effectively.

Anderson (2012) examined the role of education in promoting climate change abatement and adjustment efforts. The study revealed that educational initiatives are most effective when they emphasise practical, localised, and actionable solutions. Teaching approaches that highlight real-world applications empower individuals to take purposeful action, positioning climate education as a vital instrument for fostering sustainable transformation.

2.5 Research on the adoption of low-carbon behaviour

Kumar et al. (2023) analysed the barriers preventing firms from adopting low-carbon operations and found that economic challenges were the biggest obstacle, followed by infrastructure and operational limitations. They categorised these barriers into cause-and-effect groups, highlighting that financial concerns, environmental factors, and governance structures all play a role in slowing down the transition to net-zero emissions. Their study suggested that companies need clear managerial strategies to overcome these barriers and successfully implement low-carbon initiatives.

Arnaudova et al. (2022) investigated Swiss students' willingness to reduce meat consumption, recognising its environmental, ethical, and health-related consequences. Their study emphasised that simply raising awareness isn't enough—making plant-based alternatives more affordable, accessible, and nutritionally appealing is key to encouraging meaningful dietary shifts. They stressed that the negative effects of excessive meat consumption are too severe to ignore and that the transition to more sustainable eating habits needs to be actively guided rather than left to happen gradually.

Mata et al. (2022) explored how changes in behaviour and lifestyle, rather than technology alone, could help reduce the carbon footprint of buildings. They found that existing research lacked clear classifications or global estimates of how non-technological solutions could contribute to climate change mitigation. To address this gap, they developed a framework that categorised these solutions based on different factors, including energy use, individual vs collective action, and demand reduction. Their model identifies five key strategies: managing and operating buildings efficiently, increasing demand flexibility, maintaining comfortable but sustainable living conditions, embracing circular and sharing economies, and fostering social and

organisational innovations. Their work underscores that tackling climate change isn't just about new technology—it's also about how we live, work, and interact with our built environment.

Wei et al. (2022) explored how forecasting energy use in colleges and universities across North China could support the development of low-carbon campuses. Their study found that improving energy management not only reduces consumption and enhances both teaching and living environments but also delivers economic and social benefits. More importantly, they highlighted how such efforts can gradually instil a culture of energy conservation and environmental awareness among students and faculty, fostering long-term sustainable behaviour.

Wyss et al. (2022) investigated why some people successfully translate their pro-environmental attitudes into real-world actions while others struggle. Their findings suggest that when making eco-friendly choices is either low-cost or highly beneficial, people are more likely to act in alignment with their beliefs. However, self-control plays a crucial role—those with stronger self-discipline are better at sticking to their long-term environmental goals. The study emphasised that climate action strategies should consider not only external incentives but also personal motivation and psychological factors that influence decision-making.

Gomez et al. (2021) set out to understand how educating future doctors about climate change might shape their views on its impact on human health. They introduced a new elective course at Stanford, *The Impact of Climate Change on Human Health*, and measured its effectiveness through pre- and post-course surveys. The results were clear—students showed a significant increase in their awareness and belief in the connection between climate change and human health, highlighting the power of education in preparing medical professionals for climate-related health challenges.

Larner et al. (2021) explored whether adding a low greenhouse gas (GHG) impact label to food menus at a UK university's Student Union could encourage more sustainable eating choices. The response was generally positive, suggesting that students were open to the idea of making more climate-friendly food decisions. However, the study raised an important question—would these labels actually influence

long-term consumer behaviour both on and off campus? To increase engagement, they suggested that informational campaigns and financial incentives could be effective in reinforcing sustainable food choices.

Liu et al. (2021) investigated how repeated exposure to climate change-related images impacts college students' awareness and behaviour. Their study revealed that the more students saw images highlighting climate change, the more likely they were to develop low-carbon habits. This finding has important implications for policymakers, as it suggests that increasing the visibility of climate-related imagery—especially in educational settings like universities—could encourage more sustainable behaviours on a larger scale.

Mata et al. (2021) explored the challenges and motivations behind adopting low-carbon building solutions. Their research revealed an interesting gap—while economic, informational, and attitudinal factors are widely discussed, technical and sociodemographic barriers receive far less attention. The study found that globally, financial considerations tend to outweigh environmental concerns when it comes to adopting sustainable building materials. They concluded that stronger, more targeted policies are needed to encourage the widespread adoption of low-carbon construction methods.

Yue et al. (2021) explored whether adopting low-carbon consumption habits encourages people to embrace greener behaviours. Their research showed that individuals who prioritise sustainable consumption are more likely to engage in eco-friendly practices such as recycling and waste sorting. However, the study also highlighted that psychological factors play a crucial role—self-efficacy (the belief in one's ability to make a difference) and environmental self-identity (how strongly someone sees themselves as environmentally responsible) influence how these habits develop. Interestingly, self-efficacy had a stronger effect on purchasing sustainable products, while environmental self-identity played a bigger role in behaviours like recycling. Additionally, demographic factors shaped how these eco-friendly habits spilt over into different aspects of life.

Cordero et al. (2020) examined the long-term impact of an intensive one-year university course on students' carbon footprints. Five years after taking the course, many graduates reported making more environmentally conscious decisions—such as

choosing fuel-efficient cars and more sustainable diets—attributing these choices to what they had learned in the class. A deeper carbon footprint analysis suggested that, on average, graduates had reduced their personal emissions by 2.86 tons of CO_2 per year. The study also found that these students had developed a strong personal connection to climate action, which influenced not only their daily habits but also their professional careers.

Hudha et al. (2020) conducted a bibliometric review of research on low-carbon education, analysing academic studies published between 2014 and 2019. Their review serves as a valuable starting point for researchers looking to explore the role of education in promoting low-carbon lifestyles and sustainable practices. They found that research on low-carbon education remains concentrated in China and Malaysia, revealing a regional imbalance. They emphasised the growing global interest in this field and called for stronger inter-regional collaborations, especially among researchers from Asia and other developing countries.

Chaudhary and Elumalai (2019) explored how school students choose between active and passive modes of transportation. Their findings showed that most female students preferred passive transport options, like buses or cars. However, factors such as the classes they were taking and the time required to reach school also played a significant role in their decision-making.

Al-Marri et al. (2017) examined how a group of Qatari students studying in the UK adapted to their energy consumption habits. Their research revealed that the high cost of electricity was a major driver of behavioural change. However, it wasn’t just financial factors at play—values, education, cultural background, and the experience of independent living all shaped how these students approached energy use. The study highlighted how external and internal influences work together in shaping consumer behaviour, particularly when individuals transition to a new environment.

Fabi et al. (2017) explored how individuals approach sustainable living in a post-carbon society. They found that people navigate environmental and energy challenges in different ways, depending on their level of awareness and the social, financial, and cultural "costs" they perceive. The study also pointed to the role of

technology—providing real-time feedback on energy use can help individuals understand and adjust their habits. Ultimately, their research reinforced the idea that strong personal willpower is a key driver of meaningful behaviour change toward sustainability.

Oz-Aydin (2016) examined high school students' understanding of carbon footprints and the role of the biology curriculum in shaping their knowledge. The study found that while students were relatively aware of how household and transportation choices contribute to carbon emissions, they lacked a comprehensive understanding of how lifestyle choices impact climate change. This gap in knowledge highlights the need to rethink the way carbon literacy is taught in schools, ensuring that students gain a more holistic understanding of the issue and its broader implications.

Le Quere et al. (2015) took a critical look at the research community's high-carbon culture, particularly the environmental impact of academic travel. They found that while attending conferences in person helps spark new ideas and build professional relationships, many of these benefits can also be achieved through virtual meetings. Their study suggested that embracing remote participation could not only lower emissions but also create more inclusive spaces for global collaboration.

Li et al. (2015) examined the carbon footprint of students in a Chinese university campus, using an online survey to track their energy use and daily habits. They found that, on average, each student was responsible for 3.84 tonnes of CO_2 emissions annually. The biggest contributor (65%) came from daily activities, followed by transportation (20%) and their home environment (15%). Among daily activities, dining accounted for the largest share (34%), followed by showering (18%) and dorm electricity use (14%). The study also revealed that male students, graduate students, and those from big cities tended to have a higher carbon footprint compared to their female, undergraduate, and rural counterparts.

Ojala (2012) studied the role of hope in motivating young people to engage in pro-environmental behaviours. The research found that "constructive hope", hope grounded in awareness and proactive solutions, positively influenced environmentally responsible actions. Conversely, hope rooted in denial or avoidance was linked to inaction and even counterproductive behaviours. This suggests that fostering a realistic

yet optimistic outlook on climate change can be a powerful motivator for positive change.

2.6 Research on the linkage between Climate Change knowledge and Pro-environmental behaviour.

Leite et al. (2023) explored what drives people in a university setting to engage in pro-environmental actions related to climate change. Their study, based on the Theory of Planned Behaviour, examined how beliefs and attitudes shape motivation and behaviour. They found that when people truly believe in the importance of climate action and hold positive attitudes toward it, they are more intrinsically motivated to get involved. This motivation, combined with their attitudes, plays a key role in influencing their actual environmental behaviour within the university community. Interestingly, external rewards or personal eco-friendly habits don't seem to directly impact collective environmental action. Whether someone is a student or a university employee also affects how these factors interact. Based on these insights, the researchers suggest that university administrators should focus on awareness campaigns and carefully chosen incentives to encourage active participation in sustainability efforts on campus.

Abdelwahed et al. (2022) explored what drives people to take action on climate change. They found that positive attitudes toward climate change and social influence (subjective norms) significantly boost a person's intention to engage in climate-friendly behaviour. However, a person's perceived level of control over their actions didn't have a strong impact on this intention. Their study also revealed that having a clear intention to act on climate change is a strong predictor of actual eco-friendly behaviour. In fact, intention plays a key role in connecting people's attitudes, social influences, and perceived control to their real-world actions. These findings highlight the importance of shaping positive attitudes and fostering social support to encourage climate action. The researchers suggest that policymakers can leverage these insights to formulate strategies that enhance public perception of environmental responsibility, inspiring collective efforts toward a safer and healthier planet.

Chang et al. (2022) explored how tourists in Taiwan perceive climate change, their willingness to adapt, and how their behaviour aligns with their intentions. They

found that a tourist's awareness and understanding of climate change plays a key role in shaping their attitudes, social influences, and sense of control over their actions—all of which positively impact their intention to adapt to climate change. The study also revealed a strong connection between the intention to adapt and actual pro-environmental behaviour. In other words, when people genuinely plan to make climate-conscious choices, they are more likely to follow through with sustainable actions. One of their key takeaways was the importance of building public trust in political efforts to address climate change. The researchers emphasised that well-designed environmental policies must go hand in hand with raising public awareness to encourage meaningful and lasting climate action.

Keresztes and Kotta (2021) explored how knowledge, deeper engagement, and emotional responses influence pro-environmental behaviour. They found that many people hesitate to take action on climate change simply because they don't fully understand what solutions are available or how effective they can be. However, once individuals learn the reasoning behind eco-friendly choices and see their real impact, they become more conscious of their decisions and their environmental consequences. The study also emphasised the power of small, everyday actions. Instead of overwhelming people with big, drastic changes, the researchers encouraged starting with manageable steps. This approach not only made sustainable habits easier to adopt but also helped them stick over time, making a lasting difference.

Bradley et al. (2020) explored the psychological factors that drive pro-environmental behaviour, focusing on how people adapt to climate challenges. They found that behaviour is directly influenced by psychological adaptation and response efficacy. Risk perception also plays a role, though its effect is more indirect. Interestingly, their findings varied between countries. In Australia, the psychological factors influencing behaviour were stronger, while in France, having a strong "green" self-identity played a particularly significant role in shaping environmental attitudes and actions. This highlights how cultural differences can impact the way people engage with climate issues. The study suggested that to encourage more sustainable behaviour, efforts should focus on strengthening people's environmental identity, boosting their

confidence in the effectiveness of climate-friendly actions, and supporting their psychological adaptation to environmental challenges.

2.7 Research on the linkage between Environmental awareness and Pro-environmental behaviour

Estrada-Araoz et al. (2023) explored how environmental education influences students' sustainable behaviours in the Peruvian Amazon. Their study found a clear connection: students exposed to environmental education were more inclined to adopt environmentally friendly habits. However, the research also pointed out a challenge: while schools are teaching environmental topics, the impact is only moderate. This suggests that education needs to go beyond traditional methods, using more engaging and immersive approaches to inspire students and empower them to take meaningful action for the environment.

Takshe et al. (2023) explored the factors influencing university students' environmental attitudes and behaviours in the United Arab Emirates. Their findings revealed that Structured and unstructured education played a crucial role in shaping students' environmental awareness. Additionally, the study emphasised the importance of economic policies and incentives in motivating pro-environmental actions. Their results aligned with previous research showing that attitude plays a more significant role in determining behaviour than motivation alone.

Torres et al. (2023) examined environmental awareness and behaviour among university students in Portugal. Their findings suggested that incorporating outdoor activities into education could significantly improve students' environmental consciousness and well-being. The study emphasised the role of universities in fostering a deeper connection between students and nature through experiential learning.

Foster et al. (2022) investigated the determinants of pro-environmental behaviour among employees in workplace settings. Their study found that individuals who personally adopted an eco-friendly lifestyle were significantly more inclined to engage in environmentally responsible actions at work. Interestingly, other commonly assumed predictors—such as environmental dedication, ecological awareness, personal

confidence in promoting sustainability, and even environmentally oriented human resource practices- did not exhibit a statistically significant effect. These findings suggest that personal lifestyle choices exert a stronger influence on environmentally responsible behaviour than organisational efforts alone.

Si et al. (2022) investigated the effects of social capital, habitat conditions, and environmental knowledge on pro-environmental behaviour in communities using structural equation modelling. According to their research, eco-friendly behaviours are more likely to be adopted by those who live in well-kept environments and are more ecologically conscious. Furthermore, social trust, common standards, and close community ties were important in encouraging sustainable behaviour, supporting the notion that social support networks and environmental education are both essential for sustainability.

Dlamini et al. (2021) explored how socio-demographic factors influence individuals' environmental attitudes, perceptions, sense of place attachment, and resulting environmental behaviours. Using a structural equation modelling (SEM) approach, the researchers examined how these constructs interacted and to what extent demographic characteristics could predict them. The study revealed that employment status had a significant positive impact on how individuals perceived environmental issues. However, other demographic factors showed little influence on shaping environmental attitudes. Interestingly, factors such as education level, migration status, and population group emerged as important predictors of how strongly individuals felt connected to their local environment (place attachment). The analysis also showed that people's satisfaction with basic services—like water supply and waste management—played a key role in influencing whether they engaged in pro-environmental behaviour. These findings highlight the complex interplay between personal circumstances, infrastructure, and environmental engagement.

Mkumbachi et al. (2020) examined the environmental awareness and sustainable practices of geography students at the State University of Malang. While the students demonstrated a solid understanding of environmental issues, their actual behaviours did not consistently reflect this knowledge. The study revealed a noticeable gap between what students knew and how they acted, pointing to a disconnect between

awareness and practice. The authors emphasised the importance of creating more meaningful opportunities for student engagement in sustainability efforts, both within academic settings and in the wider community, to help bridge this gap and encourage more active participation in environmental initiatives.

Solano-Pinto et al. (2020) explored teenagers' sense of connection to nature and found that factors like knowledge of the circular economy, beliefs about environmental responsibility, pro-environmental behaviour, and overall life satisfaction all play a role. They also found that teenagers lacking these skills were found to be less connected to nature. Based on these findings, the researcher suggests that education should go beyond simply teaching environmental facts. Schools should create experiences that not only build knowledge and awareness but also contribute to students' overall well-being, reinforcing the deep and personal bond between people and the natural world.

Balunde et al. (2019) explored the relationship between environmental consciousness and sustainable behaviour among individuals in Lithuania. They found that people who placed a higher value on ecological issues were more likely to participate in actions such as recycling and environmental activism. However, when it came to everyday practices like fuel-efficient driving or using public transportation, the connection to environmental awareness was much weaker. These findings suggest that while awareness can motivate certain types of pro-environmental behaviour, other actions may be influenced more by cultural norms, convenience, or infrastructural limitations. The authors highlighted the need for further research to better understand how different social and structural factors shape environmentally responsible behaviour.

Dela Pena et al. (2018) explored the connection between environmental awareness and pro-environmental behaviour among high school students in Los Baños. While they found a moderate correlation, their study revealed that simply being aware of environmental issues did not always translate into action. Interestingly, students' environmentally friendly behaviours were more closely linked to self-awareness and understanding the consequences of their actions rather than general environmental knowledge. Based on their findings, the researchers suggested improvements in science education, particularly emphasising topics such as greenhouse gases, ozone depletion,

acid deposition, and water safety to strengthen students' understanding and inspire more meaningful action.

Handayani et al. (2018) explored the link between environmental awareness and green behaviour, underscoring that a deeper understanding of environmental issues fosters responsible action. Their study revealed that individuals who recognise the necessity of safeguarding the environment are more likely to engage in eco-friendly practices, thereby reinforcing the broader premise that heightened environmental awareness catalyses sustainable behaviour.

Safari et al. (2018) explored how environmental knowledge and awareness influence green behaviour, particularly among managers. They revealed that simply knowing about environmental issues directly encourages sustainable actions. However, they also found that this connection is even stronger when shaped by key factors like a manager’s intentions, attitudes toward the environment, and commitment to green practices. Thus highlighted the importance of fostering not just awareness, but also a deeper emotional and ethical commitment to sustainability in leadership and decision-making.

Fu et al. (2017) examined the factors influencing pro-environmental behaviours in China, focusing on cultural and social barriers. Their study found that while people were generally aware of environmental issues, their engagement in sustainable behaviours varied. Eco-friendly actions, such as energy conservation, were more common than public behaviours like environmental activism. The study highlighted the importance of fostering a strong environmental culture and implementing clear sustainability policies to encourage collective action.

Sabzehei et al. (2016) examined the impact of environmental awareness on the attitudes and environmental behaviours of female students at Qom University, and the findings indicated that the majority of students possess a moderate level of environmental awareness. Inferential analysis revealed a significant relationship between environmental awareness, attitudes, and pro-environmental behaviours. The study highlighted the importance of enhancing environmental education programs to improve awareness levels and promote sustainable behaviours among students and

suggested that targeted interventions and curriculum modifications could play a crucial role in fostering a more environmentally conscious student community.

Ajaps and McLellan (2015) studied youth attitudes toward environmental issues and their knowledge levels. While participants expressed deep concern about environmental degradation, many lacked basic knowledge of issues like global warming. They suggested that increasing the accessibility of environmental education—through field trips and interactive learning—could improve both awareness and pro-environmental behaviour. Their findings reinforce the importance of making sustainability education more engaging and practical.

Osman et al. (2014) explored the link between ecological awareness and sustainable behaviour among business students. They found that while students with greater ecological awareness were more likely to make eco-conscious decisions, their overall attitude toward sustainability did not significantly impact their behaviour. The study indicated that cultural background, parental influence, and societal norms are also significant determinants in shaping environmental behaviours.

Kollmuss and Agyeman (2002) analysed various frameworks used to explain why people with environmental knowledge do not always adopt pro-environmental behaviours. They reviewed models based on altruism, empathy, and social structures, concluding that no single theory could fully capture the complexity of what drives sustainable actions. Instead, they identified multiple influencing factors, including demographic characteristics, external pressures (such as economic and cultural influences), and internal motivations (such as values and emotional connections to the environment). Their research emphasised the importance of adopting a comprehensive approach to sustainability education and policy formulation.

2.8 Research Gap

Discussions over sustainability and environmental responsibility have become more heated worldwide as a result of environmental issues, including climate change, biodiversity loss, and the depletion of natural resources. As a result, essential dimensions including environmental awareness, pro-environmental behaviour,

perceptions of climate change, and attitudes toward sustainable development have become more and more prominent in academic studies.

Around the world, researchers like Kollmuss and Agyeman (2002) have examined the connections between behaviour and environmental consciousness, while Leiserowitz (2006) and Whitmarsh (2009) have investigated how perceptions of climate change influence sustainability-focused behaviour. While Jha (1998) provided a standardised scale to measure environmental awareness, studies by Boermans et al. (2024) examined awareness about environmental laws among college students. Studies by Singh et al. (2020) have looked at the impact of educational interventions on pro-environmental behaviour in India.

Despite a growing body of literature on environmental issues in the world, particularly in India, comprehensive empirical research focusing on Jammu & Kashmir remains limited, particularly with respect to student populations. Existing studies in the region have largely examined isolated dimensions of environmental engagement. For instance, Zeeshan et al. (2021) explored factors shaping students' perceptions of climate change in Jammu & Kashmir and the Western Himalayas, while Bhat et al. (2016) and Anees et al. (2017) assessed environmental awareness and attitudes among college students, with particular emphasis on female learners. At the household and livelihood level, Javeed (2022) analysed climate change impacts and vulnerability in rural Doda district, whereas Batool et al. (2023) applied the Theory of Planned Behaviour and Value–Belief–Norm Theory to explain pro-environmental behaviour in broader contexts. However, none of these studies has simultaneously examined environmental awareness, perception of climate change, pro-environmental behaviour, and attitude towards sustainable development within a single, integrated empirical framework, particularly among students in Jammu & Kashmir. This fragmented evidence base highlights a clear research gap and underscores the need for a holistic, region-specific investigation that captures the interrelationships among these four constructs in a climate-vulnerable Himalayan context.

Given the Kashmir Valley's distinct sociopolitical, ecological, and cultural setting, this gap is particularly important. A regional understanding of environmental attitudes and behaviours is required due to the region's unique geography, climate,

developmental restrictions, and type of lifestyle (Lone et al., 2020). Furthermore, environmental issues in the Valley could be very different from those in other regions of India or the world, requiring solutions that are specific to the local context (Shah et al., 2024). The methodological technique used in earlier research represents another significant gap. In the context of Kashmir, very few have used standardised tools to measure the pertinent structures methodically. Studies that use validated instruments like the Climate Change Perception Scale (Tse, 2015), the Environmental Awareness Ability Measure (Jha, 1998), the Attitude Towards Sustainable Development Scale (Biasutti and Frate, 2017), and the Pro-environmental behaviour Scale (Mertig, 2003) to evaluate environmental constructs among students in this area are still conspicuously lacking. Furthermore, little is known about how demographic, educational, and sociocultural elements, such as gender, academic track, and rural-urban upbringing, affect these environmental aspects in the Kashmir Valley.

Given these factors, the current study intends to close this important gap by examining the factors that influence undergraduate students in the Kashmir Valley's perceptions of climate change, pro-environmental behaviour, environmental awareness, and attitudes toward sustainable development. This study aims to provide nuanced insights that are both academically and practically beneficial for forming focused environmental education plans and policy actions in the region by using standardised questionnaires and a data-driven methodology. This study is innovative since it takes an integrated, region-specific, and empirically based approach, making it a significant addition to the scholarly literature as well as the local environmental conversation.

CHAPTER 3
METHODOLOGY

Chapter 3: METHODOLOGY

3.1 Research Design

This study adopts a quantitative, descriptive, and cross-sectional survey design to investigate the factors influencing environmental awareness, pro-environmental behaviour, climate change perception, and attitudes toward sustainable development among undergraduate students in the Kashmir Valley. A quantitative methodology was employed as it facilitates the collection of objective, quantifiable data, enabling rigorous statistical analysis to identify patterns, relationships, and potential determinants among the principal variables. The descriptive design further helps in capturing a clear picture of the current levels of environmental understanding and sustainability-related attitudes within the student population. Such an approach is useful for systematically examining what people know, believe, and do regarding specific social or environmental issues (Creswell 2014).

The cross-sectional design of this study entails that data were collected at a single temporal juncture, even though the overall data collection process spanned several months. However, the same individuals were not measured repeatedly over time. This approach is particularly effective for identifying patterns and exploring relationships between variables within a specific population group, without being affected by changes that occur over time. By using a structured survey, the study was able to collect consistent and comparable data from a large and diverse group of undergraduate students, which strengthens the relevance and generalizability of the findings within the context of the Kashmir Valley. Moreover, this method allows for meaningful comparisons across sub-groups based on demographic and educational characteristics, offering deeper insights into the factors shaping students' environmental attitudes and behaviours.

Overall, this design supports the study's objective of identifying key determinants and drawing meaningful inferences about the levels of environmental awareness and sustainable development attitudes among the youth in Kashmir Valley, thereby contributing valuable insights to educators, policymakers, and environmental advocates.

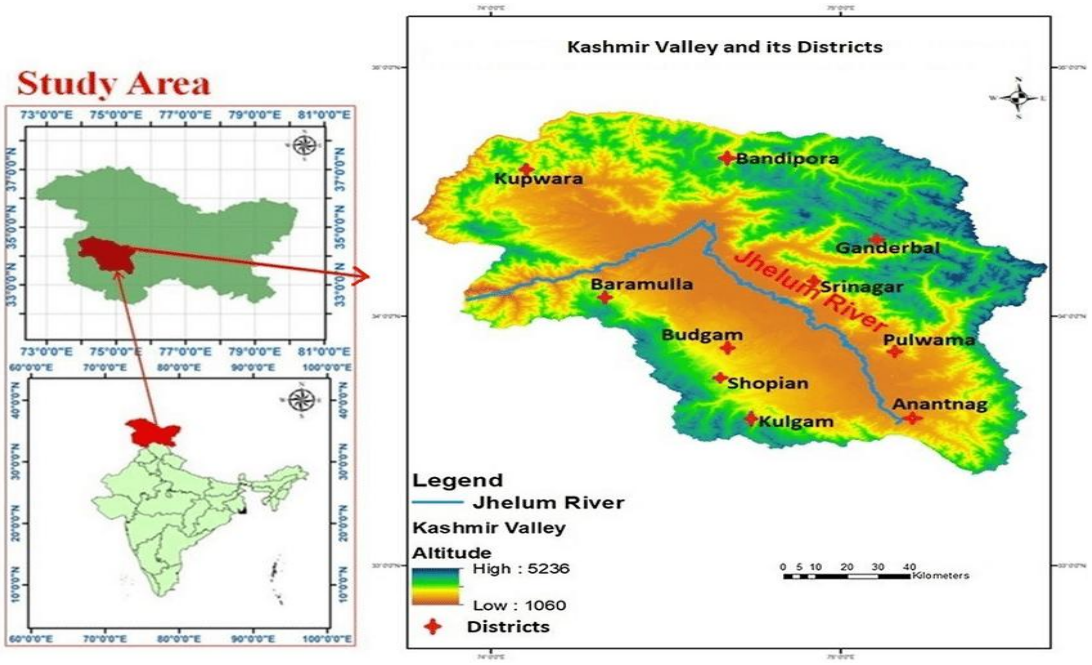


Figure 3.1: Map of Kashmir Valley, Jammu and Kashmir (Malik, 2022)

3.2 Population and Sample

3.2.1 Population

According to data available on the official website of the Higher Education Department, Government of Jammu and Kashmir, and depicted in Tables 3.1 to 3.3 and Figures 3.2 to 3.4, the Union Territory of Jammu and Kashmir is home to 142 colleges, comprising four grant-in-aid and four autonomous establishments. Twenty provide both undergraduate and postgraduate programs, although the vast majority (122) are undergraduate colleges. The fact that there are only two engineering institutes shows a lack of technical education. Fifteen colleges are exclusively for girls, and 74 of the colleges are accredited by the NAAC. In the Kashmir Division, there are 70 sanctioned colleges, of which only 69 are currently functional. The majority of these functional colleges are located in rural areas, with 55 situated in rural regions and only 15 in urban areas. The valley also has eight institutions exclusively for women. Among the 69 functional colleges, 40 are accredited by the NAAC, 60 offer undergraduate courses, and 10 offer both undergraduate and postgraduate programs. However, in Jammu division, there are 72 sanctioned functional colleges with 56 colleges in rural areas and only 16 in urban areas. The Jammu division has seven institutions exclusively for

women. Among the 72 colleges, 42 are accredited by the NAAC, 62 offer undergraduate courses, and 10 offer both undergraduate and postgraduate programs.

Over time, there has been a noticeable increase in the number of higher education institutions in Jammu and Kashmir. Between 1900 and 1930, there were just two colleges; by 1960, there were sixteen; by 1990, there were thirty-three; and between 1991 and 2010, there were seventy-five. This growth proceeded at a swift pace, eventually reaching 142 colleges today, as depicted in Table 3.4. The pattern shows a tremendous push by the government to make higher education more accessible, particularly for female students and those living in rural areas. To guarantee comprehensive educational development, the area still needs increased institutional autonomy and a stronger focus on professional, technical, and postgraduate education.

These colleges form the backbone of the region's higher education system, offering a wide array of undergraduate and postgraduate programs across disciplines such as arts, science, commerce, and social sciences. In line with the directives issued by the Hon'ble Supreme Court of India, Environmental studies have been made a mandatory subject in undergraduate curricula in almost all higher educational institutions, underscoring the relevance and timeliness of the present study.

Table 3.1: Status of Higher Education Colleges in Jammu and Kashmir

S. No	Description	Total
1	Total Colleges	142
2	Autonomous Colleges	4
3	Grant-in-Aid Colleges	4
4	Engineering Colleges	2
5	UG Colleges	122
6	UG/PG Colleges	20
7	NAAC Accredited Colleges	74
8	Girls Only Colleges	15

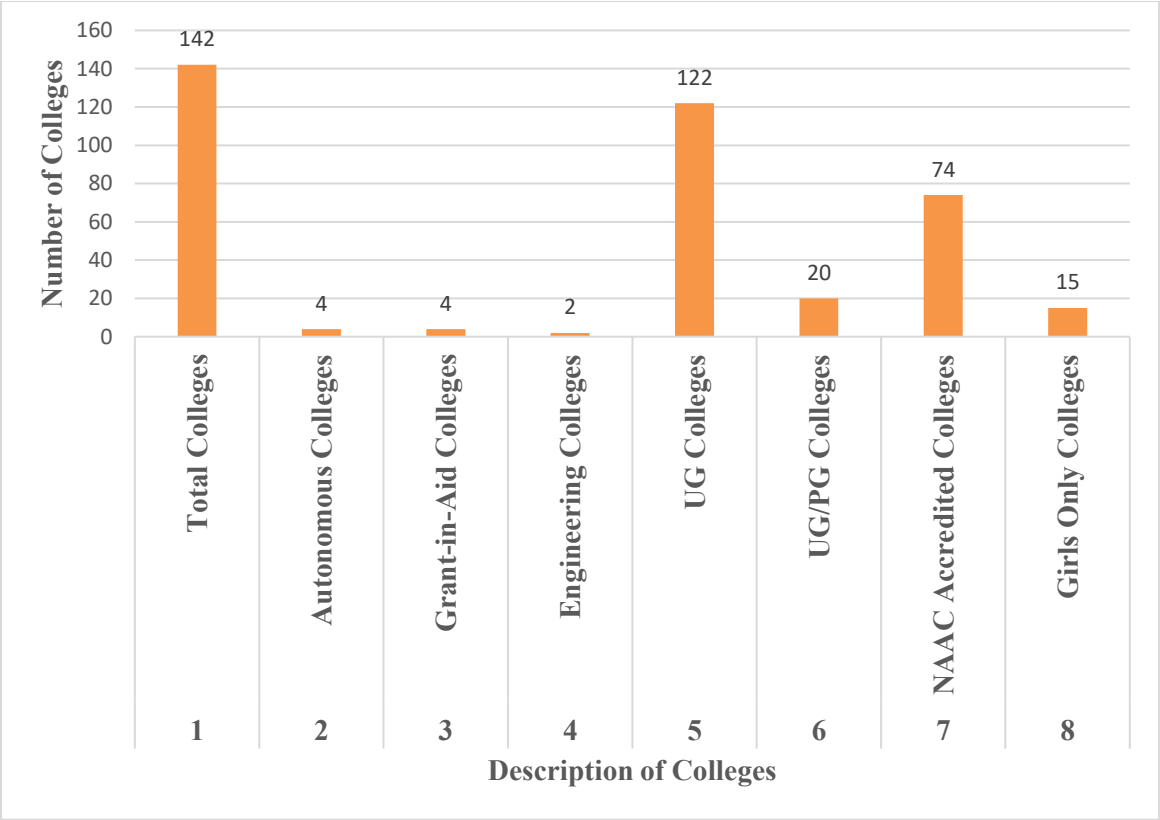


Figure 3.2: Status of Higher Education Colleges in Jammu and Kashmir

Table 3.2: Status of Higher Education Colleges in Jammu Division of Jammu and Kashmir

S. No	Description	Total
1	Total Colleges	72
2	UG Colleges	62
3	UG/PG Colleges	10
4	Rural Colleges	56
5	Urban Colleges	16
6	NAAC Accredited Colleges	42
7	Girls Only Colleges	7

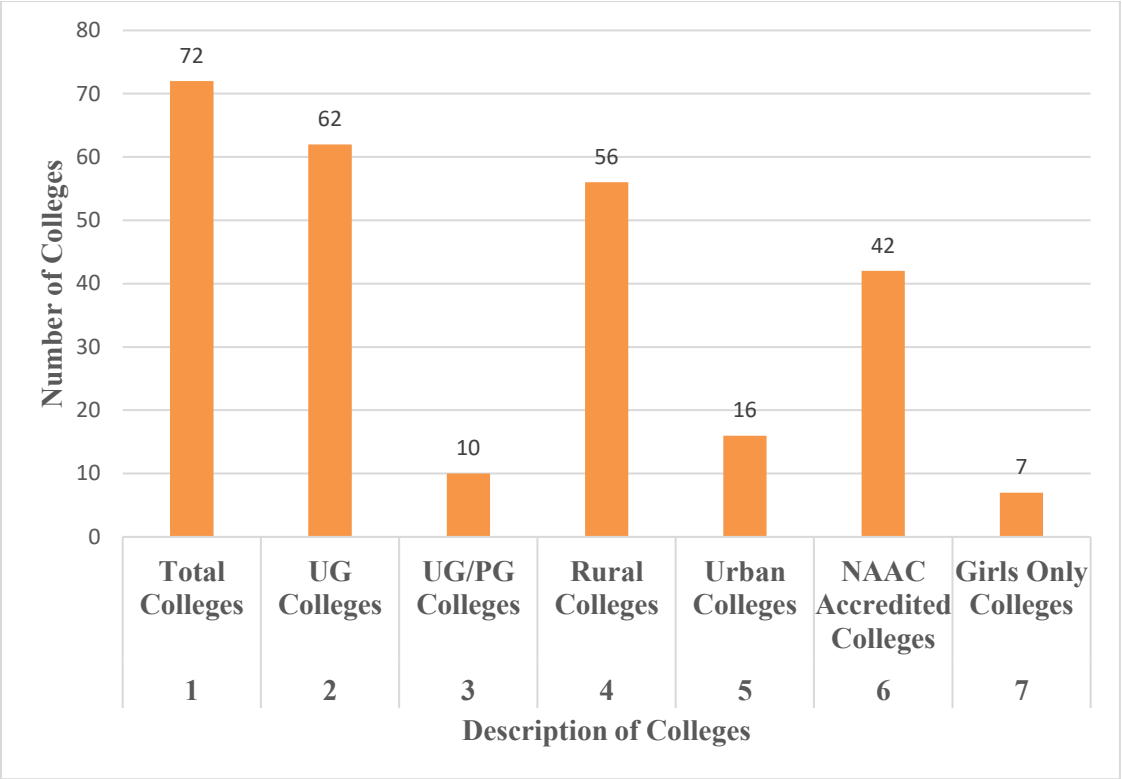


Figure 3.3: Status of Higher Education Colleges in Jammu Division of Jammu and Kashmir

Table 3.3: Status of Higher Education Colleges in the Kashmir Division of Jammu and Kashmir

S. No	Description	Total
1	Total Colleges	70
2	UG Colleges	60
3	UG/PG Colleges	10
4	Rural Colleges	55
5	Urban Colleges	15
6	NAAC Accredited Colleges	40
7	Girls Only Colleges	8

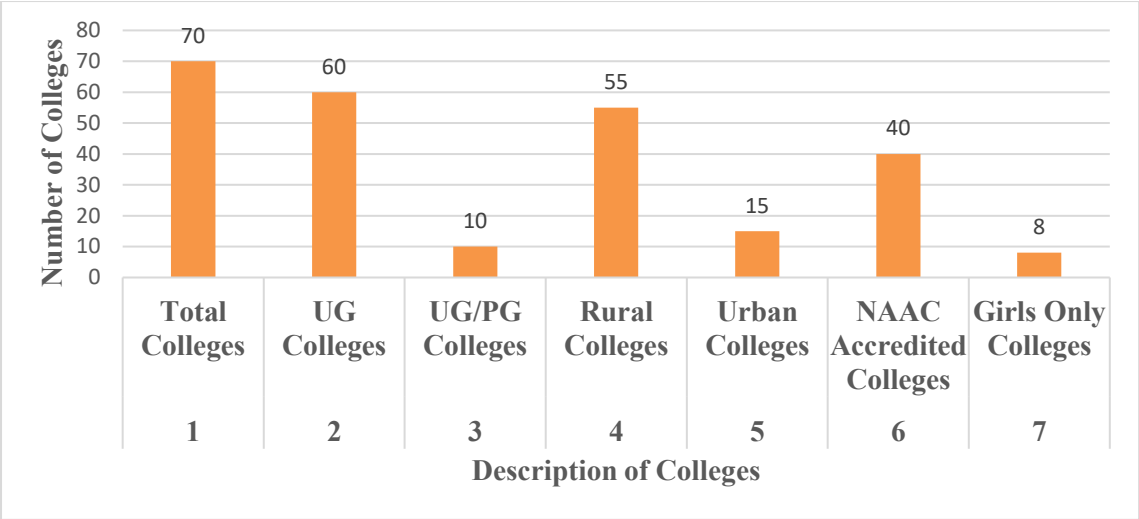


Figure 3.4: Status of Higher Education Colleges in the Kashmir Division of Jammu and Kashmir

Table 3.4: Growth of Colleges in Jammu and Kashmir over time

S.No.	Time Period	No. of Colleges
01	1900 – 1930	2
02	1931 – 1960	16
03	1961 – 1990	33
04	1991 – 2010	75
05	2011 – Present	142

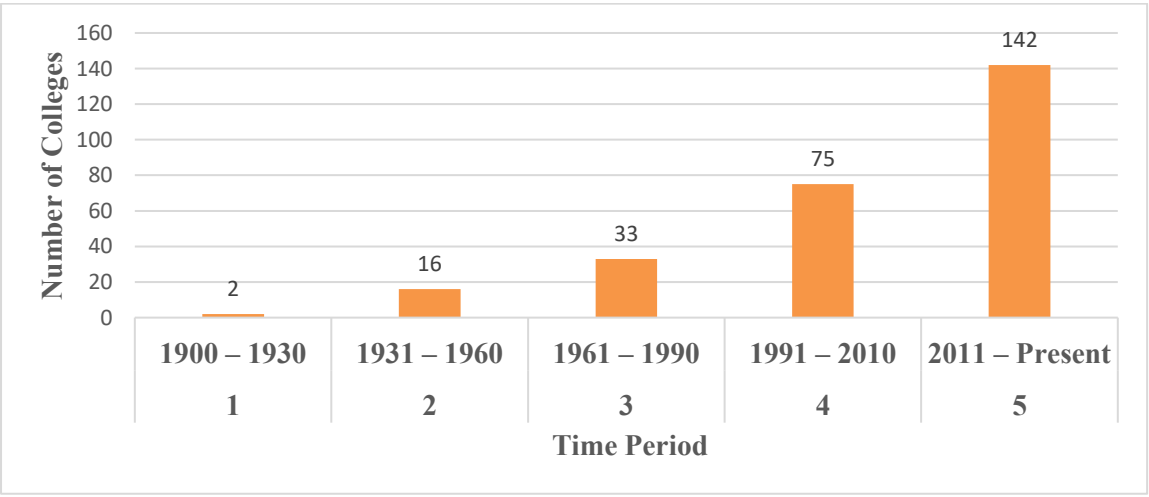


Figure 3.5: Growth of Colleges in Jammu and Kashmir over time.

The sampling units for this research were identified as the Government Degree Colleges located in the Kashmir division, selected based on verified information from

the Higher Education Department's official portal. These colleges operate as affiliated institutions, meaning they are recognised by and function under the academic and administrative control of either the University of Kashmir or Cluster University Srinagar, without the authority to confer degrees independently. Nevertheless, they play a critical role in knowledge dissemination, skill development, and student engagement, especially in rural and semi-urban areas where access to higher education might otherwise be limited. These institutions cater to a diverse student population and are considered key centres of educational and social development in the region. Despite their prominence and strategic importance, they have remained underrepresented in empirical research, particularly in studies focusing on environmental attitudes, behaviours, and sustainability awareness.

To enhance the validity and generalizability of the findings, a refined selection criterion was applied to narrow down the sampling frame. Only those Government Degree Colleges in Kashmir that have been in continuous operation for more than ten years were included in the study. The rationale behind this criterion lies in ensuring a stable academic environment, a more established student population, and institutional maturity, all of which contribute to the reliability of the data. By focusing on well-established institutions, the study aims to draw more accurate and generalizable conclusions regarding the levels and determinants of environmental awareness, pro-environmental behaviour, climate change perception, and attitudes toward sustainable development among undergraduate students in the Kashmir Valley.

Table 3.5: College-wise Distribution of Courses, Faculty, and Students in Kashmir Division (2023–2024).

S. No	Name of College	No. of Courses	No. of Faculty	No. of Students
1.	Amar Singh College, Srinagar	11	107	3530
2.	Gandhi Memorial College, Srinagar	8	38	2015
3.	GDC Kangan	4	13	756
4.	GDC Magam	6	10	836
5.	GDC Tangmarg	6	15	1106
6.	Govt. SAM Degree College Budgam	8	45	2081

7.	GDC (Boys) Anantnag	12	113	3510
8.	GDC (Boys) Pulwama	5	72	2158
9.	GDC Ajas Bandipora	2	9	139
10	GDC Allochibagh	0	6	0
11	GDC Awantipora	2	9	168
12	GDC Bandipora	6	39	1528
13	GDC Baramulla	12	52	1632
14	GDC Beerwah	7	36	1078
15	GDC Bemina	15	98	2181
16	GDC Bijbehara	7	38	2115
17	GDC Boniyar	1	9	172
18	GDC Chadoora	3	8	106
19	GDC Charar-i-shareef	8	33	983
20	GDC D.H.Pora	5	19	618
21	GDC Dangiwacha	4	9	84
22	GDC Dooru	8	30	1260
23	GDC Eidgah	4	11	112
24	GDC for Women Pulwama	7	53	2222
25	GDC Frisal Homeshalibugh	2	14	182
26	GDC Ganderbal	8	50	2961
27	GDC Hadipora	3	12	139
28	GDC Hajin	4	11	324
29	GDC Handwara	8	68	2610
30	GDC Hyderpora	5	14	134
31	GDC Killam	6	19	388
32	GDC Kokernag	6	32	1118
33	GDC Kralpora	2	7	158
34	GDC Kulgam	6	76	4178
35	GDC Kupwara	7	65	2855
36	GDC Langate	2	8	149
37	GDC Mattan	2	12	169

38	GDC Pampore	7	35	933
39	GDC Pattan	7	31	846
40	GDC Qazigund	1	13	285
41	GDC Rajpora	2	6	188
42	GDC Shopian	8	52	2257
43	GDC Sogam	3	20	800
44	GDC Soibugh	4	7	92
45	GDC Sopore	12	95	1461
46	GDC Sumbal	7	47	2192
47	GDC Tangdhar	6	21	576
48	GDC Thindim Kreeri	3	7	116
49	GDC Tral	9	47	1302
50	GDC Tulail	1	6	107
51	GDC Uri	7	26	1316
52	GDC Uttersoo	4	22	738
53	GDC Vailoo- Larnoo	4	11	196
54	GDC Verinag	2	9	56
55	GDC Vilgam	2	8	57
56	GDC Zainapora	2	8	281
57	Govt. Women's College Anantnag	10	91	4878
58	Govt. Women's College Baramulla	8	62	2585
59	Govt. Women's College Kupwara	4	19	517
60	Govt. Women's College, M. A. Road, Srinagar	10	117	3947
61	Govt. Women's College, Nawakadal, Srinagar	9	62	855
62	Govt. Women's College Sopore	5	37	761
63	IASE, Srinagar (College of Education)	4	27	819
64	Islamia College of Science & Commerce, Srinagar	22	92	2522
65	S.P. College Srinagar	11	67	1786
66	Srinagar Women’s College, Srinagar	5	23	470
67	GDC Khansahib	5	12	630

68	GDC Bomai, Sopore	4	15	179
69	GDC Gurez	3	12	184

According to data provided by the Directorate of Higher Education, Jammu and Kashmir, for the academic session 2023–2024, as shown in Table 3.5, the distribution of academic resources, course options, and student enrolment among colleges in the Kashmir Division varies significantly. There are 69 functional colleges, and one, namely Govt Degree College Chattisnghpora, was closed during the session. These colleges have over 2,700 faculty members and over 89,000 students enrolled overall. The urban-based institutions, including Amar Singh College, Government Degree College (Boys), Anantnag, and Government Women's College, M.A. Road, Srinagar, report higher student enrollments and a wider choice of academic offerings.

On the other hand, a lot of colleges in isolated and rural locations have fewer staff and academic facilities. Less than ten faculty members, fewer than 200 students enrolled, and just one or two academic programs are reported by institutions, including Government Degree College Verinag, GDC Vilgam, and GDC Tulail. Due to its recent inception, GDC Allochibagh reported no active courses or student registration during the academic term. These differences highlight how higher education has developed unevenly throughout the Kashmir Division, with some colleges experiencing overcrowding and others continuing to see a marked underutilization. In addition to having an impact on the general standard of education, this disparity restricts access for students in underprivileged communities, especially in places where educational institutions operate with a small workforce and subpar resources. The data highlights the significant role of women's colleges in the Kashmir Division, with institutions like Government Women's College Anantnag leading in student enrolment. This illustrates the rising number of women enrolled in undergraduate education.

Table 3.6: Distribution of Govt Degree Colleges in various Districts of Jammu Division of Jammu and Kashmir

S.No.	District	No. of Colleges
1.	Jammu	18
2.	Kathua	09
3.	Udhampur	09
4.	Rajouri	09
5.	Poonch	04
6.	Doda	05
7.	Reasi	04
8.	Kishtwar	04
9.	Ramban	05
10.	Samba	05
	Total	72



Figure 3.6: Distribution of Govt Degree Colleges in various Districts of Jammu Division of Jammu and Kashmir

Table 3.7: Distribution of Govt Degree Colleges in various Districts of Kashmir Division of Jammu and Kashmir

S.No.	District	No. of Colleges
1.	Srinagar	11
2.	Baramulla	12
3.	Anantnag	11
4.	Budgam	07
5.	Pulwama	06
6.	Kupwara	08
7.	Ganderbal	02
8.	Kulgam	05
9.	Shopian	02
10.	Bandipora	06
	Total	70

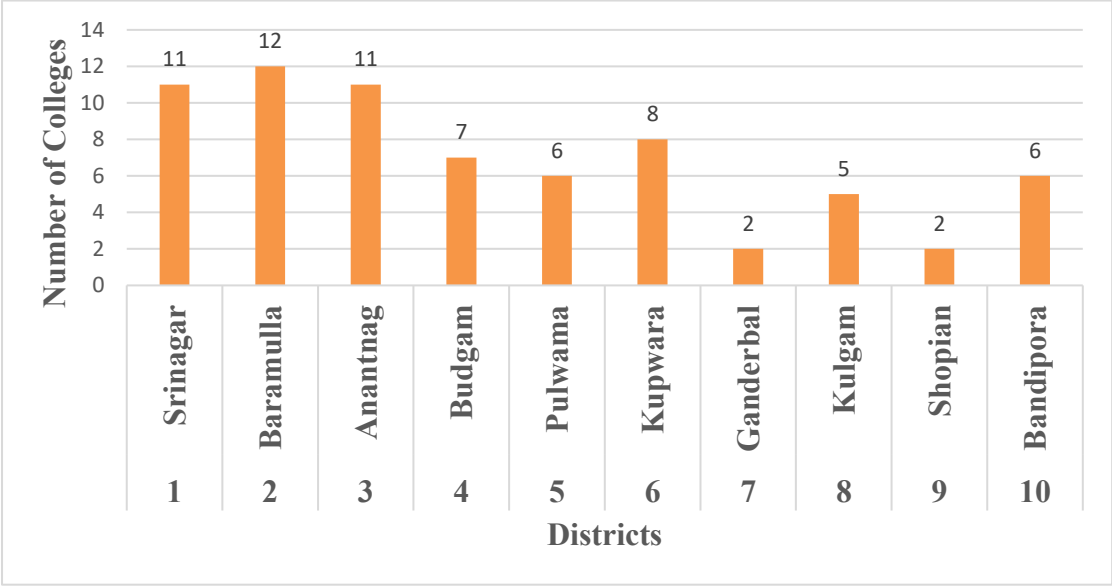


Figure 3.7: Distribution of Govt Degree Colleges in various Districts of Kashmir Division of Jammu and Kashmir

Table 3.6, 3.7 and Figures 3.6 and 3.7 represent the spatial distribution of Government Degree Colleges across the Union Territory of Jammu and Kashmir and exhibit distinct regional and demographic patterns, with 72 institutions located in the Jammu Division and 70 in the Kashmir Division. Within Jammu, the district of Jammu itself commands the largest share with 18 colleges, followed by Kathua, Udhampur,

and Rajouri, each accommodating nine institutions, whereas comparatively peripheral districts such as Reasi, Kishtwar, and Poonch are served by only four colleges apiece. In the Kashmir Division, Baramulla (12), Srinagar (11), and Anantnag (11) emerge as the principal educational hubs, while Ganderbal and Shopian remain at the lower end of the spectrum with merely two colleges each. Notably, although urban centres like Jammu and Srinagar account for the highest concentration of institutions, a greater proportion of colleges are in fact dispersed across rural districts, reflecting a deliberate policy orientation towards decentralising higher education and enhancing accessibility for students residing in geographically remote areas.

3.2.2 Sampling Technique

Purposive sampling was employed to select two colleges from each district. Purposive sampling, also known as judgmental sampling, is a non-probability sampling technique in which participants are deliberately selected based on specific characteristics relevant to the research objectives (Creswell & Creswell, 2018; Patton, 2015). Colleges were selected based on the following criteria:

(i) Recognition by the Higher Education Department,

(ii) Availability of undergraduate programmes across multiple disciplines,

(iii) Adequate student enrollment to support meaningful sampling, and

(iv) Accessibility during the data collection period.

Subsequently, Convenience sampling was used to ensure balanced representation of students across various districts, institutions, academic streams (science, humanities, commerce, etc.), and gender categories. Convenience sampling involves selecting participants who are readily available and willing to participate (Etikan et al., 2016). This technique is commonly employed in educational research due to practical constraints such as time, accessibility, and administrative permissions (Creswell & Creswell, 2017).

3.2.3 Sample Size

A bigger sample size usually gives a more accurate picture of the population, but time and money constraints can make it hard to get (Saunders et al., 2012). Researchers have different ideas on what a good sample size is. Hair et al. (2010), for instance, say that each variable and its related questions should have at least 10 to 15 respondents. Bentler and Chou (1987) also say that there should be at least five respondents for each item, as long as the data is regularly distributed and doesn't include any missing values or outliers. According to Comrey and Lee (1992), sample sizes are as follows: 100 is bad, 200 is okay, 300 is decent, 500 is very good, and 1000 is exceptional. Kass and Tinsley (1979) likewise think that a sample size of 300 is big enough. According to Krejcie and Morgan's (1970) sampling table, a sample size of 400 students would be big enough to make generalisations. But Tabachnick and Fidell (2007) say that for factor analysis, the sample should not be less than 300. Reinartz et al. (2009) say that the minimum sample size for Structural Equation Modelling (SEM) should be more than 200. Chin and Newsted (1995) and Mahdavi et al. (2008) proposed the "ten-times rule," stating that the sample size should be at least ten times the number of observed items or indicators. Tabachnick and Fidell (2007) and Green (1991) also say to use the formula $N \geq 50 + 8m$, where N is the smallest sample size and m is the number of items.

There are 117 items in total across all scales in this study. Taking these factors into account, a sample size of about 1170 was required. So, 1200 undergraduate students were chosen from different colleges in the Kashmir Valley, and the sample was evenly spread out. This sample size meets all of the minimum requirements set by other researchers and is thought to be both statistically and methodologically sound for the studies that were done.

3.2.4 Demographic Profile

Table 3.8 provides a list of the respondents' demographic data. Twenty colleges were sampled for the data collection, two from each district. Of the 1200 respondents, 608 were male and 592 were female; 212 were students from the first semester, 198 from the second, 197 from the third, 201 from the fourth, 198 from the fifth, and 194

from the sixth; 593 were students with a Bachelor of Arts stream, 306 were students with a Bachelor of Science stream, and 301 were students from other streams such as B.Com, BBA, BCA, etc.; 683 were students from rural areas, and 517 were students from urban areas; 488 had an illiterate father, while 712 were students with a literate father, 651 with illiterate mother and 549 with literate mother. There were 276 students whose father worked for the government, 286 students who worked in the private sector, and 638 students were from the category whose fathers were self-employed. 705 students had a family income under Rs 25,000, 281 had a family income between Rs 25,000 and Rs 500,000, and 214 had a family income over Rs 50,000.

Table 3.8: Demographic Information of Respondents

S.No	Particulars	Subgroup	Frequency	Percentage
01	**Gender**	Male	608	50.7
		Female	592	49.3
02	**Semester**	1st	212	17.7
		2nd	198	16.5
		3rd	197	16.4
		4th	201	16.7
		5th	198	16.4
		6th	194	16.2
03	**Stream**	B. A	593	49.4
		B.Sc.	306	25.5
		Others	301	25.1
04	**Residence**	Rural	683	56.9
		Urban	517	43.1
05	**Father's Educational Qualification**	Illiterate	488	40.7
		Literate	712	59.3
06	**Mother's Educational Qualification**	Illiterate	651	54.2
		Literate	549	45.7
07	**Father's Occupation**	Govt Service	276	23.0
		Private Service	286	23.8
		Self Employed	638	53.2
08	**Family Income**	Below 25000	705	58.7
		25000-50000	281	23.4
		50000-75000	214	17.8

3.3 Instruments of Data Collection

A structured questionnaire was developed as the primary data collection tool.

Description of the tools used

For any research study, the researcher gathers data before they can make inferences and generalisations based on the findings. The suitability of the instruments and measurements used in the study, as well as the method and procedure, data analysis, and result interpretation, all influence how significant these conclusions and generalisations are. They ought to be valid, dependable, and appropriate for the age and skill levels of the sample used in the study. For the present study, the following instruments were employed to collect data.

Environmental Awareness Scale: The Environmental Awareness Ability Measure Scale by Jha, P.K. (1998) served as the model for this scale. The 51 elements on the scale (43 positively worded and 8 negatively worded) were based on a variety of environmental considerations, including pollution sources, soil and forest conservation, energy conservation, wildlife and human health conservation, and animal husbandry. A 5-point Likert scale ranging from "Strongly agree" (1) to "Strongly disagree" (5) was used to measure the responses.

Pro-environmental behaviour Scale: The Pro-Environmental Behavioural Scale by Mertig (2003) served as the model for the scale. The scale included 14 elements about eco-friendly buying practices, recycling and litter management, everyday energy conservation, and activism and advocacy. A 5-point Likert scale, ranging from "Strongly agree" (1) to "Strongly disagree" (5), was used to measure the responses.

Climate Change Perception Scale: The survey was modified from Alan T.K.H.'s (2013) survey of Hong Kong students' perceptions about climate change. The questionnaire consisted of four parts, each developed by a different researcher, to provide a more thorough understanding of how students view climate change.

Section A assessed students' understanding of the causes, impacts, and potential solutions to climate change. The ten items on this scale were adapted from Dijkstra and Goedhart (2012), Wong (2012), and Liarakou et al. (2011). Responses were measured

using a 3-point Likert scale, where 1 indicated “True,” 2 indicated “False,” and 3 indicated “Don’t Know.”

Section B concentrated on the adoption of low-carbon behaviours (LCBs). Utilising a 10-item scale devised by Shimo-Barry (2008), the section evaluated a range of LCBs, including waste segregation for recycling, energy conservation, sustainable consumption practices, eco-conscious dining, environmentally friendly transportation, and engagement in other low-carbon initiatives. Participants’ responses were measured on a 5-point Likert scale, with 1 representing “Very Often Engage” and 5 representing “Never Engage”

Section C explored students’ perceptions of the barriers to adopting low-carbon behaviours (LCBs). The scale comprises five factors that assess both personal and societal constraints, such as challenges in changing one’s lifestyle or a lack of interest. Each item was rated on a 5-point Likert scale, where 1 represented “Strongly agree” that the item represented a barrier, and 5 indicated “Strongly disagree”.

Section D assessed students’ perceptions of the severity of climate change impacts in Jammu and Kashmir. The seven-item scale addressed both the natural and human environments. Responses were recorded on a 5-point Likert scale, where 1 indicated “Very Serious” and 5 indicated “Very Unserious.”

Attitudes Towards Sustainable Development: The questionnaire for this study was based on the work of Biasutti and Frate (2017), who looked at how university students in Italy felt about sustainable development. There are four main parts to the scale: Environmental, Economic, Social, and Educational. Each part has five items that are meant to get at different aspects of how students feel. A five-point Likert scale was used to answer each question, with 1 representing "Strongly agree” and 5 representing "Strongly disagree”. This gave us a more detailed picture of how they felt about different aspects of sustainable development.

3.4 Validity and Reliability

A thorough approach was conducted to ascertain the validity and reliability of the research tools, ensuring their precision and trustworthiness. Content validity was

established through expert assessment by a team of environmental science educators and English language experts. The specialists meticulously evaluated the survey items for clarity, usefulness, and congruence with the study objectives. Their feedback was utilised to enhance the instrument, guaranteeing its appropriateness for the target group (Bryman, 2016; Creswell & Creswell, 2018). Subsequent to expert validation, a pilot study was executed using a sample of 300 undergraduate students from the Kashmir Valley, selected to represent the larger target population. The primary objective of the pilot phase was to evaluate item clarity, confirm participant comprehension, and investigate the initial dependability of the scales. Cronbach's alpha coefficients were computed for each construct to assess internal consistency. The findings showed high reliability: Environmental Awareness ($\alpha = 0.90$), Pro-environmental behaviour ($\alpha = 0.88$), Climate Change Perception ($\alpha = 0.83$), and Attitudes toward Sustainable Development ($\alpha = 0.90$). The values surpass the conventional reliability level of 0.70 (Nunnally & Bernstein, 1994), signifying that the items within each scale exhibit internal consistency and successfully assess the desired structures. The multi-step validation and reliability testing approach confirmed that the instruments employed in the study were methodologically robust and suitable for the primary data collection phase.

3.5 Data Collection Procedure

For the purpose of data collection, several procedural and ethical measures were carefully implemented to ensure the integrity and credibility of the research process. Formal permission was obtained from the heads of selected educational institutions across the Kashmir Valley, allowing access to undergraduate students for participation in the study. In light of varying accessibility and to reach a wider and more diverse student population, the survey was administered using an online platform, specifically Google Forms. This method was chosen to facilitate ease of distribution, increase response rates, and accommodate participants from both urban and remote areas with differing levels of internet connectivity. The data collection period extended from August 2023 to September 2024, providing ample time to gather a comprehensive dataset while accounting for institutional schedules, examination periods, and student availability. Throughout the process, strict ethical guidelines were adhered to.

Participation in the study was entirely voluntary, with students provided with clear informed consent forms outlining the purpose of the research and the assurance that their responses would remain anonymous and confidential. These measures ensured that participants felt secure and respected, thereby enhancing the authenticity and reliability of the data collected.

3.6 Data Analysis Techniques

To effectively meet the research objectives, this study employed a combination of descriptive and inferential statistical techniques as part of the data analysis process. Descriptive statistical measures, including mean, standard deviation, frequency, and percentage, were applied to provide a comprehensive summary of participants' demographic profiles. They also helped in assessing the overall trends related to environmental awareness, pro-environmental behaviour, climate change perception, and attitudes toward sustainable development among undergraduate students in the Kashmir Valley. These descriptive tools provided a clear and structured overview of the data, offering valuable insights into the general patterns and tendencies within the sample, and forming the basis for further analysis using inferential methods.

To explore deeper insights and test the research hypotheses, a variety of inferential statistical methods were employed. Independent samples t-tests and Analysis of Variance (ANOVA) were utilised to assess significant differences in key variables across different demographic subgroups such as gender, academic stream, family income, parental occupation, parental education, and locality (urban/rural). Cohen's *d*, Cohen's *f*, eta squared (η^2), and partial eta squared (ηp^2) were calculated to determine the magnitude of observed effects, thereby providing an estimate of the practical significance of group differences and associations beyond mere statistical significance (Cohen, 1988). Additionally, multiple regression analysis was conducted to identify the most influential determinants of students' pro-environmental behaviour by evaluating the predictive power of environmental awareness, attitudes toward sustainable development, and climate change perception.

All statistical analyses were performed using SPSS version 22.0, which facilitated efficient data management and hypothesis testing. Furthermore, AMOS version 21.0

was used for structural equation modelling (SEM), enabling the assessment of complex relationships among latent variables and providing a more nuanced understanding of the interdependencies within the proposed conceptual framework. This comprehensive analytical approach ensured a rigorous examination of the research questions and enhanced the validity of the study's findings.

3.7 Ethical Considerations

To ensure adherence to ethical research standards and to safeguard the rights and well-being of the participants, a comprehensive set of procedures was followed throughout the data collection process. The purpose, goals, and significance of the study were explained in detail to each participant before the survey was administered. They were told how their answers would further knowledge of environmental awareness, pro-environmental behaviour, climate change perception, and attitudes toward sustainable development and make a significant contribution to the study among students in the Kashmir Valley. This briefing was presented in clear, accessible language to ensure that all participants fully understood the scope and intent of the research.

As part of the research process, participants were clearly informed that their involvement was entirely voluntary. To ensure transparency and uphold ethical standards, an informed consent form was presented at the beginning of the online questionnaire. This form explained the purpose of the study and emphasised key ethical commitments, such as maintaining the anonymity and confidentiality of all responses, using the data strictly for academic and research purposes, and securely storing all information in a password-protected digital environment with restricted access.

Furthermore, no personally identifiable information, such as names or institutional ID numbers, was gathered during the study, ensuring complete anonymity and preventing any individual response from being linked to a specific participant. All data were coded and stored in encrypted files, accessible only to the principal researcher and supervisory committee. This meticulous attention to ethical protocol was designed to foster a safe, respectful, and non-intrusive environment for participants, encouraging honest and thoughtful responses while fully safeguarding their privacy and dignity. The study

adhered to the ethical guidelines and followed best practices in human subjects' research.

Ethical standards were strictly observed throughout the study, with formal permission obtained from the respective authors or copyright holders for the use of standardised instruments developed by national and international researchers, as well as from the heads of the institutions from which the data were collected prior to the administration of the tools.

3.8 HYPOTHESIS OF THE STUDY

The term "hypothesis" originates from two Greek words and can be understood as a "sub-statement," representing a tentative claim that research seeks to validate. It is formed by combining *hypo* and *thesis*, where *thesis* denotes a statement or proposition regarding the generalisation, and *hypo* signifies that it is provisional or awaiting confirmation. Essentially, a hypothesis presents a potential solution to a problem, which must be empirically tested and supported through logical reasoning (Kerlinger, 1986). The term "hypothesis" refers to a provisional statement or assertion concerning the solution to a problem. As the central focus of any investigation is to test this statement against empirical evidence, the hypothesis forms the foundational framework for the entire study, guiding the research from inception to conclusion. Essentially, a hypothesis is a tentative generalisation or theoretical proposition about the characteristics of the phenomena under observation, accepted provisionally as true based on the current understanding of the phenomenon (Goode & Hatt, 1952). It serves as the foundation for organising and carrying out the quest for the new truth. The researcher formulated the following hypotheses for the present study.

H1. There is no statistically significant difference observed in the mean Environmental Awareness scores among the subgroups of students from the Kashmir Valley, Jammu and Kashmir, with respect to the following variables.

(a) Gender (Male & Female)

(b) Residence (Rural & Urban)

(c) Stream of Study (Humanities, Science, and others)

(d) Father's Education (Illiterate and Literate)

(e) Mother's Education (Illiterate and Literate)

(f) Semester (1^{st}, 2^{nd}, 3^{rd}, 4^{th}, 5^{th}, 6^{th})

(g) Father's Occupation (Self-employed, Private Service, Govt. Service)

(h) Family Income (Below 25000, 25000-50000, Above 50000)

H2. There is no statistically significant difference between the mean Pro-environmental behaviour scores of the subgroups of students of Kashmir Valley, Jammu and Kashmir, with respect to the following variables.

(a) Gender (Male & Female)

(b) Residence (Rural & Urban)

(c) Stream of Study (Humanities, Science, and others)

(d) Father's Education (Illiterate and Literate)

(e) Mother's Education (Illiterate and Literate)

(f) Semester (1^{st}, 2^{nd}, 3^{rd}, 4^{th}, 5^{th}, 6^{th})

(g) Father's Occupation (Self-employed, Private Service and Govt. Service)

(h) Family Income (Below 25000, 25000-50000, Above 50000)

H3. There is no statistically significant difference between the mean Climate Change Perception scores of the subgroups of students of Kashmir Valley, Jammu and Kashmir, with respect to the following variables.

(a) Gender (Male & Female)

(b) Residence (Rural & Urban)

(c) Stream of Study (Humanities, Science, and others)

(d) Father's Education (Illiterate and Literate)

(e) Mother's Education (Illiterate and Literate)

(f) Semester (1^{st}, 2^{nd}, 3^{rd}, 4^{th}, 5^{th}, 6^{th})

(g) Father's Occupation (Self-employed, Private Service and Govt. Service)

(h) Family Income (Below 25000, 25000-50000, Above 50000)

H4. There is no statistically significant difference in the mean scores of Attitudes towards Sustainable Development among the student subgroups of the Kashmir Valley, Jammu and Kashmir, with respect to the following variables.

(a) Gender (Male & Female)

(b) Residence (Rural & Urban)

(c) Stream of Study (Humanities, Science, and others)

(d) Father's Education (Illiterate and Literate)

(e) Mother's Education (Illiterate and Literate)

(f) Semester (1^{st}, 2^{nd}, 3^{rd}, 4^{th}, 5^{th}, 6^{th})

(g) Father's Occupation (Self-employed, Private Service and Govt. Service)

(h) Family Income (Below 25000, 25000-50000, Above 50000)

H5. There is a significant impact of Environmental Awareness on Pro-Environmental behaviour.

H6. There is a significant impact of Attitude towards sustainable development on pro-environmental behaviour.

H7. There is a significant impact of climate change perception on pro-environmental behaviour.

CHAPTER 4
RESULTS AND DISCUSSION

Chapter 4: RESULTS AND DISCUSSION

This chapter presents the analysis and interpretation of the collected data. The purpose of this analysis is to organise, categorise, and summarise the information, facilitating a deeper understanding and enabling the research questions to be effectively addressed. The process of looking for the data's larger meaning is called interpretation. Interpretation cannot occur without analysis, and analysis cannot occur without interpretation; hence, the two are interdependent. According to F.L. Whitney (1960), data interpretation refers to the careful and meaningful explanation of the material presented, in relation to the objectives of the study and the specific chapter or section under discussion. Interpretation is thus by no means a mechanical process." In order to create a meaningful picture from the raw data gathered, the next steps in the research process include data organisation, analysis, and interpretation, as well as conclusion formulation and generalisation. The objective material in the researcher's hands, along with his subjective responses, is studied in data analysis and interpretation in order to ascertain the underlying facts or meanings. In order to facilitate interpretation, it entails dissecting already complex factors into their parts and rearranging them. It is necessary to systematise and arrange the data gathered using different techniques, such as screening, classifying, and tabulating. Editing entails ensuring that the information gathered is accurate, useful, and comprehensive. Tabulating is the process of accurately capturing the categorised material in mathematical terms, while classifying entails dividing the information into groups of classes.

The study of various methods used for data analysis and interpretation, as well as the conclusion of the data analysis, is covered in this chapter. As the data was gathered, it was examined while keeping the study's goals and hypothesis in mind. The following methodology was used to analyse the data: Environmental awareness, pro-environmental behaviour, climate change perception, and attitude toward sustainable development are the four main components of the study, as was previously discussed in prior chapters. The study also examines the relationships between these four components. The tools' raw scores were extracted independently and used as the foundational data sources for the research.

After undergoing statistical analysis, these unprocessed data were converted into standardised data. First, each of the four factors, environmental awareness, pro-environmental behaviour, perception of climate change, and attitude toward sustainable development, was examined separately. Then, the relationships between these four factors were examined. Following statistical testing, the hypotheses stated under each of the four elements were either accepted or rejected. Gender, residence, study stream, semester, parental education, parental occupation, and family income were the categorical variables taken into account.

4.1 DATA SCREENING AND CLEANING

Through data screening and cleaning, the researcher ensures that the data are usable, reliable, and valid to obtain true and effective results. The data are carefully monitored through visual inspection and by applying various statistical procedures available. The data are checked for missing values, outliers, unengaged responses, normality, etc. Notably, the data used in the present study did not report any missing values. However, there were many unengaged responses and outliers in the data that were timely checked and removed from further analysis.

Subsequently, the data were subjected to a normality test using Skewness and Kurtosis (Hair et al. 2010). Kurtosis indicates the distribution's flatness or peakedness, while skewness quantifies the degree of distortion or absence of symmetry. A positively skewed distribution indicates that the data are shifted to the left, whereas one that is negatively skewed indicates that the data are shifted to the right. Additionally, a peaked distribution is indicated by a positive Kurtosis value, while a negative value indicates a flatter distribution (Hair et al., 2010). Researchers claim that measured variables that exhibit a normal distribution offer better results compared to non-normal data (Tabachnick & Fidell, 2007). For a normal distribution, the values of both Skewness and Kurtosis should lie between +/-1 or close to zero (Field, 2009). However, some researchers are a bit more liberal and consider a value of +2/-2 as acceptable (George & Mallery, 2010) in order to prove the normal distribution.

Table 4.1: Skewness and Kurtosis

Variables	N	Skewness	Std. Error	Kurtosis	Std. Error
EA	1200	1.014	0.100	1.550	0.199

PEB	1200	0.448	0.100	-0.143	0.199
CCP	1200	1.216	0.100	1.296	0.199
ATSD	1200	1.069	0.100	1.429	0.199

From Table 4.1, it is observed that the values of both skewness and kurtosis for all the variables, Environmental awareness (EA), Pro-environmental behaviour (PEB), Climate Change Perception (CCP) and Attitude towards sustainable development (ATSD), are within the acceptable range; therefore, the data for the present study are assumed to be normally distributed for further analysis.

4.2 Validity and Reliability of Scales

Before diving into the key findings of the study, it's crucial to first confirm that the measurement tools used are both valid and reliable. When we ensure that our scales meet these criteria, it lays a solid groundwork for interpreting the data in a way that's both accurate and meaningful. In this section, we'll explore the psychometric properties of the scales designed to assess environmental awareness, pro-environmental behaviour, perceptions of climate change, and attitudes toward sustainable development. We'll focus on aspects like internal consistency, construct validity, and how well these tools fit the target population.

Table 4.2: Factor Loadings of various items and Cronbach's α value of the Environmental Awareness Scale

S.No.	Statement	Factor Loadings	S.No.	Statement	Factor Loadings	Cronbach's α
1.	**EA1**	0.471	27.	**EA27**	0.453	
2.	**EA2**	0.513	28.	**EA28**	0.550	
3.	**EA3**	0.514	29.	**EA29**	0.676	
4.	**EA4**	0.521	30.	**EA30**	0.468	
5.	**EA5**	0.463	31.	**EA31**	0.481	
6.	**EA6**	0.469	32.	**EA32**	0.694	
7.	**EA7**	0.463	33.	**EA33**	0.634	
8.	**EA8**	0.461	34.	**EA34**	0.615	
9.	**EA9**	0.512	35.	**EA35**	0.672	
10.	**EA10**	0.452	36.	**EA36**	0.695	

11.	**EA11**	0.513	37.	**EA37**	0.565	0.903
12.	**EA12**	0.453	38.	**EA38**	0.609	
13.	**EA13**	0.600	39.	**EA39**	0.591	
14.	**EA14**	0.512	40.	**EA40**	0.533	
15.	**EA15**	0.587	41.	**EA41**	0.452	
16.	**EA16**	0.471	42.	**EA42**	0.473	
17.	**EA17**	0.585	43.	**EA43**	0.426	
18.	**EA18**	0.486	44.	**EA44**	0.471	
19.	**EA19**	0.628	45.	**EA45**	0.442	
20.	**EA20**	0.510	46.	**EA46**	0.535	
21.	**EA21**	0.457	47.	**EA47**	0.432	
22.	**EA22**	0.652	48.	**EA48**	0.441	
23.	**EA23**	0.426	49.	**EA49**	0.452	
24.	**EA24**	0.657	50.	**EA50**	0.421	
25.	**EA25**	0.601	51.	**EA51**	0.594	
26.	**EA26**	0.435				

Table 4.3: Factor Loadings of various items and Cronbach's α value of the Pro-environmental Behaviour Scale

S. No	**Statement**	**Factor Loadings**	**S. No**	**Statement**	**Factor Loadings**	**Cronbach'sα**
1	**PEB1**	0.578	8	**PEB8**	0.664	0.88
2	**PEB2**	o.508	9	**PEB9**	0.668	
3	**PEB3**	0.552	10	**PEB10**	0.682	
4	**PEB4**	0.647	11	**PEB11**	0.558	
5	**PEB5**	0.561	12	**PEB12**	0.712	
6	**PEB6**	0.586	13	**PEB13**	0.607	
7	**PEB7**	0.650	14	**PEB14**	0.726	

Table 4.4: Factor loading and Cronbach's α value of Attitude towards Sustainable Development Scale

S.No.	Statement	Factor Loadings	S.No.	Statement	Factor Loadings	Cronbach'sα
1.	**ATSD1**	0.418	11	**ATSD11**	0.500	0.90
2.	**ATSD2**	0.516	12	**ATSD12**	0.547	
3.	**ATSD3**	0.435	13	**ATSD13**	0.555	
4.	**ATSD4**	0.455	14	**ATSD14**	0.575	
5.	**ATSD5**	0.562	15	**ATSD15**	0.525	
6.	**ATSD6**	0.584	16	**ATSD16**	0.591	
7.	**ATSD7**	0.577	17	**ATSD17**	0.576	
8.	**ATSD8**	0.530	18	**ATSD18**	0.609	
9.	**ATSD9**	0.525	19	**ATSD19**	0.581	
10	**ATSD10**	0.601	20	**ATSD20**	0.495	

4.1 (a) Convergent and Discriminant Validity of the Construct

From Tables 4.2, 4.3 and 4.4, the Cronbach's α value for the variables Environmental Awareness, Pro-Environmental behaviour, and Attitude towards sustainable development is 0.90, 0.88, and 0.90, respectively (Extraction Method: Principal Component Analysis. Rotation Method: Varimaxwith Kaiser Normalisation). From Table 4.5, the composite reliability (CR) for Environmental Awareness, Pro-environmental behaviour, and Attitude towards sustainable development is 0.939, 0.902, and 0.884, respectively, while the average variance extracted (AVE) values are 0.345, 0.319, and 0.357, respectively.

Table 4.5: Convergent and Discriminant Validity of Environmental Awareness, Attitude towards Sustainable Development, and Pro-Environmental Behaviour

Variable	CR	AVE	EA	ATSD	PEB
EA	0.939	0.345	**0.587**		
ATSD	0.902	0.319	0.543***	**0.565**	

PEB	0.884	0.357	0.254***	0.324***	**0.598**

Malhotra and Dash (2018) note that even if more than 50% of the variance is due to error, convergent validity can still be considered adequate based on Composite Reliability (CR) alone, as "AVE is a more conservative measure than CR." In the present study, although the AVE values are below 0.5, convergent validity is nonetheless established for all constructs. The results also indicate robust discriminant validity among the constructs. This is evidenced by the fact that all diagonal values (representing the square roots of the AVEs) are greater than the corresponding off-diagonal values (inter-construct correlations). This confirms that each construct is more strongly associated with its own indicators than with those of other constructs, thereby demonstrating a clear distinction between the constructs.

Table 4.6: Factor loading and Cronbach's α value of Understanding about climate change

S. No	Statement	Factor loading	S. No	Statement	Factor loading	Cronbach'sα
1	**UCC1**	0.424	**6**	**UCC6**	0.646	0.764
2	**UCC2**	0.614	**7**	**UCC7**	0.588	
3	**UCC3**	0.715	**8**	**UCC8**	0.504	
4	**UCC4**	0.468	**9**	**UCC9**	0.771	
5	**UCC5**	0.740	**10**	**UCC10**	0.434	

Table 4.7: Factor loading and Cronbach's α value of engagement in the Low-Carbon Behaviour section of the Scale.

S.No.	Statement	Factor loading	S.No.	Statement	Factor loading	Cronbach'sα
1	**LCB1**	0.854	6	**LCB6**	0.734	0.874
2	**LCB2**	0.571	7	**LCB7**	0.588	
3	**LCB3**	0.564	8	**LCB8**	0.691	
4	**LCB4**	0.543	9	**LCB9**	0.857	
5	**LCB5**	0.591	10	**LCB10**	0.656	

Table 4.8: Factor loading and Cronbach's α value of the hindrance to adoption of low-carbon behaviour section of the scale.

S. No.	Statement	Factor loading	S.No.	Statement	Factor loading	Cronbach's α
1	HLCB1	0.607	**4**	HLCB4	0.568	0.654
2	HLCB2	0.642	**5**	HLCB5	0.589	
3	HLCB3	0.562				

Table 4.9: Factor loading and Cronbach's α value of the Impacts of climate changesection of the scale.

S.No.	Statement	Factor loading	S.No.	Statement	Factor loading	Cronbach's α
1	ICC1	0.588	**5**	ICC5	0.681	0.805
2	ICC2	0.683	**6**	ICC6	0.476	
3	ICC3	0.600	**7**	ICC7	0.763	
4	ICC4	0.659				

To assess the internal consistency and validity of the measurement scales used in the study, several psychometric properties were evaluated. From Tables 4.6 to 4.9, the Cronbach's alpha (α) values for the sub-constructs, Understanding Climate Change (UCC), adoption of Low Carbon behaviour (LCB), Hindrance/barriers to adoption of Low Carbon behaviour (HLCB), and Impacts of Climate Change (ICC), were found to be 0.803, 0.874, 0.654, and 0.805, respectively. These values indicate acceptable to good levels of internal consistency, particularly for UCC, LCB, and ICC (George & Mallery, 2010). However, the reliability of HLCB is relatively lower, suggesting a need for careful interpretation.

Principal Component Analysis (PCA) was employed for factor extraction, using Varimax rotation with Kaiser Normalisation, to confirm the construct validity of the scale. Further, from Table 4.10, the composite reliability (CR) values for LCB, UCC, ICC, and HLCB were 0.831, 0.764, 0.810, and 0.654, respectively, indicating an acceptable level of convergent reliability for most constructs (Hair et al., 2010). The composite reliability of the HLCB construct was found to be 0.654, which is slightly below the recommended threshold of 0.7 (Hair et al., 2017). However, all indicator loadings exceeded 0.5, suggesting that the construct demonstrates adequate convergent

validity. Given that this study is exploratory in nature, the composite reliability is deemed acceptable for further analysis (Fornell & Larcker, 1981).

Table 4.10: Convergent and Discriminant Validity of Understanding Climate Change, adoption of low-carbon behaviour, hindrance to adoption of low-carbon behaviour and impacts of climate change

Variable	CR	AVE	LCB	UCC	ICC	HLCB
LCB	0.831	0.366	**0.605**			
UCC	0.764	0.283	0.126**	**0.532**		
ICC	0.810	0.382	0.267***	0.237***	**0.618**	
HLCB	0.654	0.279	0.333***	0.148*	0.512***	**0.528**

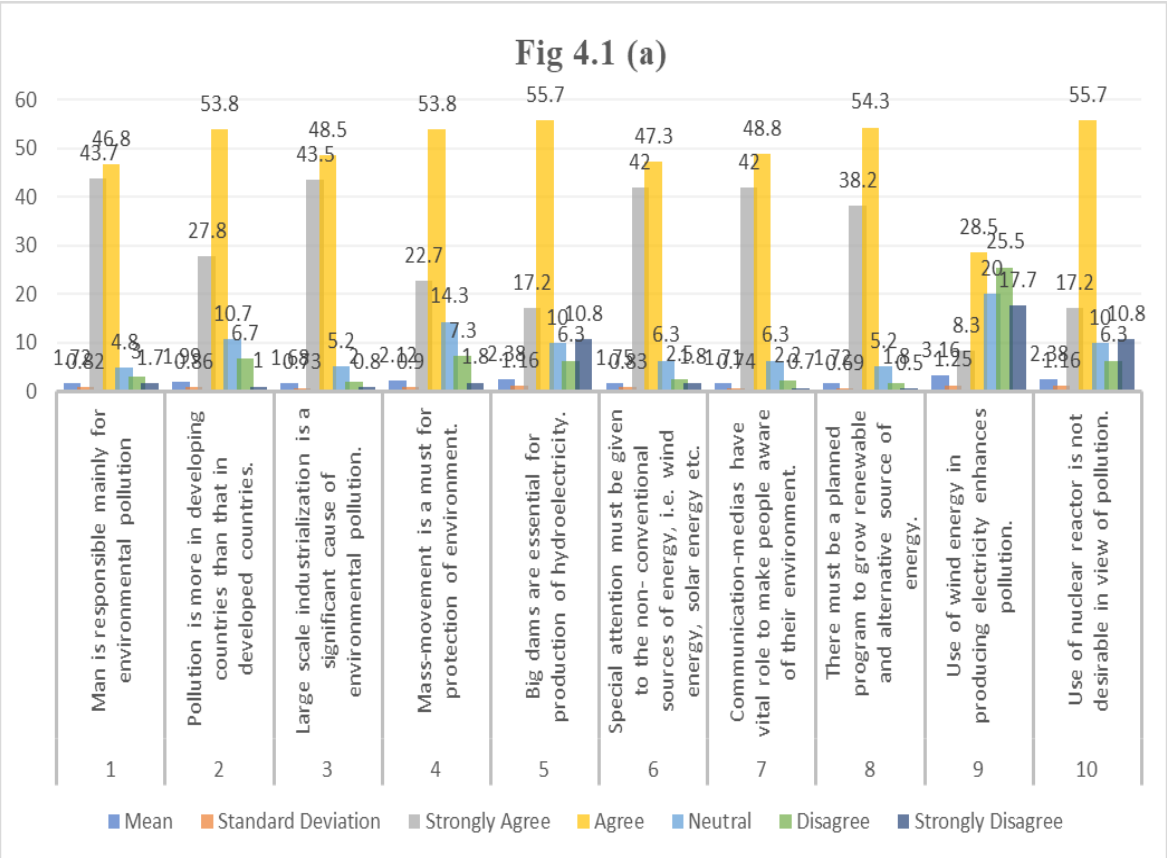
From Table 4.10, although the Average Variance Extracted (AVE) values are below the recommended threshold of 0.5, Malhotra and Dash (2018) note that "AVE is a more conservative measure than Composite Reliability (CR); therefore, based on CR alone, a researcher may conclude that the convergent validity of a construct is acceptable, even if more than 50% of the variance is attributed to error." Accordingly, it can be inferred that all constructs in the present study demonstrate adequate convergent validity. Furthermore, discriminant validity among the constructs is well established, as the square roots of the AVE values for each construct exceed their respective inter-construct correlations (Fornell-Larcker Criterion, 1981). This indicates that each construct shares a stronger relationship with its own indicators than with those of other constructs, thereby confirming a clear distinction among the measured constructs.

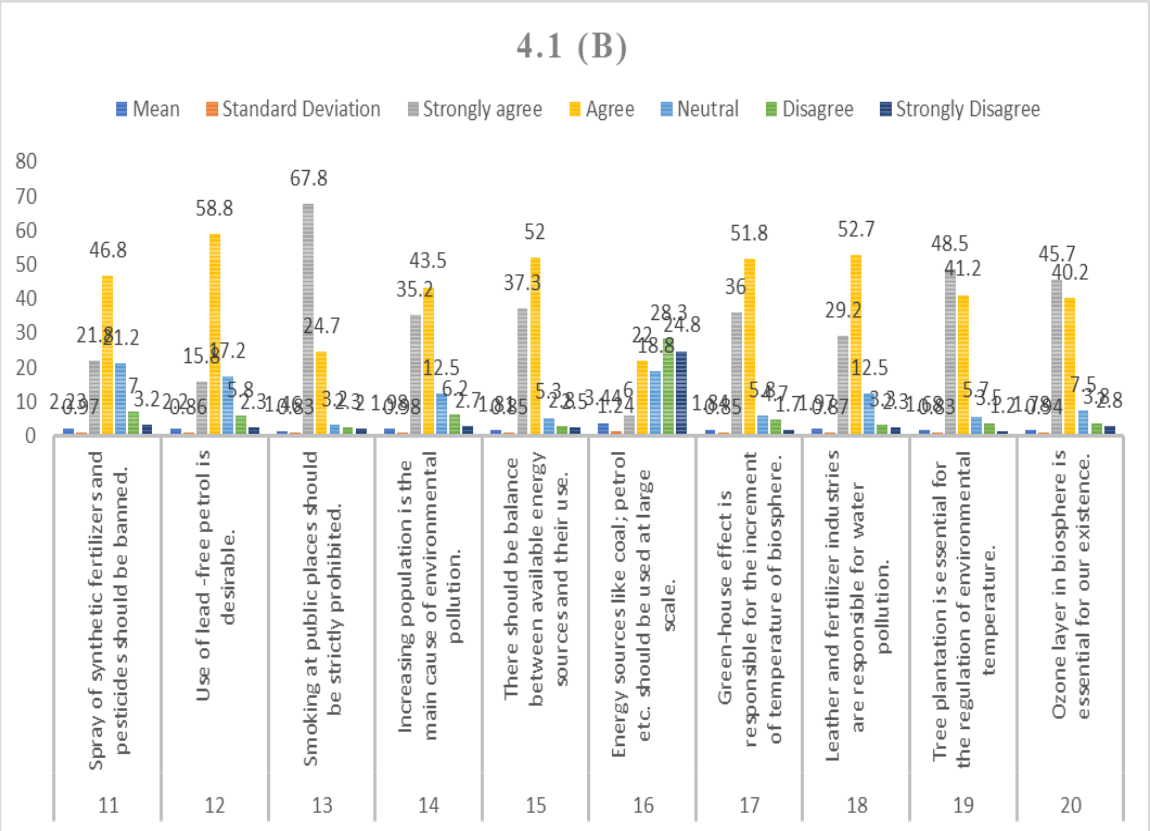
4.3: Environmental Awareness: The present study explored the level of environmental awareness among undergraduate students enrolled in various colleges across the Kashmir Valley. Environmental awareness, an essential aspect of environmental literacy, encompasses students' understanding of ecological principles, awareness of pressing environmental issues, and recognition of the impacts of human activities on the natural world. Based on the data collected through standardised tools, the following results were obtained and are discussed in detail below.

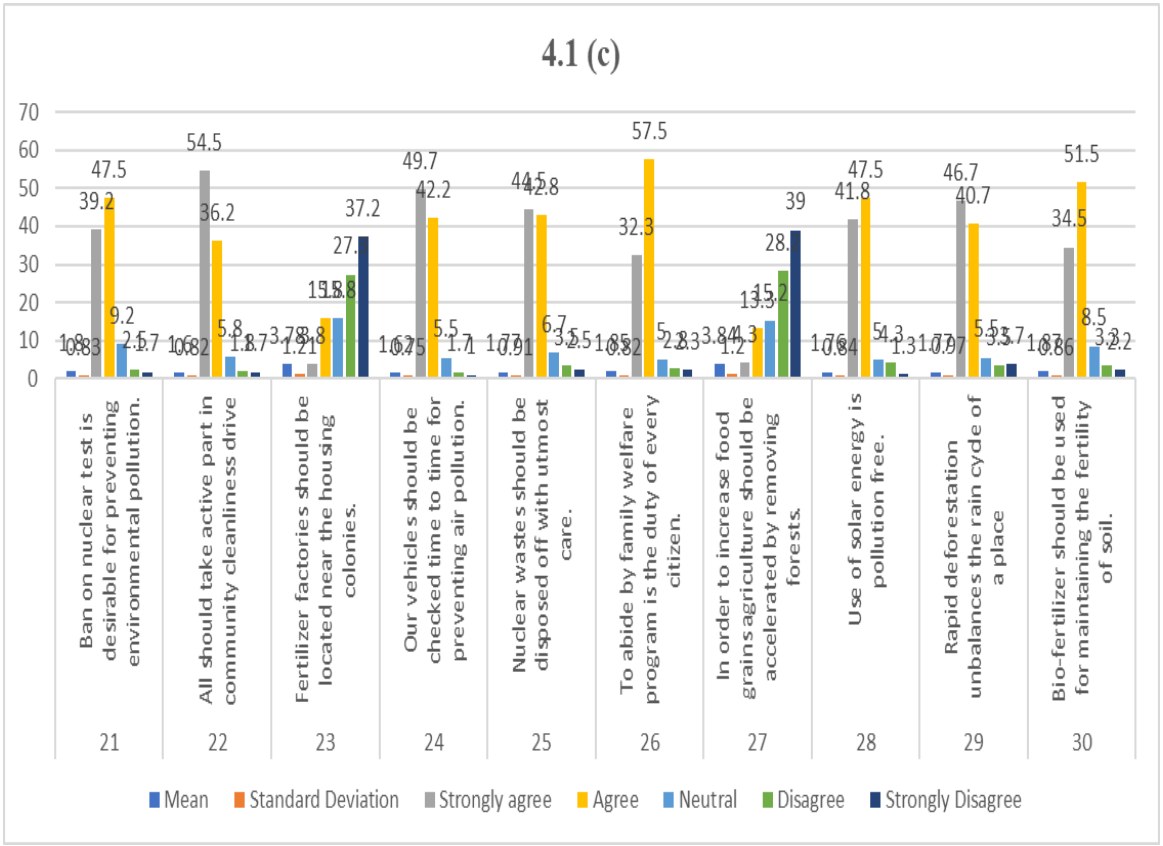
Table 4.11: Environmental awareness among students

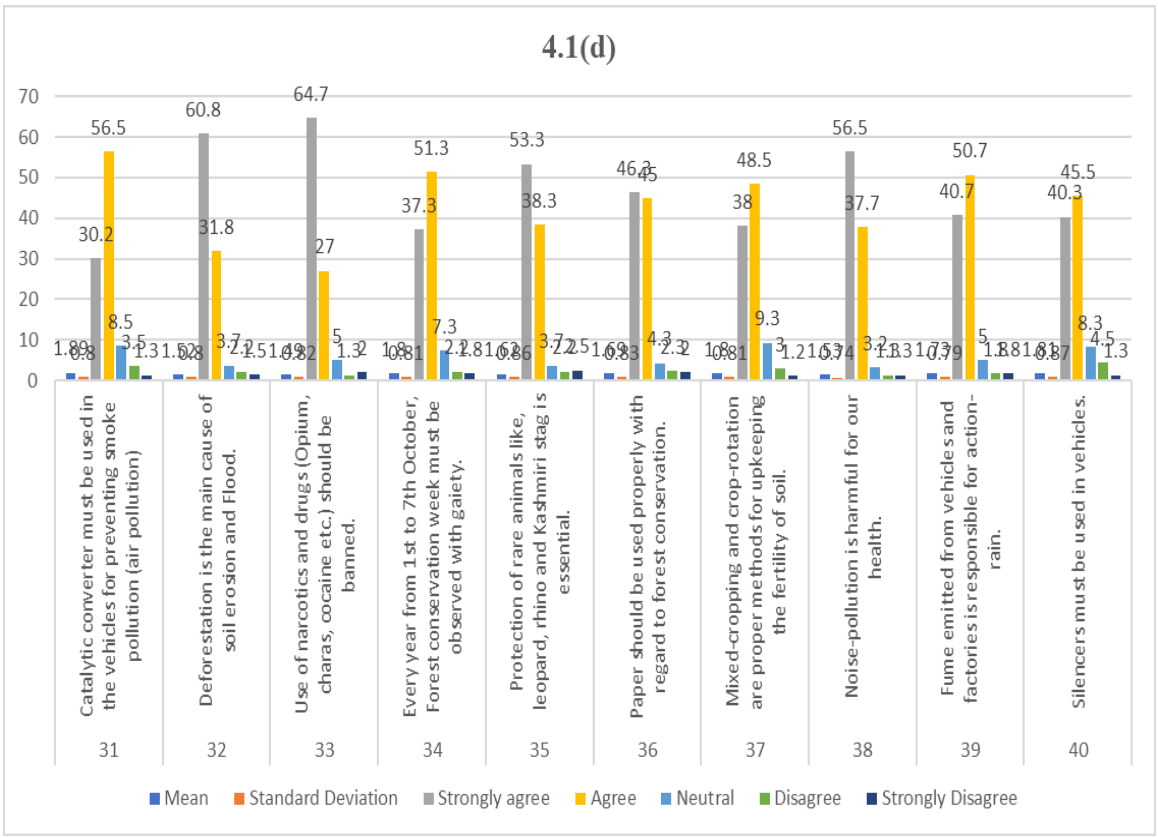
S.NO.	Statement	Mean	SD	SA	A	N	D	SD
1.	EA1	1.72	0.82	43.7	46.8	4.80	3.00	1.70
2.	EA2	1.99	0.86	27.8	53.8	10.7	6.7	1.0
3.	EA3	1.68	0.73	43.5	48.5	5.2	2.0	0.8
4.	EA4	2.12	0.90	22.7	53.8	14.3	7.3	1.8
5.	EA5	2.38	1.16	17.2	55.7	10.0	6.3	10.8
6.	EA6	1.75	0.83	42.0	47.3	6.3	2.5	1.8
7.	EA7	1.71	0.74	42.0	48.8	6.3	2.2	0.7
8.	EA8	1.72	0.69	38.2	54.3	5.2	1.8	0.5
9.	EA9	3.16	1.25	8.3	28.5	20.0	25.5	17.7
10.	EA10	2.38	1.16	17.2	55.7	10.0	6.3	10.8
11.	EA11	2.23	0.97	21.8	46.8	21.2	7.0	3.2
12.	EA12	2.20	0.86	15.8	58.8	17.2	5.8	2.3
13.	EA13	1.46	0.83	67.8	24.7	3.2	2.3	2.0
14.	EA14	1.98	0.98	35.2	43.5	12.5	6.2	2.7
15.	EA15	1.81	0.85	37.3	52.0	5.3	2.8	2.5
16.	EA16	3.44	1.24	6.0	22.0	18.8	28.3	24.8
17.	EA17	1.84	0.85	36.0	51.8	5.8	4.7	1.7
18.	EA18	1.97	0.87	29.2	52.7	12.5	3.3	2.3
19.	EA19	1.68	0.83	48.5	41.2	5.7	3.5	1.2
20.	EA20	1.78	0.94	45.7	40.2	7.5	3.8	2.8
21.	EA21	1.80	0.83	39.2	47.5	9.2	2.5	1.7
22.	EA22	1.60	0.82	54.5	36.2	5.8	1.8	1.7
23.	EA23	3.78	1.21	3.8	15.8	15.8	27.3	37.2
24.	EA24	1.62	0.75	49.7	42.2	5.5	1.7	1.0
25.	EA25	1.77	0.91	44.5	42.8	6.7	3.5	2.5
26.	EA26	1.85	0.82	32.3	57.5	5.0	2.8	2.3
27.	EA27	3.84	1.20	4.3	13.3	15.2	28.2	39.0
28.	EA28	1.76	0.84	41.8	47.5	5.0	4.3	1.3
29.	EA29	1.77	0.97	46.7	40.7	5.5	3.5	3.7

30.	EA30	1.87	0.86	34.5	51.5	8.5	3.3	2.2
31.	EA31	1.89	0.80	30.2	56.5	8.5	3.5	1.3
32.	EA32	1.52	0.80	60.8	31.8	3.7	2.2	1.5
33.	EA33	1.49	0.82	64.7	27.0	5.0	1.3	2.0
34.	EA34	1.80	0.81	37.3	51.3	7.3	2.2	1.8
35.	EA35	1.62	0.86	53.3	38.3	3.7	2.2	2.5
36.	EA36	1.69	0.83	46.3	45.0	4.3	2.3	2.0
37.	EA37	1.80	0.81	38.0	48.5	9.3	3.0	1.2
38.	EA38	1.53	0.74	56.5	37.7	3.2	1.3	1.3
39.	EA39	1.73	0.79	40.7	50.7	5.0	1.8	1.8
40.	EA40	1.81	0.87	40.3	45.5	8.3	4.5	1.3
41.	EA41	3.16	1.17	5.5	27.7	28.8	21.0	17.0
42.	EA42	2.12	0.88	19.0	50.0	23.7	5.5	1.8
43.	EA43	2.12	0.84	18.7	59.2	16.2	3.3	2.7
44.	EA44	2.06	0.81	20.7	60.5	12.2	5.3	1.3
45.	EA45	2.09	1.35	46.0	28.8	6.0	8.2	11.0
46.	EA46	1.78	0.85	41.0	46.7	7.2	3.5	1.7
47.	EA47	2.16	0.95	24.7	46.7	19.2	7.3	2.2
48.	EA48	2.21	0.93	20.0	51.2	19.0	7.5	2.3
49.	EA49	1.94	0.76	25.2	61.7	8.5	3.5	1.2
50.	EA50	2.90	1.19	9.3	35.8	23.5	18.0	13.3
51.	EA51	1.68	0.84	48.5	40.8	6.2	3.0	1.5


Fig 4.1 (a)
60
50
40
30
20
10
0
Man is responsible mainly for environmental pollution
Pollution is more in developing countries than in developed countries.
Large scale industrialization is a significant cause of environmental pollution.
Mass-movement is a must for protection of environment.
Big dams are essential for production of hydroelectricity.
Special attention must be given to the non- conventional sources of energy, i.e. wind energy, solar energy etc.
Communication-medias have vital role to make people aware of their environment.
There must be a planned program to grow renewable and alternative source of energy.
Use of wind energy in producing electricity enhances pollution.
Use of nuclear reactor is not desirable in view of pollution.
1
2
3
4
5
6
7
8
9
10
Mean
Standard Deviation
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree


4.1 (B)
Mean
Standard Deviation
Strongly agree
Agree
Neutral
Disagree
Strongly Disagree
80
70
60
50
40
30
20
10
0
Spray of synthetic fertilizers and pesticides should be banned.
Use of lead -free petrol is desirable.
Smoking at public places should be strictly prohibited.
Increasing population is the main cause of environmental pollution.
There should be balance between available energy sources and their use.
Energy sources like coal; petrol etc. should be used at large scale.
Green-house effect is responsible for the increment of temperature of biosphere.
Leather and fertilizer industries are responsible for water pollution.
Tree plantation is essential for the regulation of environmental temperature.
Ozone layer in biosphere is essential for our existence.
11
12
13
14
15
16
17
18
19
20


4.1 (c)
70
60
50
40
30
20
10
0
Ban on nuclear test is desirable for preventing environmental pollution.
All should take active part in community cleanliness drive
Fertilizer factories should be located near the housing colonies.
Our vehicles should be checked time to time for preventing air pollution.
Nuclear wastes should be disposed off with utmost care.
To abide by family welfare program is the duty of every citizen.
In order to increase food grains agriculture should be accelerated by removing forests.
Use of solar energy is pollution free.
Rapid deforestation unbalances the rain cycle of a place
Bio-fertilizer should be used for maintaining the fertility of soil.
21
22
23
24
25
26
27
28
29
30
Mean
Standard Deviation
Strongly agree
Agree
Neutral
Disagree
Strongly Disagree


4.1(d)
70
60
50
40
30
20
10
0
Catalytic converter must be used in the vehicles for preventing smoke pollution (air pollution)
Deforestation is the main cause of soil erosion and Flood.
Use of narcotics and drugs (Opium, charas, cocaine etc.) should be banned.
Every year from 1st to 7th October, Forest conservation week must be observed with gaiety.
Protection of rare animals like, leopard, rhino and Kashmiri stag is essential.
Paper should be used properly with regard to forest conservation.
Mixed-cropping and crop-rotation are proper methods for upkeeping the fertility of soil.
Noise-pollution is harmful for our health.
Fume emitted from vehicles and factories is responsible for action-rain.
Silencers must be used in vehicles.
31
32
33
34
35
36
37
38
39
40
Mean
Standard Deviation
Strongly agree
Agree
Neutral
Disagree
Strongly Disagree

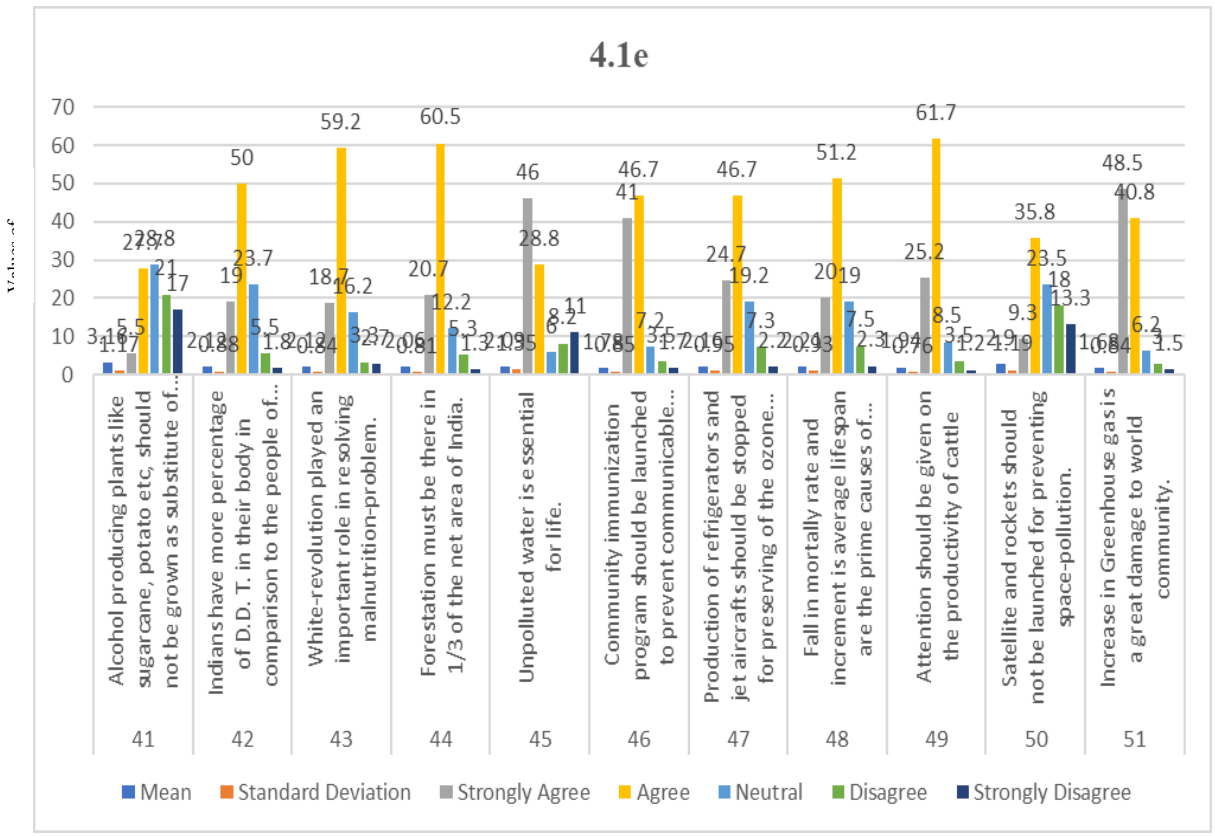


Fig. 4.1 (a-e): Environmental Awareness among students

From table 4.7 and figures 4.1 (a-e) regarding environmental awareness it can be revealed that 90% of students were aware that anthropogenic activities are the main cause of overexploitation of environment, 92% of students were aware that industrialization leads to environmental pollution, 67.8% of students strongly agreed that smoking should be prohibited in public places, 78.7% agreed that overpopulation as the cause of environmental pollution, 91.9 % agree that vehicles should be checked time to time for pollution, 87.3%agree that nuclear wastes should be disposed-off with utmost care. Students were found to be cognizant of critical environmental concerns, including deforestation, biodiversity preservation, renewable energy use, and sustainable farming practices. However, it was found that students arenot very aware of alternative energy sources. Students were aware that large-scale use of fossil fuels can prove disastrous for human life. Thus, it can be concluded that students have awareness about the environment.

Table 4.12: Sociodemographic determinants of Environmental awareness among students

S. No.	Variable	Subgroup	Mean	SD	t-value/ F-value	P-value	Level of Significance at 5%
1	Gender	Male	2.047	0.35	0.650	0.516	Not Significant
		Female	2.027	0.39			
2	Residence	Rural	2.040	0.36	0.274	0.785	Not Significant
		Urban	2.031	0.39			
3	Stream of Study	Humanities	2.054	0.38	2.215	0.027	**Significant**
		Science	2.017	0.37			
		Others	2.053	0.35			
4	Father's education	Illiterate	2.052	0.39	2.68	0.008	**Significant**
		Literate	2.028	0.36			
5	Mother's Education	Illiterate	2.037	0.390	0.072	0.942	Not Significant
		Literate	2.035	0.361			
6	Semester	1st	2.017	0.341	1.666	0.141	Not Significant
		2nd	1.952	0.313			
		3rd	2.122	0.444			
		4th	2.038	0.373			
		5th	2.055	0.358			
		6th	2.029	0.421			
7	Father's occupation	Govt Service	2.007	0.327	3.13	0.044	**Significant**
		Private Service	2.048	0.402			
		Self-employed	2.043	0.382			
8	Family Income	Below 25000	2.035	0.387	0.315	0.730	Not Significant
		25000-50000	2.020	0.402			
		Above 50000	2.057	0.311			

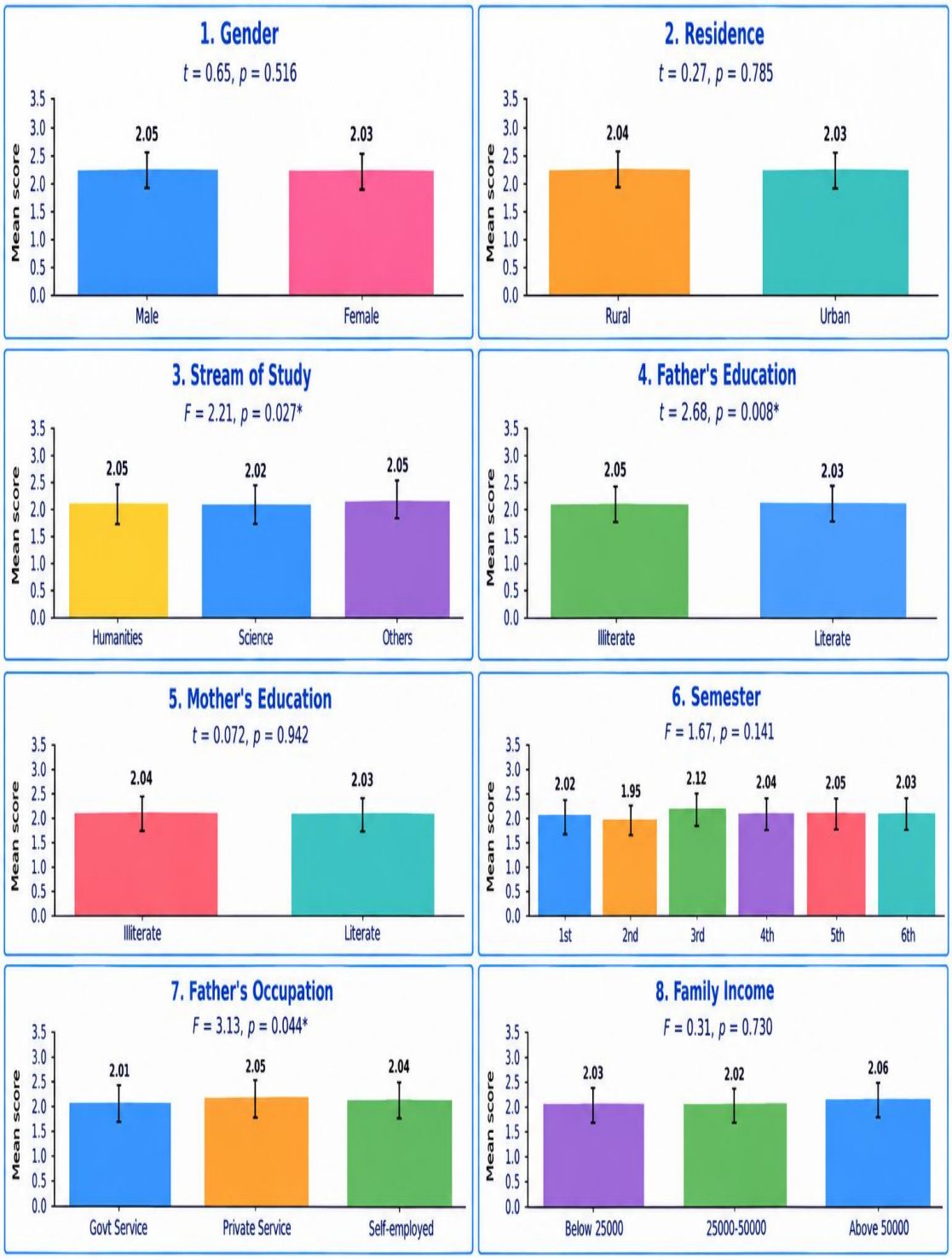


Fig. 4.2: Sociodemographic determinants of Environmental awareness among students

As shown in Table 4.12 and Figure 4.2, male and female college students demonstrate equivalent awareness of environmental issues. With a t-value of 0.650 and a p-value of 0.516, gender appears to have no significant impact on environmental knowledge. The closely aligned mean scores of 2.047 for males and 2.027 for females reinforce this conclusion. This finding presents a notable contrast to previous studies conducted by Kumar et al. (2015), which indicated that gender influences students' environmental awareness. Nonetheless, it is consistent with the findings of Shobeiri (2007), who investigated students in Iran and India, as well as Medhi (2018), who researched high school students in Guwahati city, Assam—both of which revealed no notable gender-based differences. A notable disparity was identified in environmental awareness according to the students' subject stream. Students in the science field exhibited a greater level of awareness compared to those in non-science disciplines, as indicated by a t-value of 2.215 and a p-value of 0.027, which is statistically significant at the 0.05 threshold. This conclusion is corroborated by the work of Rogayan and Nebrida (2019), who observed analogous outcomes in their study of science students at President Ramon Magsaysay State University in the Philippines. Similarly, Islam and Razzak (2017) found that science faculty students at Aligarh Muslim University exhibited higher levels of environmental awareness than their arts counterparts. This variation could arise from the greater depth of engagement that science students have with subjects pertaining to environmental studies, including pollution, resource conservation, and ecological balance. The curriculum frequently explores these issues from a scientific perspective, facilitating a deeper comprehension. Finally, the analysis reveals that environmental awareness does not differ significantly between students from rural and urban areas. The t-value of 0.274 and p-value of 0.785 indicate the absence of statistical significance, with mean scores of 2.034 for rural students and 2.031 for urban students being virtually indistinguishable. This indicates that the location of residence does not significantly influence students' environmental awareness levels in the Kashmir Valley. The father's education was found to have a significant impact on environmental awareness, as students with literate parents were found to have more awareness as compared to the students with illiterate parents. The difference in environmental awareness was also found to be significant with respect to the parental occupation, with students whose parents are working in the government

sector being found to be more aware regarding the environment. The findings of the present study are consistent with earlier research demonstrating that parental education and occupation significantly influence students' environmental awareness. Studies indicate that parents play a crucial role in shaping children's environmental attitudes and knowledge through modelling and daily practices. For instance, Masykuroh et al. (2022) reported that parents act as primary agents in fostering environmental awareness and responsible attitudes among children. Evidence further suggests that educational interventions targeting children can indirectly enhance household environmental knowledge and practices, highlighting the broader role of family context (Damerell et al., 2013). In addition, socioeconomic characteristics such as parental education level and occupational status have been associated with higher levels of environmental concern and awareness (Alam & Zakaria, 2021). These findings support the present result that students with literate parents and those whose parents are employed in more stable occupations, such as the government sector, tend to exhibit higher environmental awareness compared to their counterparts.

4.4: Pro-Environmental behaviour: The study also assessed the extent to which undergraduate students in the Kashmir Valley engage in PEBs, which are defined as deliberate actions aimed at limiting negative environmental impacts and supporting sustainability. These habits may include energy conservation, trash reduction, recycling, responsible consumerism, and support for environmental protection measures. Understanding the prevalence and drivers of such practices is vital in an area like Kashmir, which faces rising ecological challenges, including deforestation, water scarcity, and the impacts of climatic variability.

Table 4.13: Pro-environmental behaviours among students

S.No.	Statement	Mean	SD	SA	A	N	D	SD
1	PEB1	2.23	1.26	38.5	25	19.2	9.5	7.8
2	PEB2	2.19	1.13	33.3	32.2	21.7	7.7	5.2
3	PEB3	2.48	1.34	31.2	22.5	25.2	8.7	12.5
4	PEB4	2.31	1.30	36.3	26.2	16.7	12.2	8.7

5	PEB5	2.42	1.39	35.3	23.5	18.2	9.8	13.2
6	PEB6	2.29	1.31	38.2	22.8	20.2	9.2	9.7
7	PEB7	2.30	1.35	37.2	26.8	16.0	8.3	11.7
8	PEB8	2.19	1.27	40.0	25.5	17.3	9.2	8.0
9	PEB9	2.03	1.31	51.0	20.7	11.2	9.0	8.2
10	PEB10	2.16	1.32	43,5	23.5	15.7	7.7	9.7
11	PEB11	2.65	1.43	29.2	21.5	20.8	11.8	16.7
12	PEB12	2.34	1.27	33.0	28.3	19.7	10.0	9.0
13	PEB13	2.37	1.32	35.0	24.7	18.7	11.8	9.8
14	PEB14	2.26	1.28	37.7	25.5	17.5	11.5	7.8

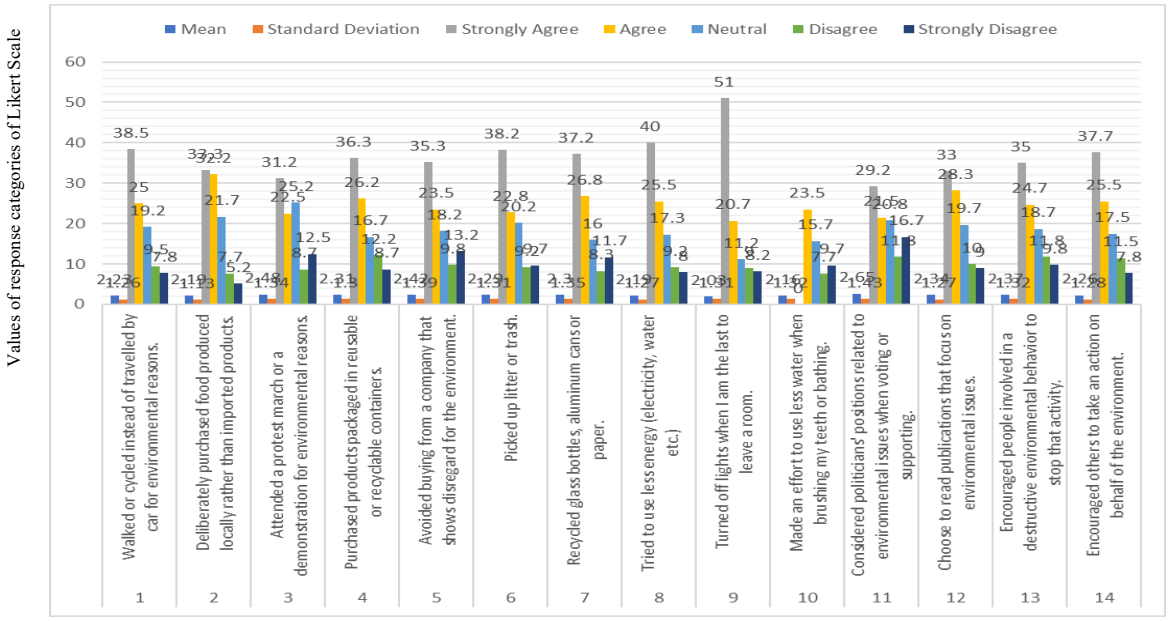


Fig. 4.3: Pro-environmental behaviours among students

The study highlights varying levels of engagement in pro-environmental behaviours among undergraduate students. The behaviours assessed range from individual actions like conserving energy to more collective efforts such as participating in environmental protests (Table 4.13 and Fig. 4.3).

High Participation in Daily Energy Conservation: The mean score (2.03) corresponds to turning off lights when leaving a room, with 51% of students strongly agreeing to this behaviour. This suggests that simple, habitual actions are more

commonly practised. Similarly, efforts to use less water while brushing teeth or bathing (mean = 2.16) showed high engagement, with 43.5% strongly agreeing. These findings imply that students are more inclined toward low-effort, routine-based behaviours that fit easily into their daily lives, and the results align with the findings of Lopez-Mosquera & Sanchez (2012), in which it was explored how simple, habitual energy-saving behaviours, such as turning off lights, are commonly practised.

Moderate Engagement in Recycling and Litter Management: Recycling behaviours, such as recycling glass bottles, aluminium cans, or paper (mean = 2.30), and picking up litter (mean = 2.29), show moderate levels of engagement. Around 37.2% strongly agreed with recycling, and 38.2% with litter collection. This indicates that while awareness exists, practical barriers like a lack of recycling facilities may limit participation. Thogersen J. (2006) examined the moderate engagement in behaviours like recycling, providing insight into how recycling behaviours are influenced by both awareness and practical barriers, such as facility availability, which aligns with the moderate levels of recycling and litter collection in your study.

Selective Eco-friendly Purchasing Habits: When it comes to eco-friendly consumer choices, such as purchasing locally produced food (mean = 2.19) and products in recyclable containers (mean = 2.31), students show moderate engagement. About 33.3% strongly agreed with buying local products. Factors like price sensitivity, availability of products, and awareness could influence these behaviours. This paper discusses factors that influence eco-friendly consumer behaviour, including price sensitivity and product availability, supporting the moderate engagement observed in the study regarding eco-friendly purchasing habits (Peattie & Crane, 2005).

Lower Involvement in Activism and Advocacy: The lowest engagement levels were observed in politically and socially oriented behaviours. Considering environmental issues when voting (mean = 2.65) and attending environmental protests (mean = 2.48) had the lowest percentages of strong agreement (29.2% and 31.2%, respectively). This suggests a gap between environmental concern and active civic participation, possibly due to a lack of opportunities, political disengagement, or perceptions of efficacy. This study addresses barriers to more active forms of pro-environmental behaviour, such as political participation and activism, which aligns with the findings of lower engagement in environmentally oriented civic actions such as attending protests or considering

environmental issues when voting (Kollmuss & Agyeman, 2002)

Encouraging others to adopt pro-environmental actions (mean = 2.26) and discouraging environmentally harmful behaviours (mean = 2.37) showed moderate responses, with 37.7% and 35% strongly agreeing, respectively. This indicates that while students are somewhat willing to influence peers, this behaviour is less common than individual actions. Students' moderate willingness to encourage others to engage in pro-environmental actions (Schultz & Zelezny, 2003)

Routine behaviours like saving energy and water are more prevalent, possibly because they require minimal effort and are easily integrated into daily life. Civic actions and advocacy show lower engagement, pointing to potential areas where environmental education and awareness campaigns could have a significant impact. The standard deviations across behaviours are relatively high, indicating diverse attitudes and practices among students. These data suggest the need for targeted environmental education programs that not only promote awareness but also empower students to engage in more collective and advocacy-based environmental actions. Encouraging institutional support for recycling programs, eco-friendly product availability, and civic participation could bridge the gap between awareness and action.

Table 4.14: Impact of sociodemographic factors on pro-environmental behaviour of students

S.No.	Variable	Subgroup	Mean	SD	t-value/F-value	P-value	Level of significance at 5% level
1	Gender	Male	2.45	0.80	2.91	0.004	**Significant**
		Female	2.30	0.81			
2	Residence	Rural	2.45	0.79	2.68	0.007	**Significant**
		Urban	2.31	0.85			
3	Stream of Study	Humanities	2.53	0.82	6.21	0.002	**Significant**
		Science	2.24	0.78			
		Others	2.36	0.80			
4	Father's education	Illiterate	2.28	0.78	1.60	0.109	Not Significant
		Literate	2.37	0.82			
5	Mother's Education	Illiterate	2.30	0.81	1.99	0.460	Not Significant
		Literate	2.39	0.80			
6	Semester	1st	2.38	0.77	4.44	0.001	
		2nd	1.88	0.91			

		3rd	2.43	0.85			**Significant**
		4th	2.41	0.82			
		5th	2.26	0.83			
		6th	2.23	0.81			
7	Father's occupation	Govt Service	2.23	0.88	3.13	0.044	**Significant**
		Private Service	2.33	0.87			
		Self-employed	2.43	0.77			
8	Family Income	Below 25000	2.36	0.83	1.25	0.288	Not Significant
		25000-50000	2.28	0.78			
		Above 50000	2.39	0.79			

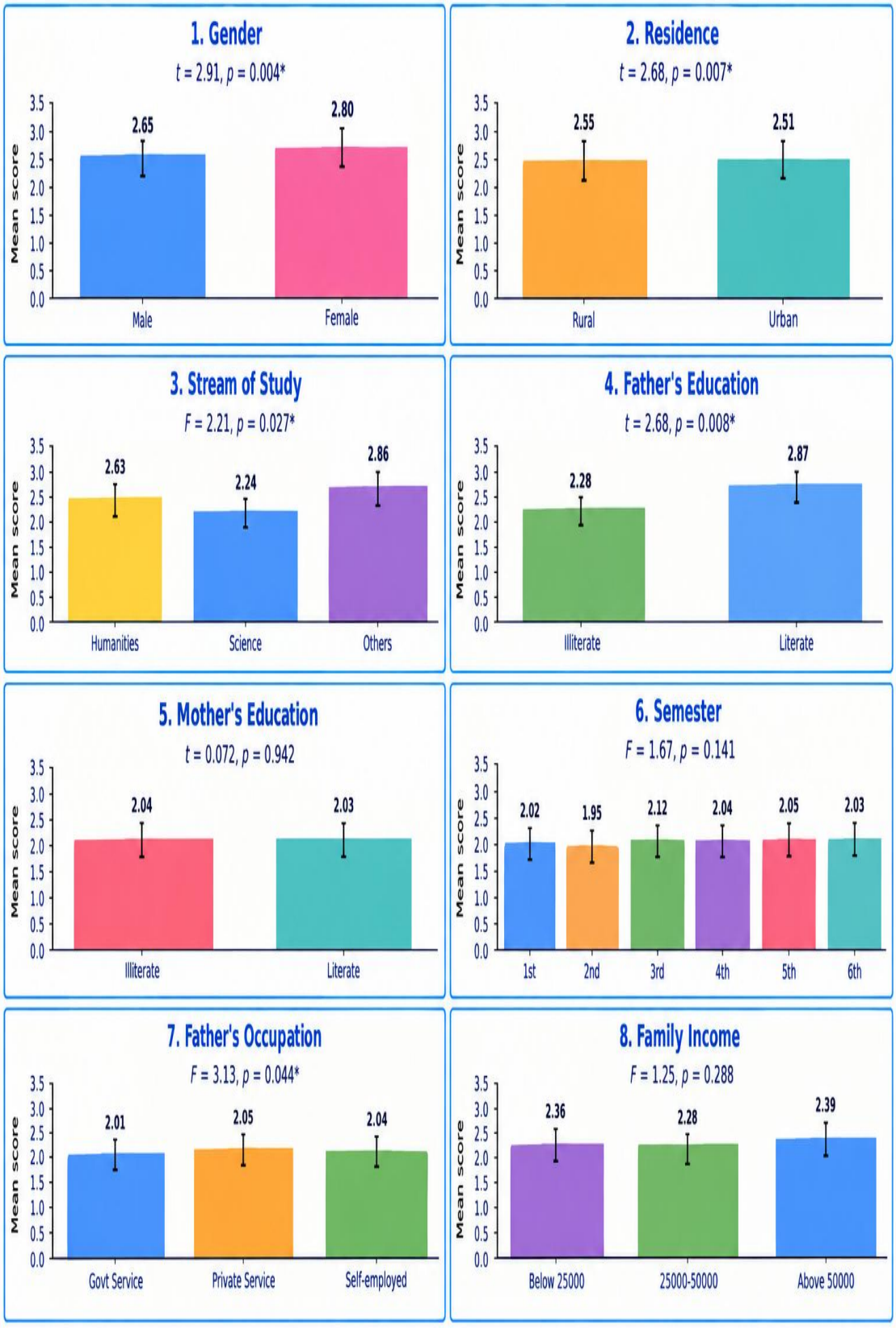


Fig. 4.4: Sociodemographic determinants of Pro-environmental behaviour

Table 4.14 and Figure 4.4 highlight various factors that influence PEB, showing notable differences across gender, geographical location, field of study, and parental occupation. However, factors like parental education and family income appear to have no significant impact on PEB. The analysis reveals a statistically significant gender difference in PEB, with females (mean: 2.30) exhibiting slightly higher levels of pro-environmental behaviour than males (mean: 2.45). This finding aligns with previous research suggesting that women generally have higher eco-sensitive intentions and values than men (Runhaar et al., 2019). Men tend to show a higher propensity to contribute financially through increased taxes to support environmental conservation, but are less inclined to reduce their living standards for environmental causes (Tien & Huang, 2023). Further research has suggested that women's pro-environmental behaviours may be linked to ecofeminism, a concept emphasising the interconnection of gender and the environment (Fathonah & Nastiti, 2024).

The residential context plays an important role in determining PEB, with urban students showing higher levels of PEB (mean: 2.31) compared to their rural counterparts (mean: 2.45), as indicated by a p-value of 0.007. This finding is consistent with research that suggests urban populations have greater access to environmental education and resources, which fosters more sustainable practices (Tanner,1999). According to Environmental Deprivation Theory (Barker, 1968), urban residents are more exposed to degraded environments, leading to heightened environmental concern and a broader range of pro-environmental behaviours. Conversely, the Nature Exploitation Theory posits that rural residents, who depend on local natural resources, may prioritise economic development over environmental preservation, despite the resulting harm (Freudenburg, 1991; Bogner & Wiseman, 1997). However, empirical studies have produced mixed results on these theoretical perspectives. For instance, Bogner and Wiseman (1997) found no significant differences in environmental behaviour between urban and rural areas. Similarly, Arcury and Christianson (1993) argued that environmental concern and behaviour were comparable across both populations. Huddart-Kennedy et al. (2009) noted that although rural residents might express greater environmental concern, actual behavioural differences were minimal. In contrast, other studies (e.g., Chen et al., 2011) suggested that urban residents tend to engage more actively in pro-environmental activities.

Academic discipline was also found to significantly influence PEB, with students in science fields exhibiting the highest levels of PEB, followed by students from streams like commerce, management and Computer applications, while students from humanities demonstrated the lowest levels of pro-environmental behaviour. This supports findings by Hidayah and Agustin (2017), who suggested that science education enhances PEB, as environmental topics are often integrated into science curricula. Additionally, students' semester of study influenced their PEB, with second-semester students reporting the highest levels compared to those in later semesters, likely due to variations in exposure to environmental education and awareness campaigns (Dunlap & Jones, 2002).

Parental occupation emerged as a significant factor, with students whose parents work in government sectors displaying more pro-environmental behaviour, reflected in a p-value of 0.044. This supports previous research indicating that parents' occupational backgrounds may influence their children's environmental behaviours through values and practices (Kaiser et al., 2005). However, parental education and family income were not found to significantly affect PEB in this study, which contrasts with some studies suggesting that higher parental education and income levels are associated with higher pro-environmental behaviour in children (Zhao et al.,2020).

4.5: Perception about Climate Change

The students' perceptions of climate change in the Kashmir Valley are presented and discussed in this section. In this section, students' awareness of climate change, comprehension of the causes, effects and solutions, adoption of low-carbon behaviours, and the barriers to adoption of low-carbon behaviours are all considered aspects of their perception of climate change. This sub-variable is important because people's attitudes and behavioural reactions to environmental difficulties are frequently influenced by their perceptions.

In addition to determining whether there are notable variations depending on demographic and educational factors such as gender, residence, parental education, stream of study, and semester of study, the analysis sought to gauge the participants' general perceptions about climate change. Consistencies, variations, and potential contextual factors impacting the findings are identified by interpreting the results in

light of the body of current literature.

Table 4.15: Students' understanding of climate change

S.No	Item	Mean ± SD	True	False	Don't know
1	UCC1	1.42 ± 0.60	64.1	29.8	6.0
2	UCC2	1.43 ± 0.66	67.0	23.4	9.7
3	UCC3	1.42 ± 0.64	66.2	25.2	8.6
4	UCC4	1.42 ± 0.65	67.2	23.3	9.5
5	UCC5	1.41 ± 0.67	69.1	20.1	10.8
6	UCC6	1.49 ± 0.66	60.1	30.6	9.4
7	UCC7	1.40 ± 0.65	68.6	22.3	9.1
8	UCC8	1.51 ± 0.70	60.8	27.5	11.7
9	UCC9	1.37 ± 0.65	72.2	18.0	9.8
10	UCC10	1.56 ± 0.73	58.3	27.2	14.5

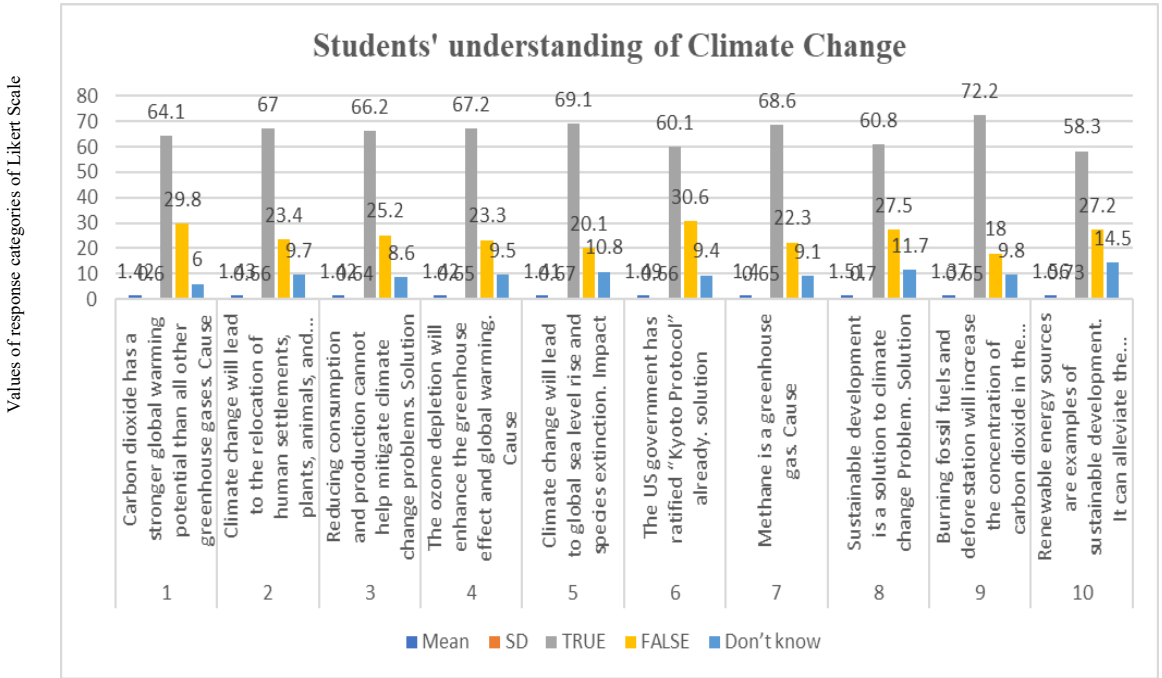


Figure 4.5: Students' understanding of climate change

Table 4.15 and Fig. 4.5 examine the extent to which undergraduate students in the Kashmir Valley understand the causes, effects, and solutions to climate change. The findings suggest that while students demonstrate a basic level of awareness, there are evident gaps in their comprehension of more complex aspects. A majority correctly identified fundamental causes such as burning fossil fuels and deforestation (72.2%) and impacts like sea level rise and species extinction (69.1%). However, their understanding of technical concepts remains limited. For instance, only 29.8% correctly recognised that greenhouse gases like methane, chlorofluorocarbons, and nitrous oxide have a higher global warming potential than carbon dioxide, an important concept explained by the IPCC (2021) and the UNFCCC (2013). Similarly, just 30.6% knew that the United States has not ratified the Kyoto Protocol, highlighting a lack of awareness of key international climate agreements (UNFCCC, 2013). Misconceptions were also observed regarding the distinction between ozone depletion and global warming, with only 23.3% answering correctly—an issue commonly identified in climate literacy studies (Mead et al., 2012). Although many students demonstrated awareness of general solutions such as renewable energy and sustainable development, the relatively high proportion of incorrect or "don't know" responses emphasises the need to enhance climate education at the undergraduate level, addressing both foundational and advanced climate science concepts (Monroe et al., 2019).

Table 4.16: Students' engagement in low-carbon (Green Living) behaviour (LCB).

S.No.	Item	Mean	VOE	OE	SE	SDE	NE
1	LCB1	3.30 ± 1.61	22.5	14.1	11.8	14.6	37
2	LCB2	2.99 ± 1.47	22.9	16.3	22.6	15.1	23.1
3	LCB3	2.93± 1.46	24.4	16.6	21.3	17	20.7
4	LCB4	3.05 ± 1.38	18.5	17.6	24.5	19.3	20
5	LCB5	2.97 ± 1.47	23	18.5	19	17.4	22.1
6	LCB6	3.24 ± 1.39	13.6	22	15.1	25.1	24.2
7	LCB7	2.98 ± 1.42	20.7	19	21.8	18.1	20.5
8	LCB8	3.14 ± 1.52	21.1	17.4	16.7	16.2	28.6
9	LCB9	3.29 ± 1.61	22.6	14	11.8	14.3	37.3
10	LCB10	3.14 ± 1.53	22.4	15	17.9	16.1	28.6

VOE: Very often Engage, OE: Often Engage, SE: Sometimes Engage,

SDE: Seldom Engage, NE: Never Engage

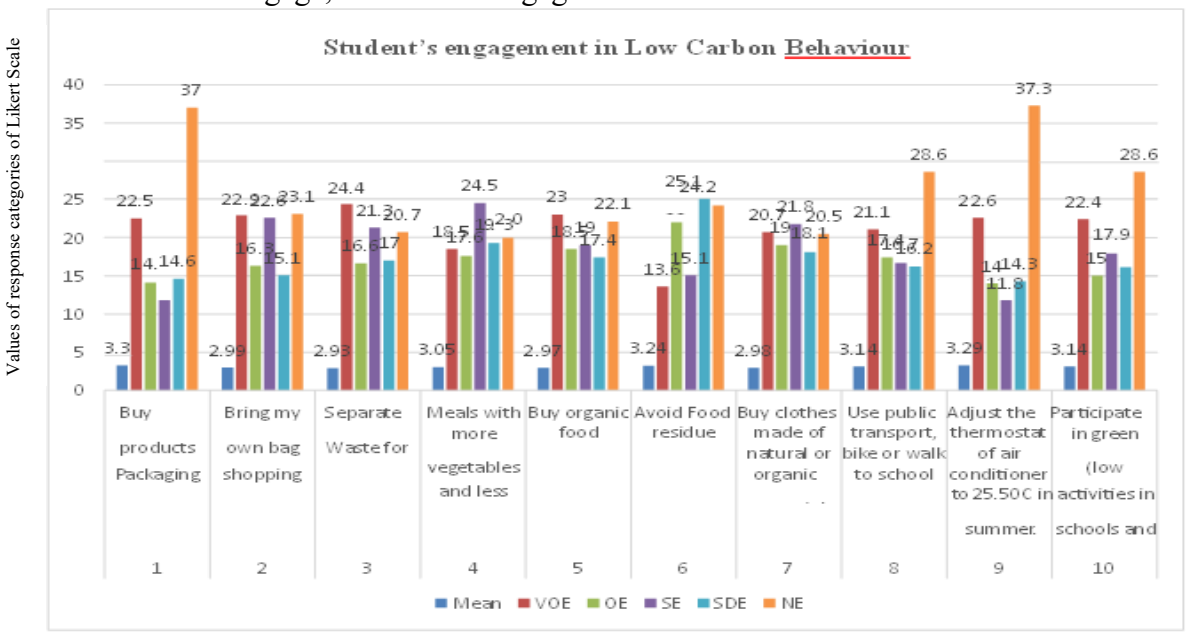


Figure 4.6 Students' engagement in low-carbon (Green Living) behaviours (LCB)

As shown in Table 4.16 and Figure 4.6, the overall mean score for students' engagement in low-carbon behaviours (LCBs) was 3.10, indicating that students engage in such behaviours slightly more often than not. The data reflect a moderate level of participation in climate-conscious actions, with varying degrees of commitment across different practices. Some notable behaviours include bringing reusable shopping bags (39.9%), buying organic food (41.5%), choosing products with minimal packaging (36.6%), and wearing clothing made from natural materials (39.7%). A similar number of students reported using public transportation (36.5%), selecting plant-based meals over meat (36.1%), and participating in eco-friendly or green activities (37.4%). However, certain behaviours—like avoiding food waste (only 25.6% adoption) and consistently purchasing low-packaging products—were far less common, with over half of the respondents not engaging in these actions. These findings suggest that while there is some willingness among students to adopt low-carbon lifestyles, the overall level of engagement remains limited. This lukewarm participation poses a challenge in the broader fight against climate change, as individual behavioural changes play a crucial role in reducing carbon emissions (Gifford, 2011; IPCC, 2021). Encouraging more consistent and widespread adoption of LCBs requires not only raising awareness but also creating supportive environments through education, incentives, and policy

(Steg & Vlek, 2009).

Table 4.17: Students' views on barriers to adopting low-carbon behaviours

S.No.	Statement	Mean ± SD	SA	A	N	D	SD
1	HLCB1	2.97 ± 1.34	18	22.8	18.1	26.8	14.3
2	HLCB2	3.11± 1.28	13.4	22	20.2	29.6	14.9
3	HLCB3	3.30 ± 1.34	14.1	14.8	20.1	29	22.1
4	HLCB4	3.26 ± 1.33	14.7	15.9	17.9	32	19.5
5	HLCB5	3.11 ± 1.42	18.2	19.9	16.1	24.4	21.3

SA…Strongly Agree, A…Agree, N…Neutral, D…Disagree, SD…Strongly Disagree

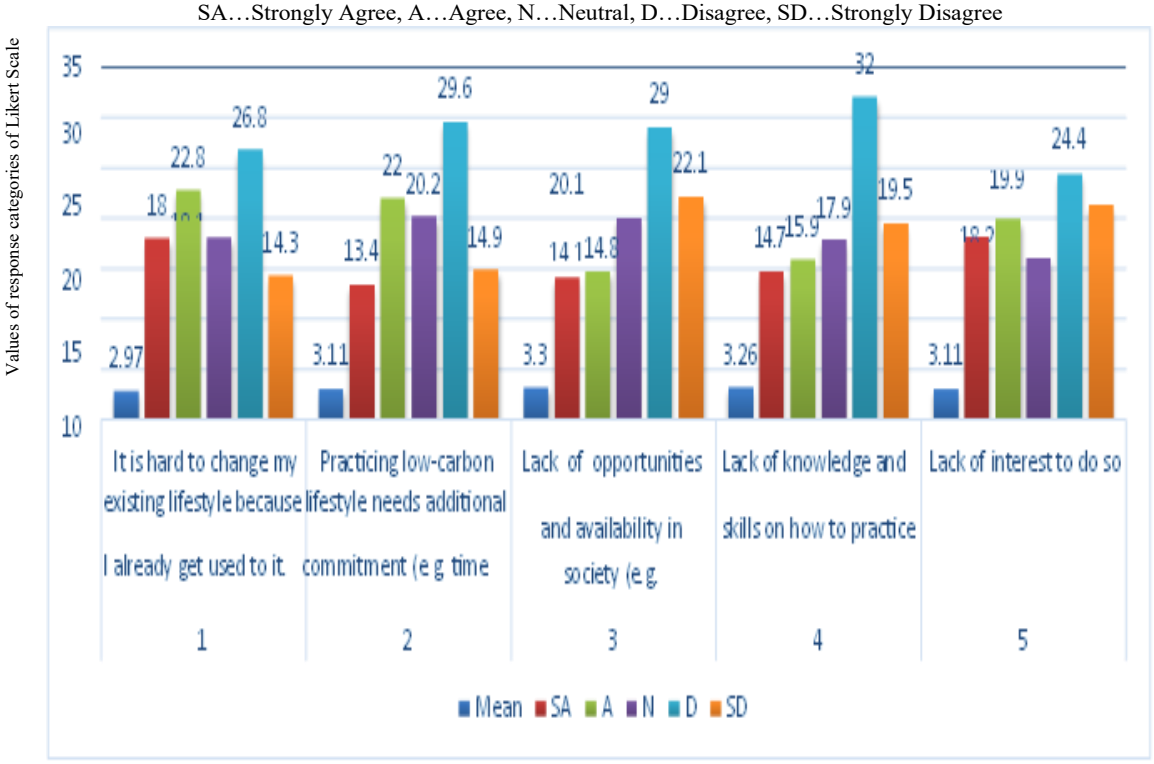


Figure 4.7: Students' views on barriers to adopting low-carbon behaviour

As shown in Table 4.17 and Figure 4.7, the overall mean score of 3.15 suggests that students held a moderately strong view regarding the barriers to adopting low-carbon behaviours (LCBs). Among the various challenges identified, two emerged as the most significant: firstly, the lack of accessible social opportunities and availability of low-carbon alternatives (Mean = 3.30), and secondly, insufficient information and knowledge about how to adopt a low-carbon lifestyle (Mean = 3.26). These findings

reflect the broader societal shortcomings in terms of support infrastructure, such as limited access to organic produce, inadequate waste segregation systems, and the unaffordability or unavailability of eco-friendly products, which continue to act as barriers to the adoption of sustainable living practices (Haq et al., 2008). Given these contextual limitations, students' perceptions are understandable. However, what is particularly concerning is the high number of students reporting a lack of awareness and hands-on knowledge regarding how to live a low-carbon lifestyle. Similar results were found by researchers who highlighted the role of environmental literacy and practical exposure in shaping sustainable behaviours (Kollmuss & Agyeman, 2002; Kaiser et al., 2008). It underscores the need for more focused climate education initiatives and institutional support that not only raise awareness but also empower students with the necessary skills and resources to make informed, climate-conscious choices.

Table 4.18: Students' views on the impacts of climate change in Jammu & Kashmir

S.No.	Statement	Mean ± SD	VUS	US	M	S	VS
1	ICC1	3.29 ± 1.42	16.6	12.9	23.3	19.6	27.6
2	ICC2	3.39 ± 1.25	8.3	19.2	19.8	30.4	22.2
3	ICC3	3.22 ± 1.32	13.6	16.3	25.7	23.5	20.9
4	ICC4	3.32 ± 1.32	12.3	16.3	21.9	26.3	23.2
5	ICC5	3.38 ± 1.35	12.8	14	23.1	23	27.1
6	ICC6	3.45 ± 1.48	16.1	13	16.1	19.3	35.4
7	ICC7	3.60 ± 1.43	13.4	10.5	18.1	19	39.1

SD..Standard deviation VUS..Very Unserious, US. Unserious, M.. Moderate, S…Serious, VS…VerySerious

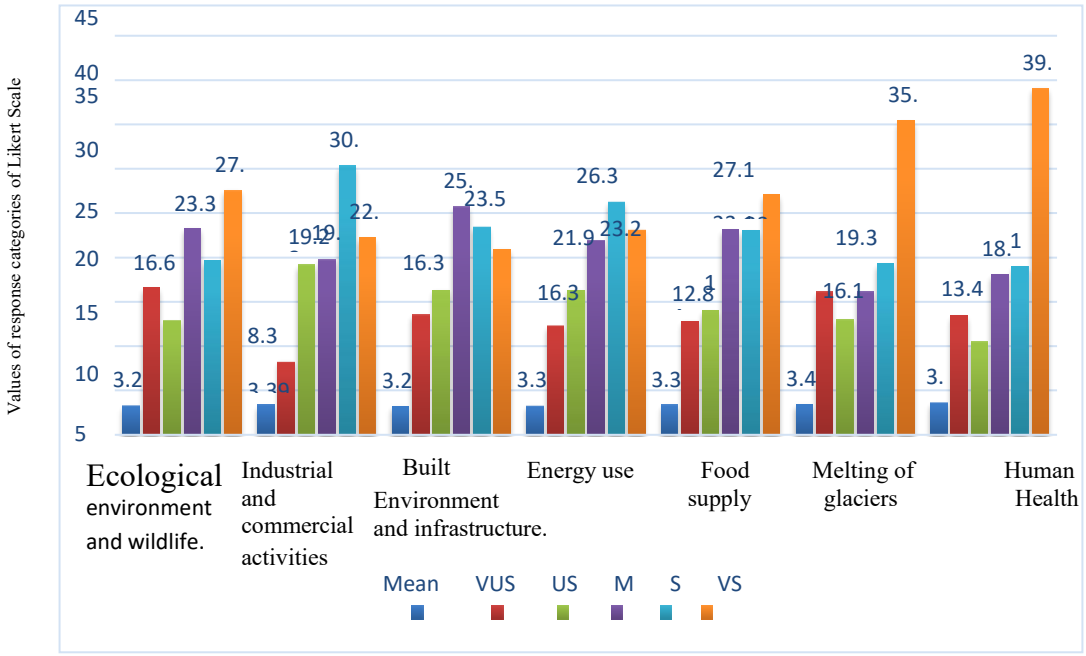


Figure 4.8: Students' views on the impacts of climate change in Jammu & Kashmir

Table 4.18 and Figure 4.8 indicate that students strongly believe climate change is significantly affecting Jammu and Kashmir, with an overall mean response of 3.38. Survey findings reveal that while students perceive only a moderate impact on the region's built environment and infrastructure (Mean = 3.22), they expressed heightened concern over more critical issues. Notably, they identified serious consequences for human health (Mean = 3.60) and the accelerated melting of glaciers (Mean = 3.45). In addition, students recognised considerable effects on the local food supply (Mean = 3.38) and the ecological environment (Mean = 3.29). These insights suggest a growing awareness among the youth about the wide-ranging impacts of climate change on both people and ecosystems in the valley.

Table 4.19: Students' understanding of climate change in relation to their socio-demographic characteristics.

S.No.	Variable	Subgroup	Mean	SD	t-value	p-value	Level of Significance at 5% level
01	Gender	Male	1.40	0.43	3.57	0.00	**Significant**
		Female	1.49	0.38			
02	Residence	Rural	1.43	0.40	1.35	0.17	Not Significant
		Urban	1.46	0.42			
03	Stream of Study	B. A	1.46	0.40	0.60	0.55	Not Significant
		B.SC	1.42	0.42			
		Others	1.45	0.41			
04	Father's Education	Illiterate	1.44	0.39	0.40	0.68	Not Significant
		Literate	1.45	0.42			
05	Mother's Education	Illiterate	1.48	0.38	2.50	0.01	**Significant**
		Literate	1.42	0.43			
06	Semester	1st	1.45	0.41	1.32	0.25	Not Significant
		2nd	1.45	0.40			
		3rd	1.39	0.38			
		4th	1.46	0.41			
		5th	1.49	0.44			
		6th	1.43	0.39			
07	Father's Occupation	Govt. Service	1.40	0.39	2.52	0.08	Not Significant
		Private Service	1.43	0.39			
		Self Employed	1.48	0.42			
08	Family Income	Below 25000	1.46	0.41	1.57	0.21	Not Significant
		25000-50000	1.41	0.37			
		Above 500000	1.46	0.43			

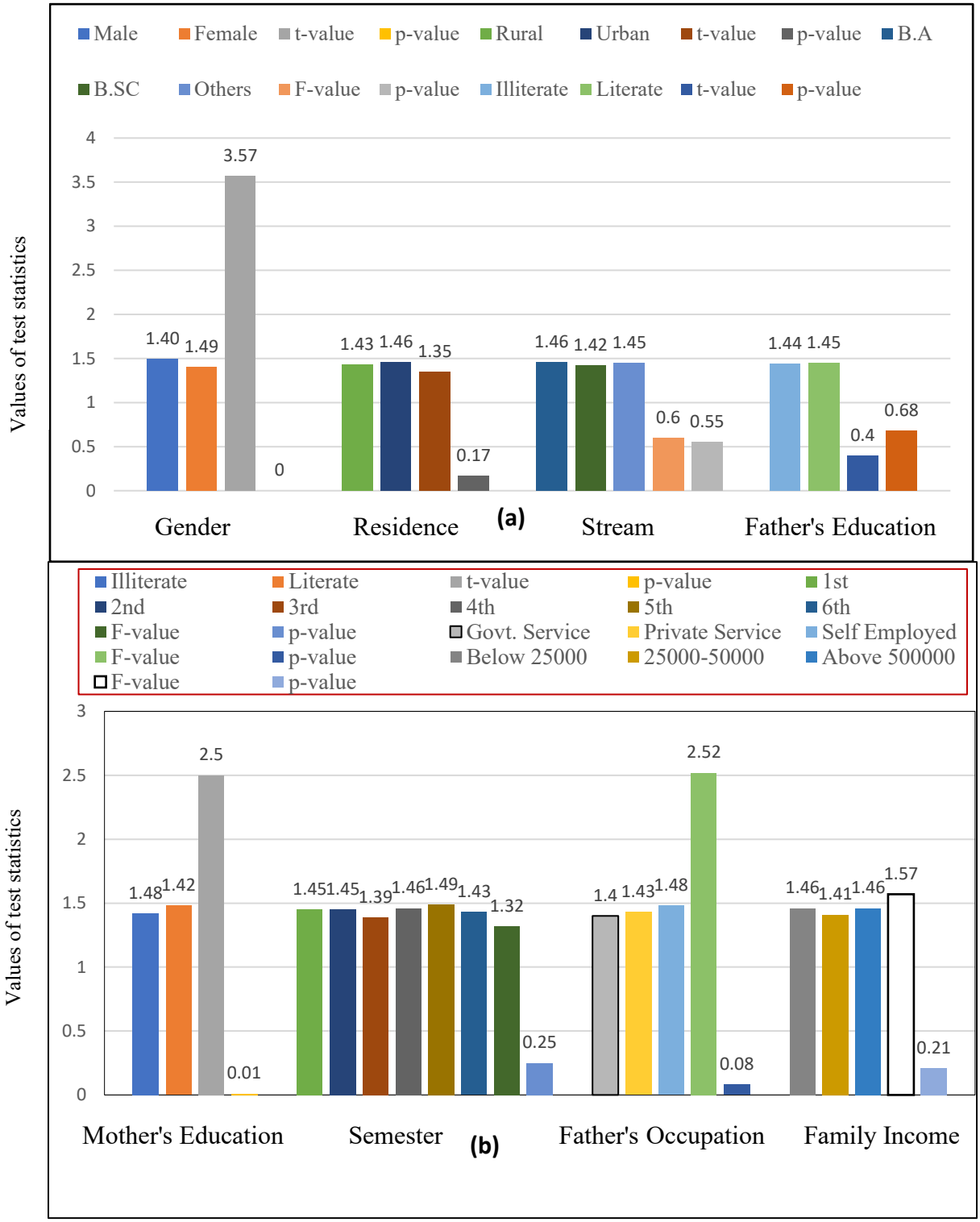


Figure 4.9 (a) and (b): Students' understanding of climate change in relation to their socio-demographic characteristicscs

Table 4.20: Students' participation in low-carbon behaviours in relation to their socio-demographic characteristics.

S.No	Variable	Subgroup	Mean	SD	t-value	p-value	Level of significance at 5% level
01	**Gender**	Male	3.16	0.97	2.11	0.03	**Significant**
		Female	3.04	0.96			
02	**Residence**	Rural	3.12	0.96	0.71	0.08	**Significant**
		Urban	3.07	0.98			
03	**Stream of Study**	B. A	3.06	0.93	3.53	0.03	**Significant**
		B.SC	3.04	1.02			
		Others	3.05	0.98			
04	**Father's Education**	Illiterate	3.05	0.93	1.34	0.18	Not significant
		Literate	3.13	0.99			
05	**Mother's Education**	Illiterate	3.05	0.96	1.81	0.07	Not significant
		Literate	3.16	0.97			
06	**Semester**	1st	3.24	0.94	1.04	0.039	**Significant**
		2nd	3.10	0.90			
		3rd	3.05	0.98			
		4th	3.07	1.01			
		5th	3.06	1.00			
		6th	3.09	0.96			
07	**Father's Occupation**	Govt Service	3.14	1.01	0.31	0.74	Not significant
		Private Service	3.12	0.95			
		Self Employed	3.08	0.96			
08	**Family Income**	Below 25000	3.10	0.94	0.66	0.52	Not significant
		25000-50000	3.15	1.06			
		Above 500000	3.05	0.93			

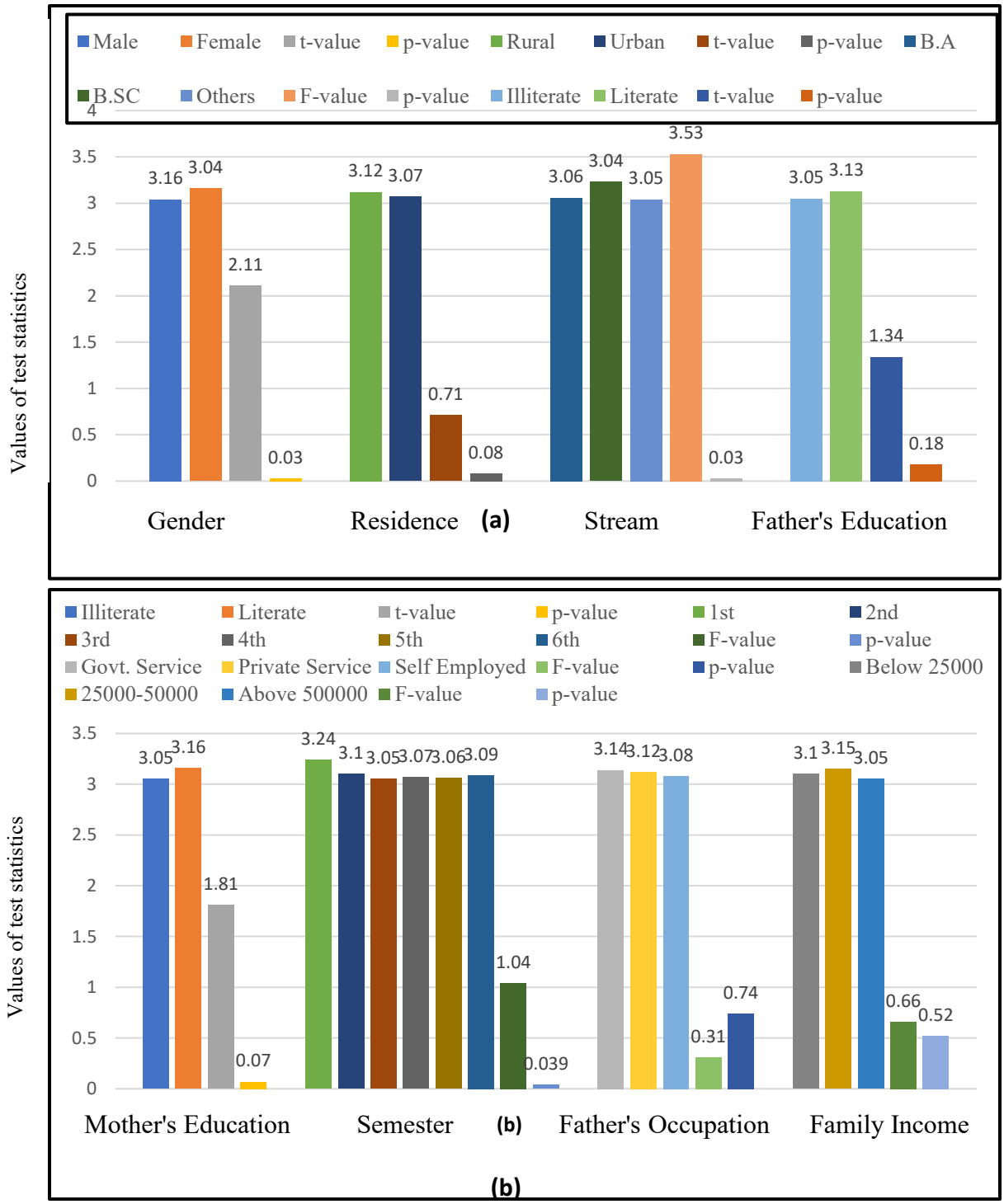


Figure 4.10(a) and (b): Students' participation in low-carbon behaviours in relation to their socio-demographic characteristics.

Table 4.21: Students' perspectives on the challenges in adopting low-carbon behaviours in relation to their socio-demographic characteristics.

S.No.	Variable	Gender	Mean	SD	t-value	p-value	Level of significance at 5% level
01	**Gender**	Male	3.12	0.86	0.85	0.39	Not Significant
		Female	3.17	0.92			
02	**Residence**	Rural	3.17	0.88	0.92	0.35	Not significant
		Urban	3.12	0.90			
03	**Stream of Study**	B. A	3.16	0.91	0.45	0.64	Not Significant
		B.SC	3.11	0.89			
		Others	3.17	0.84			
04	**Father's Education**	Illiterate	3.20	0.87	1.52	0.13	Not significant
		Literate	3.12	0.90			
05	**Mother's Education**	Illiterate	3.18	0.89	1.44	0.15	Not significant
		Literate	3.11	0.89			
06	**Semester**	1st	3.14	0.79	0.51	0.77	Not significant
		2nd	3.19	0.86			
		3rd	3.22	0.89			
		4th	3.13	0.97			
		5th	3.09	0.85			
		6th	3.13	0.97			
07	**Father's Occupation**	Govt. Service	3.25	0.89	2.13	0.12	Not significant
		Private Service	3.10	0.90			
		Self Employed	3.13	0.88			
08	**Family Income**	Below 25000	3.14	0.88	0.26	0.77	Not significant
		25000-50000	3.18	0.91			
		Above 500000	3.13	0.90			

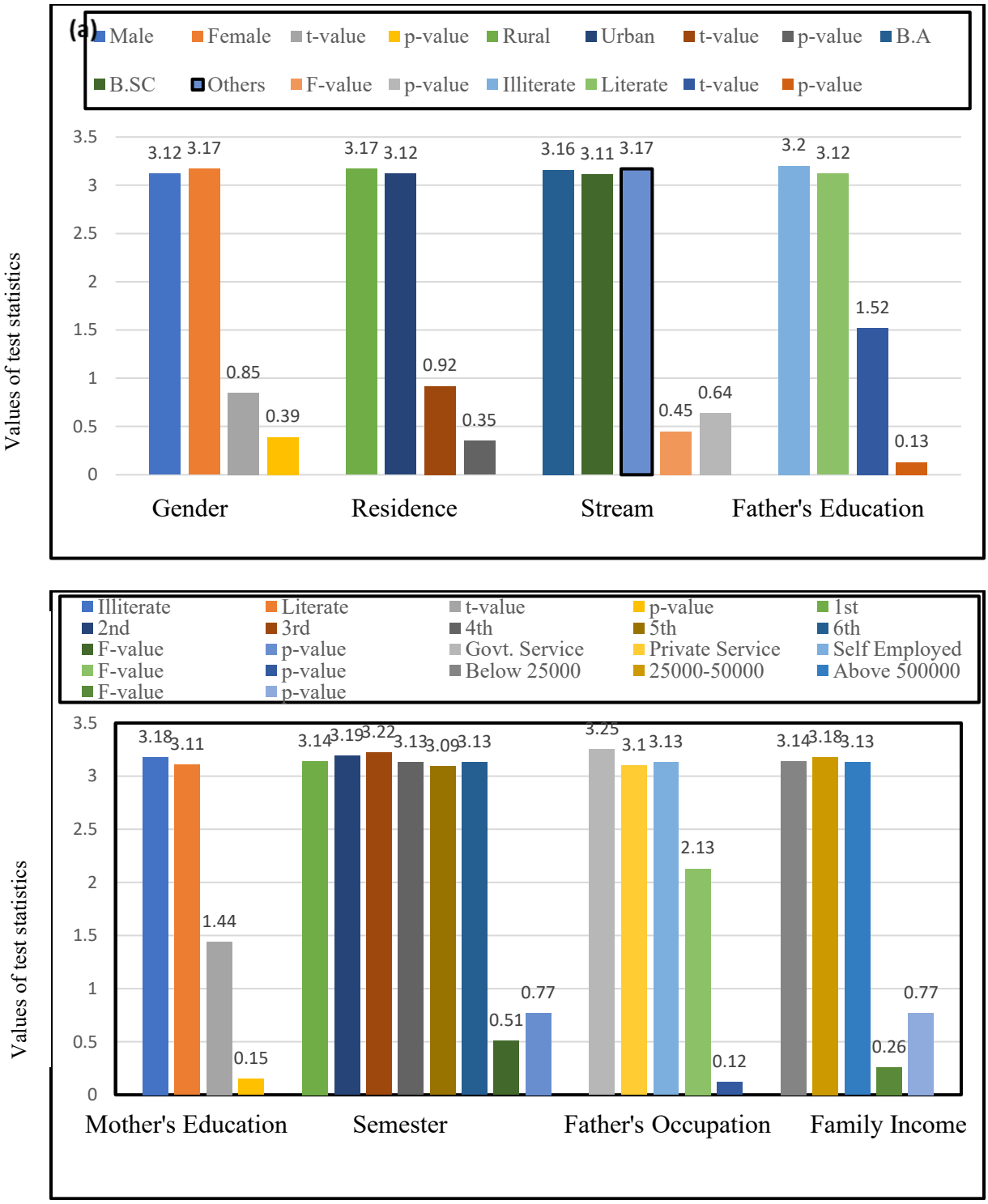


Figure 4.11 (a) and (b): Students' perspectives on the challenges in adopting low-carbon behaviours in relation to their socio-demographic characteristics

Table 4.22: Students' perceptions of the impacts of climate change in Jammu & Kashmir in relation to their socio-demographic characteristics.

S.No.	Variable	Subgroup	Mean	SD	t-value	p-value	Level of significance at 5% level
01	**Gender**	Male	3.43	0.89	1.99	0.04	**Significant**
		Female	3.32	0.89			
02	**Residence**	Rural	3.37	0.87	0.16	0.87	Not significant
		Urban	3.38	0.92			
03	**Stream of Study**	B. A	3.34	0.89	1.21	0.29	Not Significant
		B.SC	3.38	0.97			
		Others	3.45	0.82			
04	**Father's Education**	Illiterate	3.44	0.88	2.88	0.01	**Significant**
		Literate	3.28	0.89			
05	**Mother's Education**	Illiterate	3.37	0.89	0.37	0.71	Not significant
		Literate	3.39	0.89			
06	**Semester**	1^{st}	3.48	0.86	1.59	0.16	Not significant
		2^{nd}	3.28	0.84			
		$3^{rd.}$	3.29	0.87			
		4^{th}	3.38	0.94			
		5^{th}	3.39	0.90			
		6^{th}	3.44	0.92			
07	**Father's Occupation**	Govt. Service	3.46	0.92	1.32	0.27	Not significant
		Private Service	3.35	0.86			
		Self Employed	3.35	0.89			
08	**Family Income**	Below 25000	3.33	0.87	3.50	0.03	**Significant**
		25000-50000	3.50	0.92			
		Above 500000	3.39	0.91			

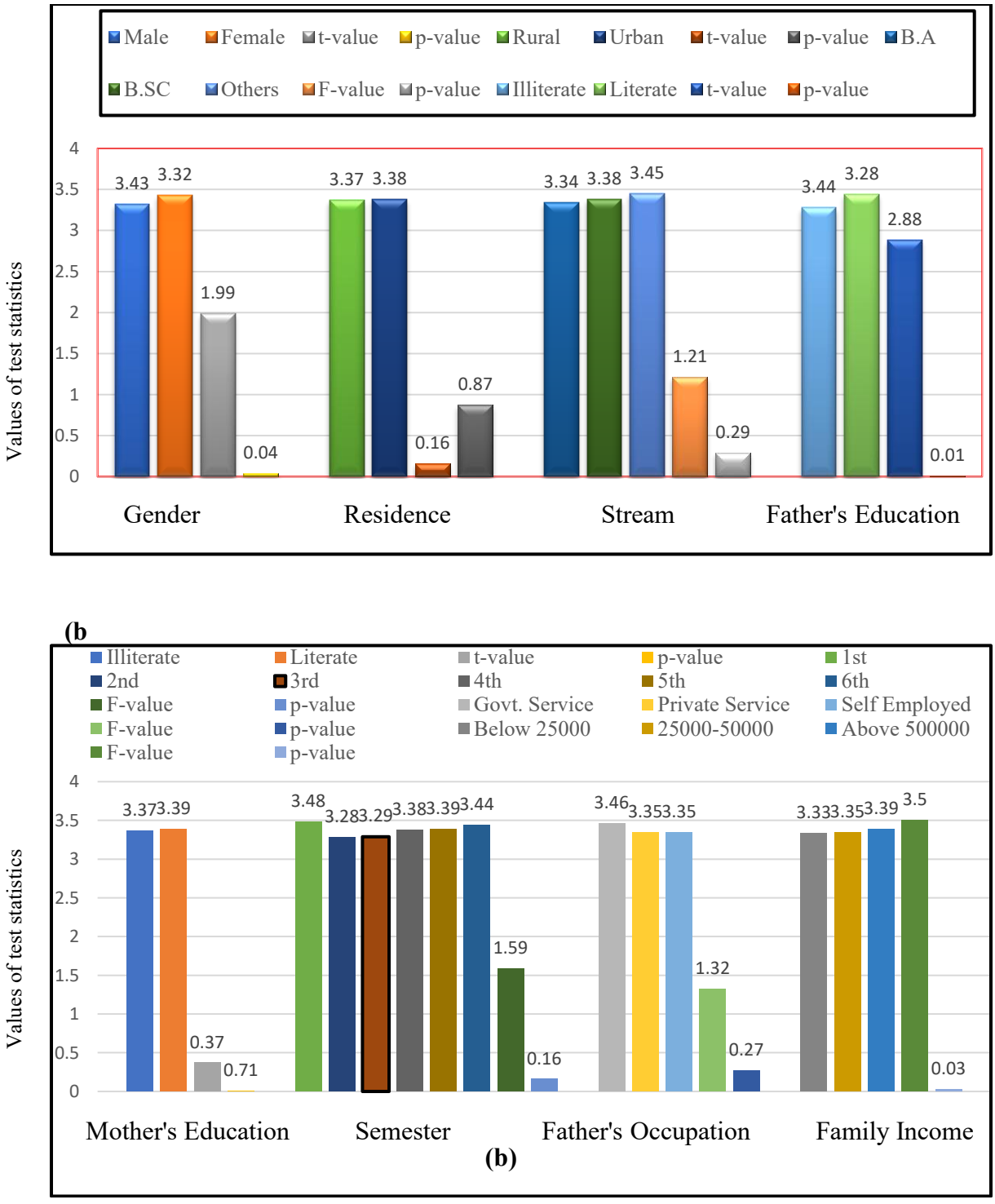


Figure 4.12 (a) and (b): Students' perceptions of the impacts of climate change in Jammu & Kashmir in relation to their socio-demographic characteristics.

Table 4.19 and Figures 4.9 (a) and (b) present the results of the analysis examining differences in undergraduate students' understanding of climate change across colleges in the Kashmir Valley. A statistically significant gender-based difference was observed, which is significant at the 0.05 level. The mean scores reveal that male students (M = 1.40) demonstrated a higher level of understanding compared to female students (M = 1.49). These findings aligned with earlier studies by McCright (2010), Lee et al. (2015), and O'Connor et al. (2002), which similarly reported that male respondents often exhibit slightly greater factual knowledge regarding climate change, possibly due to differences in access to information, confidence in scientific topics, or socialisation patterns.

Further analysis revealed a significant difference in climate change understanding based on the educational attainment of students' mothers. The t-value of 2.50 and p-value of 0.01 indicate statistical significance at the 0.05 level. Students whose mothers possessed formal education demonstrated a higher level of climate change awareness and understanding than those whose mothers had no formal education. This result supports findings by Ojala (2015), who emphasised the influential role of maternal education in shaping children's environmental consciousness. Educated mothers are more likely to engage their children in discussions about environmental topics, thereby enhancing their understanding and encouraging critical thinking about climate-related challenges. Similarly, Lawson et al. (2019) discovered that maternal education is a major determinant of children's climate perceptions, with parents' knowledge and beliefs about climate change having a considerable impact. Additionally, Gronhoj and Thogersen (2009) claim that women are crucial in forming early climate-related attitudes through both direct communication and indirect influence, and that environmental knowledge and values are frequently passed down from parents to children. However, students' understanding of climate change did not significantly differ based on their place of residence, subject stream, father's education, semester of study, father's occupation, or family income. The results were in consensus with studies conducted by Bord et al. (2000), Mead et al. (2012), and Lee et al. (2015), who found that income and parental education, parental occupation and rural-urban residence were not strong predictors of climate change understanding.

The analysis presented in Table 4.20 and Figures 4.10(a) and (b) reveals a statistically significant difference in the engagement of undergraduate students in Low Carbon behaviours (LCBs) based on gender across various colleges in the Kashmir Valley. The results, supported by a t-value of 2.11 and a p-value of 0.03, indicate that female students are more actively involved in adopting environmentally friendly practices than their male counterparts. This is further evidenced by the mean scores, where female students scored 3.04 compared to 3.16 for males. This gender-based disparity in environmental behaviour is not unique to the Kashmir Valley and reflects a broader trend observed in previous research. For instance, Hunter et al. (2004) reported that women are typically more environmentally conscious, a tendency that may be linked to gendered socialisation emphasising care, empathy, and community responsibility. These traits may lead women to be more receptive to sustainable practices that benefit both society and the planet. In a similar vein, Zelezny et al. (2000) observed that women tend to score better on measures of pro-environmental behaviour and environmental concern. According to Vicente-Molina et al. (2013), gender is a strong predictor of sustainable behaviour, with women more likely to recycle, use less energy, and engage in sustainable consumption.

Furthermore, the stronger engagement of female students in LCBs may also be linked to their heightened sensitivity to environmental risks, particularly those affecting health, food security, and community well-being. Many studies have found that women are more likely than men to care about environmental problems, including pollution, climate change, and damage to ecosystems. This increased worry may be because these kinds of problems commonly affect their daily tasks at home and in the community (McCright, 2010; Xiao & McCright, 2012). It is also worth considering how gendered experiences shape environmental values and actions. Women may be more likely to adopt practical, everyday sustainability behaviours, such as energy conservation, waste reduction, and the use of green products, because these actions align with their roles as household managers and caregivers. Educational institutions and policy interventions, therefore, can build on this tendency by encouraging greater environmental participation among male students through awareness campaigns, practical demonstrations, and value-based education that frames sustainability as a shared social

responsibility.

The implications of this gender difference are significant. If sustainability goals are to be achieved at the community and national levels, it is crucial to engage all demographics—particularly young men—more effectively. Tailored programs that address the attitudes, motivations, and perceived barriers among male students may help bridge this behavioural gap. Moreover, integrating environmental education with gender-sensitive approaches could ensure that both male and female students develop the knowledge, skills, and values needed to support long-term ecological sustainability.

A significant difference at the 0.05 level was also observed in students' engagement in low-carbon behaviours (LCBs) based on their subject stream, as indicated by the F-value of 3.53 and p-value of 0.03. Students from the science stream showed the highest level of engagement in LCBs, followed by those in the commerce, computer applications, and management streams, while students from humanities streams were comparatively less engaged. Similar results were obtained by Said et al. (2003), Kumar and Teotia (2017) and Islam and Razzak (2017), who found that science stream students were found to be more engaged in sustainable practices than their arts and commerce counterparts.

In terms of residence, Urban students (M = 3.07) show slightly lower mean scores than rural students (M = 3.12), indicating marginally stronger engagement in low-carbon behaviour, as lower mean values reflect greater behavioural involvement. However, the small mean difference (0.05) suggests limited practical variation between the two groups despite statistical significance. From the perspective of the Theory of Planned Behaviour proposed by Ajzen (1991), behavioural performance is influenced by perceived behavioural control. Urban students may benefit from better infrastructure (e.g., public transport, waste management), which facilitates low-carbon practices. Nevertheless, research indicates that socio-demographic factors such as residence generally explain only a small proportion of variance in pro-environmental behaviour, with psychological and normative factors playing a stronger role (Stern, 2000; Kollmuss & Agyeman, 2002).

Semester-wise differences are also significant (p = 0.039). First-semester students (M = 3.24) show comparatively weaker engagement, while third-semester students (M =

3.05) demonstrate stronger engagement. This pattern suggests that increased academic exposure and campus experience may enhance environmentally responsible behaviour over time. The Value-Belief-Norm Theory proposed by Stern (2000) posits that environmental values and beliefs gradually translate into personal norms and behaviour, which may strengthen as students progress academically.

However, no significant differences in engagement in LCBs were found based on students' parents' education levels, current semester of study, father's occupation, or family income. The findings aligned with the studies by Mertig (2003), who found that behaviour towards the environment is more influenced by institutional exposure, like courses and environmental campaigns, than parental education and income. However, the results contradicted the findings of Gifford and Nilson (2014) and Zelezny et al. (2000), who found that socioeconomic factors like parental education, parental income and residence can predict environmental concern and action.

Table 4.21 and Figures 4.11 (a) and (b) indicate that there are no statistically significant differences in undergraduate students' perceptions of barriers to adopting Low-Carbon Behaviours (LCBs) across different colleges in the Kashmir Valley. This holds true across various socio-demographic variables, including gender, place of residence, subject stream, parental education (both father's and mother's), semester of study, father's occupation, and family income, as none of the p-values was found below the 0.05 significance level. The findings aligned with the studies by Gifford (2011), Lorenzoni et al. (2007), and Abrahamse and Steg (2011), who found that there are psychological barriers in the adoption of low-carbon behaviours and these are not connected with sociodemographic variables like gender, income and education. Thus, it can be concluded that the main obstacles to LCB adoption are psychological, structural, or associated with societal norms and practices, and that they do not substantially differ depending on sociodemographic factors such as gender, education, income, or place of residence.

Table 4.22 and Figures 4.12 (a) and (b) indicate a significant gender-based difference in the perceptions of undergraduate students from various colleges in the Kashmir Valley regarding the multifaceted impacts of climate change in the Union Territory of Jammu and Kashmir. This difference is supported by a t-value of 1.99 and a p-value of 0.04, signifying statistical significance at the 0.05 level. Female students showed positive and

concerned attitudes toward the impacts of climate change compared to the male students, with mean scores of 3.32 and 3.43, respectively. These results align with the findings of McCright (2010) and Xiao and McCright (2012), who reported that women demonstrate greater concern about climate change, particularly in relation to issues such as water resources, public health, and food security.

The data also showed a significant difference in climate change perception based on fathers' education, with a t-value of 2.88 and a p-value of 0.01. Students whose fathers were literate exhibited higher levels of sensitivity toward climate change issues compared to those whose fathers were illiterate. This trend echoes the findings of Bolaji and Enuoh (2012) and Kellstedt et al. (2008), who noted that in developing countries, parental knowledge plays a crucial role in enhancing children's understanding of environmental issues—often filling the gaps left by limited school-based climate education.

The study also found a statistically significant effect of family income on students' perceptions of climate change ($F = 3.50$, $p = 0.03$), with students from lower-income families demonstrating greater awareness of climate change impacts than their middle- and higher-income peers. This suggests that socio-economic context shapes environmental risk perception. Research indicates that while higher income may facilitate environmental concern through better access to education and resources (Brechin, 2003; Kahn & Kotchen, 2010), lower-income groups often perceive environmental risks more acutely due to direct exposure to climate vulnerabilities and limited adaptive capacity (Xiao & McCright, 2007). In line with Protection Motivation Theory (Rogers, 1975), heightened perceived vulnerability can intensify awareness and concern. Thus, greater climate change awareness among lower-income students in the present study may reflect lived experiences of environmental stress and perceived susceptibility to climate-related risks.

Thus, it can be concluded that students' comprehension of climate change, participation in low-carbon behaviours (LCBs), and perceptions of the effects of climate change in the Kashmir Valley are greatly influenced by sociodemographic characteristics, including gender, parental education, subject stream, and family income. In particular, female students were more engaged and concerned about LCBs, although male students demonstrated more comprehension. A middle-class economic background and parental

education, particularly maternal education, were also linked to increased awareness and concern about climate change impacts. This suggests that structural and psychological elements may be more stable among groups, as no significant relationship was identified for variables like residence, semester, or fathers' occupation. The results indicate that for more successful involvement, focused climate education and awareness campaigns should take these sociodemographic subtleties into account.

4.6 Attitude towards Sustainable Development: Assessing students' attitudes toward sustainable development, which reflects their convictions, values, and commitments about social justice, environmental preservation, and economic sustainability, was another goal of the current study. Long-term social well-being and responsible environmental behaviour are thought to be critically dependent on a favourable attitude toward sustainable development. Understanding young people's opinions on sustainability is crucial and timely, especially in the Kashmir Valley, an area dealing with ecological fragility, developmental obstacles, and sociopolitical sensitivities.

Table 4.23: Students' attitude towards sustainable development

S.No.	Statement	Mean	SD	SA	A	N	D	SD
1	ATSD1	1.85	0.84	35.5	50.5	8.8	3.8	1.3
2	ATSD2	1.78	0.82	39.5	49.3	6.8	2.5	1.8
3	ATSD3	1.96	0.91	31.7	50.0	11.5	4.3	2.5
4	ATSD4	2.04	1.08	35.5	41.3	11.2	7.5	4.5
5	ATSD5	1.79	0.95	45.3	40.0	8.3	3.3	3.0
6	ATSD6	2.02	0.98	31.5	47.0	12.5	5.8	3.2
7	ATSD7	2.02	0.84	26.3	52.2	17.0	2.5	2.0
8	ATSD8	2.01	0.89	26.7	55.0	11.7	3.7	3.0
9	ATSD9	1.80	0.96	44.5	41.3	6.5	4.7	3.0
10	ATSD10	1.79	1.00	48.0	36.7	7.7	3.8	3.8
11	ATSD11	1.67	0.87	50.7	36.8	7.7	3.2	1.7
12	ATSD12	1.70	0.91	50.8	36.5	6.3	4.3	2.0

13	ATSD13	2.06	0.89	24.0	55.8	13.0	4.7	2.5
14	ATSD14	1.72	0.89	46.8	42.0	5.3	3.5	2.3
15	ATSD15	1.79	0.84	40.8	45.7	8.7	3.5	1.3
16	ATSD16	1.71	0.81	43.8	46.7	5.5	2.2	1.8
17	ATSD17	1.73	0.82	43.5	45.5	7.2	2.2	1.7
18	ATSD18	2.01	0.94	31.0	48.2	12.5	5.8	2.5
19	ATSD19	1.78	0.87	41.0	47.7	5.5	3.7	2.2
20	ATSD20	2.09	1.07	33.3	40.3	14.8	7.3	4.2

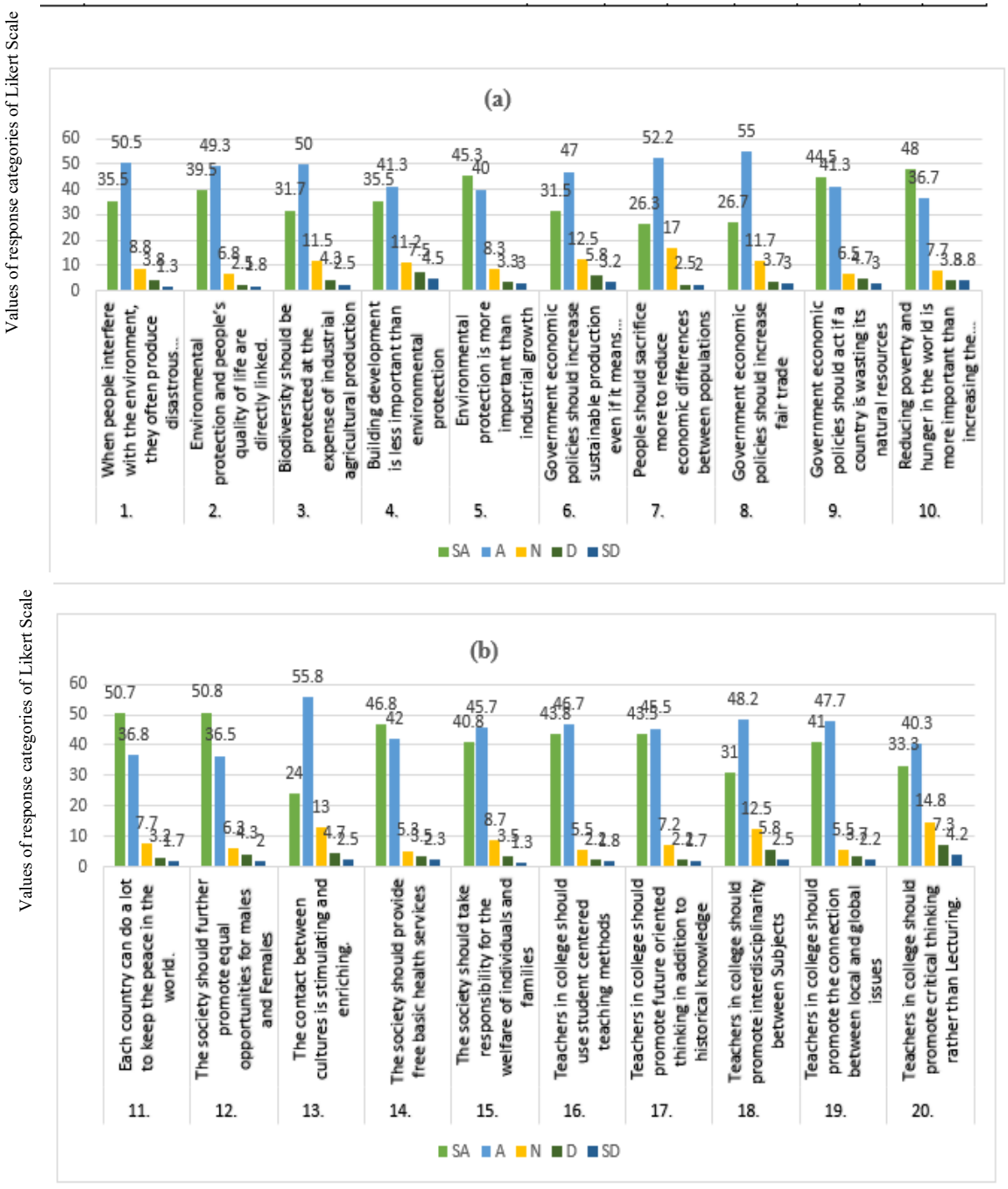


Fig. 4.13 (a &b): Attitude towards sustainable development among students in Kashmir Valley, Jammu and Kashmir

From Table 4.23 and Figure 4.13 (a) and (b), it can be revealed that students have a very positive attitude towards all four domains, viz., environmental, economic, social and educational, of sustainable development. The students are well aware that human

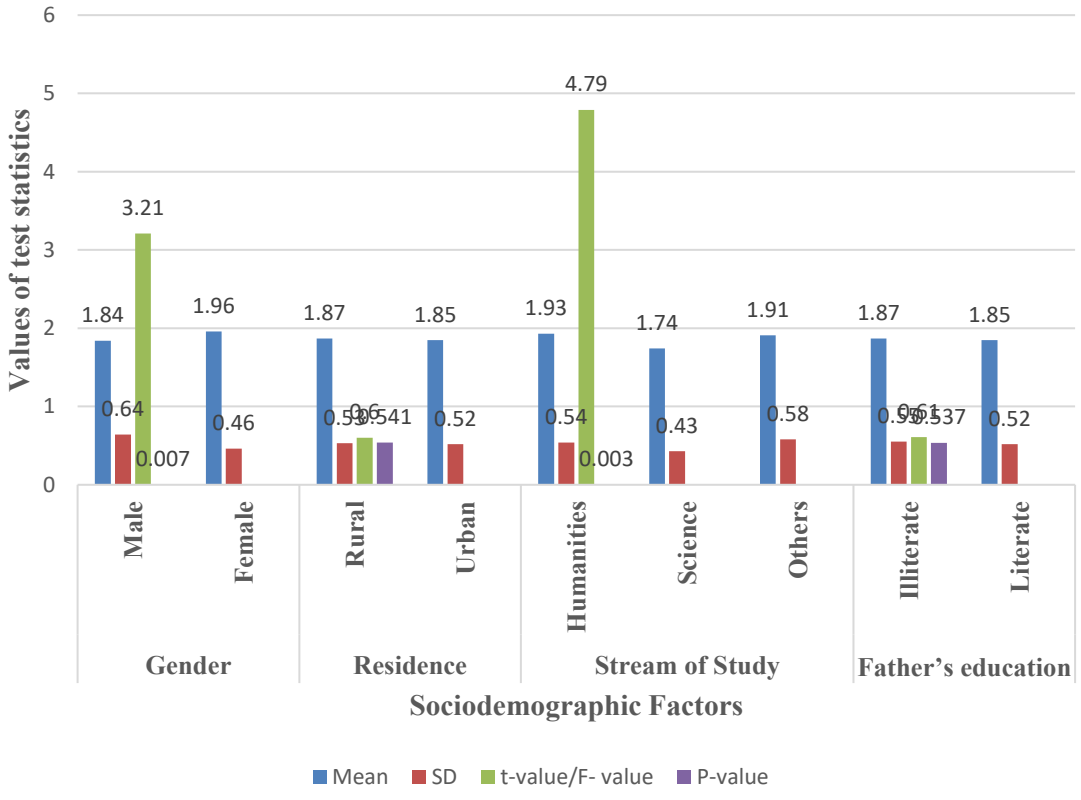
interference with the environment can have harmful and potentially disastrous consequences, as depicted by the data, in which86% of students have agreed with this. Similarly, 88.8% have agreed that quality of life is linked to environmental quality, 81.7% of students agreed that protecting biodiversity is more important than industrial expansion, and 76.8% of students agreed that development is less important than environmental protection. Regarding the economic domain of sustainable development, the students have a positive attitude as depicted by the data, in which 78.5% agree that government economic policies should lead to sustainable production, and 84.7% agree that addressing hunger and poverty holds greater importance than prioritising the economic prosperity of industrialised nations. Regarding the Social domain, students agree that it is the duty of every country to maintain peace in the world, and Society ought to be accountable for ensuring the well-being of both individuals and the community as a whole, and societies should promote equal opportunities irrespective of gender. Regardingeducation for sustainable development, more than 80% of students agreed that teachers should promote student-centred teaching, promote future-oriented thinking, interdisciplinarity between subjects, and the linkage between local and global issues.

Table 4.24 Students' view on attitude towards sustainable Development in Kashmir Valley, Jammu & Kashmir, in relation to their socio-demographic attributes

S.No.	Variable	Subgroup	Mean	SD	t-value/F-value	P-value	Level of significance at 5% level
1	Gender	Male	1.84	0.64	3.21	0.007	**Significant**
		Female	1.96	0.46			
2	Residence	Rural	1.87	0.53	0.60	0.541	Not Significant
		Urban	1.85	0.52			
3	Stream of Study	Humanities	1.93	0.54	4.79	0.003	**Significant**
		Science	1.74	0.43			
		Others	1.91	0.58			
4	Father's education	Illiterate	1.87	0.55	0.61	0.537	Not Significant
		Literate	1.85	0.52			
5	Mother's Education	Illiterate	1.88	0.56	0.49	0.620	
		Literate	1.86	0.50			
6	Semester	1st	1.91	0.52	2.51	0.028	**Significant**
		2nd	1.78	0.62			
		3rd	1.94	0.58			

		4th	1.87	0.49			
		5th	1.76	0.52			
		6th	1.74	0.50			
7	Father's occupation	Govt Service	1.87	0.54	0.19	0.821	Not Significant
		Private Service	1.84	0.50			
		Self employed	1.88	0.52			
8	Family Income	Below 25000	1.91	0.55	1.45	0.018	**Significant**
		25000-50000	1.88	0.51			
		Above 50000	1.71	0.42			

Fig: 4.14 (a)



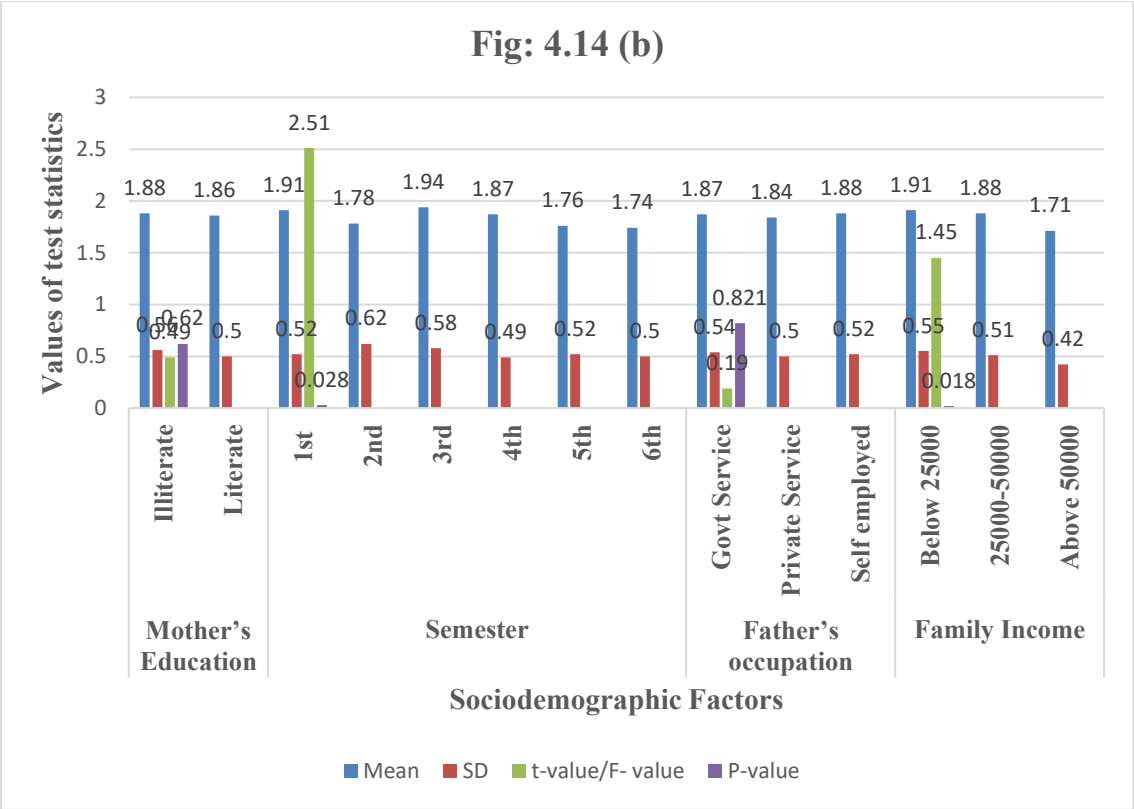


Fig. 4.14 (a & b) Students' views on attitude towards Sustainable Development in Kashmir Valley, Jammu &Kashmir, concerning their Socio-demographic attributes.

From Table 4.29 and Fig. 4.14 (a & b), it can be inferred that male students exhibit a slightly more favourable attitude towards sustainable development compared to female students. The difference, while statistically significant, is moderate and could be influenced by varying exposure to environmental education or societal expectations. However, the result contradicts the findings of Lee et al. (2013), who found that female students exhibit more favourable attitudes toward sustainable practices like waste reduction and energy conservation, while male students are more interested in technological innovations related to sustainability. The minimal difference suggests that both rural and urban students in the Kashmir Valley hold similar views on sustainable development. Science students show the most favourable attitude (mean = 1.74), compared to Humanities (1.93) and other streams (1.91). The difference is statistically significant (p = 0.003). The results align with Jenkins et al. (2019) and Williams & McBride (2015), who studied sustainability awareness among

students and reported that this may be due to their greater exposure to environmental science and sustainability topics in their curriculum. Humanities and other streams, while still positive, may lack the same depth of engagement with sustainability issues. This underlines the importance of integrating sustainability education across all disciplines. There are negligible differences between students with literate and illiterate parents for both fathers (mean = 1.85 vs. 1.87, $p = 0.537$) and mothers (mean = 1.86 vs. 1.88, $p = 0.620$). Students in the 5th semester (mean = 1.76) and 2nd semester (mean = 1.78) show more favourable attitudes compared to those in the 1st (1.91) and 3rd semesters (1.94). The *p*-value of 0.028 indicates statistical significance. The variation could be attributed to differences in curriculum exposure at different academic levels. Students in higher semesters might have more exposure to sustainability-related topics or may develop more critical thinking over time, enhancing their appreciation for sustainable development. There is no significant difference in attitudes based on the father's occupation—government service (mean = 1.87), private service (1.84), and self-employed (1.88), with a *p*-value of 0.821. Students from higher-income families (above 50,000; mean = 1.71) have more favourable attitudes compared to those from lower-income groups (below 25,000; mean = 1.91). The *p*-value of 0.018 indicates statistical significance. Liu & Zhang (2017) and Bleich & Krieger (2021) also observed that students from higher-income families are more likely to have greater access to environmental education and resources, which may influence their attitudes toward sustainability.

4.7: Effect Size of variables

Table 4.25: Effect Sizes for t-test variables (Cohen's d, η^2)

S.NO.	Dependent Variable	Variable (t-test)	t value	Cohen's d	Eta squared (η^2)
1.	Environmental Awareness (EA)	Gender	0.650	0.054	0.000
2.	Environmental Awareness (EA)	Residence	0.274	0.024	0.000
3.	Environmental Awareness (EA)	Father's education	2.68	0.065	0.001
4.	Environmental Awareness (EA)	Mother's Education	0.94	0.005	0.000

5.	Understanding of Climate Change	Gender	3.570	0.222	0.011
6.	Understanding of Climate Change	Residence	1.350	-0.073	0.004
7.	Understanding of Climate Change	Father's Education	0.400	-0.024	0.000
8.	Understanding of Climate Change	Mother's Education	2.500	-0.148	0.010
9.	Participation in Low-Carbon Behaviours	Gender	2.110	-0.124	0.004
10.	Participation in Low-Carbon Behaviours	Residence	0.710	0.052	0.001
11.	Participation in Low-Carbon Behaviours	Father's Education	1.340	-0.082	0.002
12.	Participation in Low-Carbon Behaviours	Mother's Education	1.810	-0.114	0.005
13.	Challenges in Adopting Low-Carbon Behaviours	Gender	0.850	-0.056	0.001
14.	Challenges in Adopting Low-Carbon Behaviours	Residence	0.920	0.056	0.002
15.	Challenges in Adopting Low-Carbon Behaviours	Father's Education	1.520	0.090	0.003
16.	Challenges in Adopting Low-Carbon Behaviours	Mother's Education	1.440	0.079	0.003
17.	Perceived Impacts of Climate Change in J&K	Gender	1.990	-0.124	0.003
18.	Perceived Impacts of Climate Change in J&K	Residence	0.160	-0.011	0.000
19.	Perceived Impacts of Climate Change in J&K	Father's Education	2.880	-0.180	0.010
20.	Perceived Impacts of Climate Change in J&K	Mother's Education	0.370	-0.022	0.000
21.	Attitude Towards Sustainable Development	Gender	3.71	0.22	0.01
22.	Attitude Towards Sustainable Development	Residence	0.60	0.04	0.00
23.	Attitude Towards Sustainable Development	Father's Education	0.61	0.04	0.00
24.	Attitude Towards Sustainable Development	Mother's Education	0.49	0.04	0.00
25.	Pro-environmental Behaviour	Gender	2.91	0.19	0.01
26.	Pro-environmental Behaviour	Residence	2.68	0.17	0.02
27.	Pro-environmental Behaviour	Father's Education	1.60	0.11	0.01
28.	Pro-environmental Behaviour	Mother's Education	1.99	0.11	0.01

Table 4.26: Effect Sizes for ANOVA tests (partial η², Cohen's f)

S.No.	Dependent Variable	Variable (ANOVA)	F value	Cohen's f	Partial eta squared (ηp^2)
29.	Environmental Awareness (EA)	Stream of Study	2.215	0.061	0.004
30.	Environmental Awareness (EA)	Semester	1.666	0.084	0.007
31.	Environmental Awareness (EA)	Father's occupation	3.13	0.030	0.001
32.	Environmental Awareness (EA)	Family Income	0.315	0.023	0.001
33.	Understanding of Climate Change	Stream of Study	0.600	0.032	0.001
34.	Understanding of Climate Change	Semester	1.320	0.074	0.005
35.	Understanding of Climate Change	Father's occupation	2.520	0.065	0.004
36.	Understanding of Climate Change	Family Income	1.570	0.051	0.003
37.	Participation in Low-Carbon Behaviours	Stream of Study	3.530	0.077	0.006
38.	Participation in Low-Carbon Behaviours	Semester	1.040	0.066	0.004
39.	Participation in Low-Carbon Behaviours	Father's occupation	0.310	0.023	0.001
40.	Participation in Low-Carbon Behaviours	Family Income	0.660	0.033	0.001
41.	Challenges in Adopting Low-Carbon Behaviours	Stream of Study	0.450	0.027	0.001
42.	Challenges in Adopting Low-Carbon Behaviours	Semester	0.510	0.046	0.002
43.	Challenges in Adopting Low-Carbon Behaviours	Father's occupation	2.130	0.060	0.004
44.	Challenges in Adopting Low-Carbon Behaviours	Family Income	0.260	0.021	0.000
45.	Perceived Impacts of Climate Change in J&K	Stream of Study	1.210	0.045	0.002
46.	Perceived Impacts of Climate Change in J&K	Semester	1.590	0.082	0.007
47.	Perceived Impacts of Climate Change in J&K	Father's occupation	1.320	0.047	0.002
48.	Perceived Impacts of Climate Change in J&K	Family Income	3.500	0.076	0.006

49.	Attitude Towards Sustainable Development	Stream of Study	4.79	0.20	0.04
50.	Attitude Towards Sustainable Development	Semester	2.51	0.14	0.02
51.	Attitude Towards Sustainable Development	Father's occupation	0.19	0.03	0.00
52.	Attitude Towards Sustainable Development	Family Income	1.45	0.17	0.03
53.	Pro-environmental Behaviour	Stream of Study	6.21	0.18	0.03
54.	Pro-environmental Behaviour	Semester	4.44	0.23	0.05
55.	Pro-environmental Behaviour	Father's occupation	3.13	0.12	0.01
56.	Pro-environmental Behaviour	Family Income	1.25	0.06	0.00

Table 4.25 presents effect sizes for group differences examined through independent-samples *t*-tests using Cohen's *d* and eta squared (η^2). According to Jacob Cohen (1988), Cohen's *d* values of 0.20, 0.50, and 0.80 represent small, medium, and large effects, respectively, while η^2 values of 0.01, 0.06, and 0.14 correspond to small, medium, and large effects.

The results indicate that most observed differences across gender, residence, and parental education fall within the small or negligible effect size range, despite some statistically significant *t* values. For example, gender differences in *Understanding of Climate Change* ($d = 0.222$, $\eta^2 = 0.011$) and *Attitude Towards Sustainable Development* ($d = 0.22$, $\eta^2 = 0.01$) reflect small but meaningful effects. This aligns with prior research suggesting that gender differences in environmental concern and climate perception are typically modest, with females often demonstrating slightly higher environmental concern (Stern, 2000; Clayton, 2003).

Similarly, the small effect sizes observed for *Pro-environmental Behaviour* (Gender: $d = 0.19$; Residence: $d = 0.17$) are consistent with empirical findings that socio-demographic variables generally explain only a limited proportion of variance in environmental behaviour (Kollmuss Agyeman, 2002). Their work emphasises that while demographic variables may show statistical differences, their practical magnitude is often small compared to psychological determinants such as values, beliefs, and norms.

The relatively small η^2 values across most variables (ranging from .000 to .011) further suggest that although certain socio-demographic factors influence environmental awareness, climate perception, and behaviour, their overall explanatory power remains limited. This is supported by Schultz (2001), who argues that environmental attitudes and behaviours are more strongly shaped by value orientations and identity factors than by basic demographic characteristics.

Thus, Table 4.25 indicates that while statistically significant group differences exist, the magnitude of these differences is generally small, highlighting the importance of psychological and contextual determinants over purely demographic ones in shaping environmental awareness and sustainable development attitudes.

Table 4.26 presents the effect sizes for ANOVA analyses using partial eta squared (ηp^2) and Cohen's *f*. According to Jacob Cohen (1988), Cohen's *f* values of 0.10, 0.25, and 0.40 indicate small, medium, and large effects, while partial η^2 values of .01, .06, and .14 similarly represent small, medium, and large effects.

The findings reveal that most independent variables (stream of study, semester, father's occupation, and family income) demonstrate small effect sizes on the dependent variables. For instance, *Environmental Awareness* across stream of study ($\eta p^2 = .004$) and semester ($\eta p^2 = .007$) reflects minimal practical impact. This supports prior research suggesting that academic discipline may influence environmental knowledge, but the magnitude of its effect is often modest (Monroe et al., 2019).

Notably, relatively stronger effects are observed for *Attitude Towards Sustainable Development* across streams of study ($\eta p^2 = .04$, $f = .20$) and *Pro-environmental Behaviour* across semesters ($\eta p^2 = .05$, $f = .23$). Although these values still fall within the small-to-moderate range, they indicate comparatively greater explanatory power. This finding aligns with Ajzen's (1991) Theory of Planned Behaviour, which posits that behavioural intentions and actions are shaped by accumulated knowledge, social norms, and perceived behavioural control, factors that may strengthen over academic progression.

Similarly, the effect of family income on *Perceived Impacts of Climate Change in J&K* ($\eta p^2 = .006$) supports literature indicating that socio-economic context influences climate risk perception, though typically with modest effect sizes (Weber, 2010).

Overall, Table 4.26 demonstrates that while educational and socio-economic variables

contribute to differences in environmental awareness, climate perception, and sustainable development attitudes, their effects are generally small. This reinforces the broader environmental psychology literature, which emphasises that cognitive, value-based, and identity-related constructs often exert stronger influence than structural demographic factors (Stern, 2000; Clayton, 2003).

4.8: Testing of the theoretical research model:

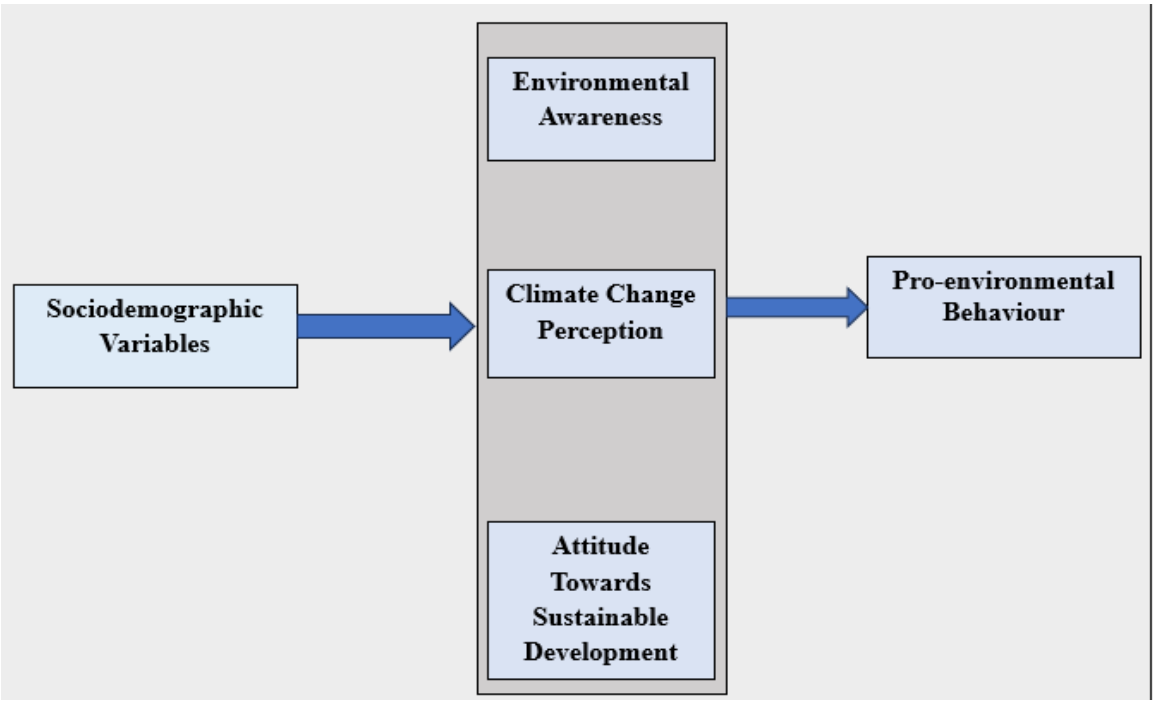


Fig.4.15: Proposed Theoretical Research Model

To examine the proposed hypotheses, SEM with AMOS version 21.0 was utilised. The adequacy of the model fit was assessed using multiple fit indices, including the relative or normed chi-square (C_{min}/DF), Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), Standardised Root Mean Residual (SRMR), and PCLOSE. As presented in Table 4.25, the results reveal that all model fit indices for the structural model fall within the acceptable thresholds, except for the CFI value (C_M/DF = 2.24, CFI = 0.804, RMSEA = 0.046, SRMR = 0.047, and PCLOSE = 1.00). Overall, the findings indicate that the structural model provides an adequate and satisfactory fit to the observed data.

Table 4.27: Model Fit Indices of Structural Model

	CMIN/DF	CFI	RMSEA	SRMR	P Close
Default Model	2.242	0.804	0.046	0.047	1.00
Acceptable Value	Less than 3	≥0.90	<0.08	<0.08	>0.05

Table 4.28: Results of Structural Equation Model

S. No.	Hypothesis	Beta	p-value	Result
H5	There is a significant impact of Environmental Awareness on Pro-Environmental behaviour	0.050	0.447	Not Supported
H6	There is a significant impact of Attitude towards sustainable development on pro-environmental behaviour	0.283	0.002	Supported
H7	There is a significant impact of climate change on pro-environmental behaviour	0.064	0.147	Not Supported

The results of the structural model are presented in Table 4.28. It is evident from the results that environmental awareness (EA) has no significant impact on pro-environmental behaviour ($\beta = 0.50$ and $p = 0.447$), thus not supporting H5, suggesting that environmental awareness alone does not significantly influence students' environmentally responsible actions. Similarly, climate change showed no significant influence on pro-environmental behaviour ($\beta = 0.064$ and $p = 0.147$), thus not supporting H7, suggesting that although students may possess awareness or express concern about climate change, such awareness does not automatically lead to corresponding actions or behavioural changes. However, the results of H2 indicated a significant impact of attitude towards sustainable development on pro-environmental behaviour ($\beta = 0.283$ and $p = 0.002$), thus supporting H6, thereby aligning with the theory that beliefs and values about sustainability guide behaviour. This might suggest that knowledge or perception alone isn't enough to drive behaviour; rather, it's the underlying attitude and value system that matters most.

The finding that pro-environmental behaviour is significantly and favourably impacted by attitudes toward sustainable development, aligning with existing research, such as Stern (2000), who emphasises that personal norms and values are critical predictors of

environmental actions, but not environmental awareness or perceptions of climate change, is an important finding for educational and policy interventions. It implies that raising students' understanding of environmental issues or climate change alone won't be sufficient to influence their behaviour. Many people may be aware of environmental problems or comprehend the science underlying climate change, yet they may not take appropriate action. Nonetheless, a favourable outlook on sustainable development indicates an internalised conviction in environmental conservation, long-term social well-being, and individual accountability for sustainability. Students who have this mindset are more inclined to recycle, save resources, and support environmental causes because it cultivates a stronger moral and emotional bond with the natural world. This suggests that when it comes to forming environmentally conscious behaviour, affective and value-based learning elements are more important than cognitive knowledge alone. A holistic and experiential approach to sustainability education is required of educational institutions in the Kashmir Valley in order to foster such attitudes in their students. This involves incorporating ethical conversations, culturally appropriate examples, and narratives into curricula to help pupils relate to local environmental issues. Sustainable practices can be reinforced through practical events like clean-up campaigns, tree plantings, and involvement in eco-clubs. Institutions can also encourage behavioural change by setting an example, supporting peer-led projects, and implementing sustainable campus policies like water conservation and garbage segregation. Furthermore, students' dedication to pro-environmental behaviour can be strengthened by developing emotionally engaging learning environments where they consider their relationship with nature and imagine a sustainable future for their community. In the end, by focusing on cultivating positive attitudes, educators can nurture a generation that not only understands environmental challenges but is also motivated to take meaningful action to address them.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

Chapter V: CONCLUSIONS AND RECOMMENDATIONS

5.1: Conclusions

The current study examined the sociodemographic factors that influence undergraduate students' perceptions of climate change, pro-environmental behaviour, environmental awareness, and attitudes toward sustainable development in the Kashmir Valley. The findings showed that students were generally very much aware of environmental issues, particularly those related to pollution, renewable energy, deforestation, and population expansion. This cognitive awareness did not, however, always result in behavioural action; this pattern is consistent with the "value-action gap" that has been noted in the literature on environmental psychology (Kollmuss & Agyeman, 2002).

Both awareness and pro-environmental behaviour were statistically significantly influenced by gender and academic stream, with female and science students showing higher levels of participation in eco-friendly behaviour. Perception of climate change was also rather strong, especially when it came to local effects like food shortages and glacier melting. This supports previous findings that place-based environmental changes make perceptions more salient (Chhokar et al., 2006; Fielding & Head, 2012). However, there was still a lack of knowledge about technical solutions (such as nuclear energy and the Kyoto Protocol) and global climate governance procedures.

Students' engagement in low-carbon lifestyle behaviours (LCB) was moderate, despite their positive attitudes toward sustainable development, which included support for gender equality, environmental protection, and inclusive policies. In line with the structural and psychological limitations mentioned in previous environmental behaviour research, barriers such as perceived cost burdens, lack of infrastructure, lifestyle inertia, and ignorance were frequently mentioned (Tilbury, 2011; Sharma & Jha, 2020). Furthermore, sociodemographic factors, including family income and level of education, had some bearing on how people perceived climate change and local concerns, highlighting the significance of exposure to the economy and family influence. Findings also reveal strong sustainability awareness, with students prioritising environmental protection over unchecked development. Science students exhibit higher sustainability awareness, while male students show slightly more favourable attitudes. However, female students demonstrate stronger engagement in PEB. Urban students display higher PEB levels than their rural counterparts, likely due to better access to environmental education and infrastructure. Academic progression enhances sustainability awareness, with senior students showing greater engagement. Students adopt low-effort behaviours like energy and water conservation, but participate less in activism and civic engagement. Recycling and eco-friendly

purchasing receive moderate attention, though external barriers such as inadequate facilities and affordability influence engagement. Parental education and occupation do not significantly impact PEB, but higher household income correlates with stronger sustainability attitudes. These results highlight the necessity of localising climate information, integrating environmental education across curricula, and fostering behavioural change, a strategy supported by the NEP (2020) and UNESCO (2017). In the end, it is important to recognise that students' environmental behaviour is influenced by educational institutions, community infrastructure, and institutional support in addition to being a question of personal preference. Overall effect sizes were small to moderate, indicating that environmental awareness, climate change perception, sustainability attitudes and pro-environmental behaviours are shaped by a complex interaction of institutional, educational, and contextual factors.

In order to investigate the theoretical framework on environmental awareness, perceptions of climate change, and attitudes toward sustainable development in predicting pro-environmental behaviour among students in the Kashmir Valley, the study used structural equation modelling (SEM). The main conclusions show that pro-environmental conduct is not statistically significantly impacted by environmental awareness or perceptions of climate change. However, attitudes toward sustainable development exhibit a positive influence, indicating that value-based attitudes rather than a merely cognitive comprehension of environmental challenges are the deeper roots of behavioural change. The study concludes that institutional interventions, curriculum integration and supportive campus infrastructure are crucial for promoting equitable and sustained environmental engagement among students in the Kashmir Valley.

5.2: Policy Recommendations Based on the Study

- All academic disciplines should be required to teach environmental education, with a focus on Kashmir-specific topics, including water scarcity, biodiversity loss, and glacier retreat.
- To improve action-oriented learning, incorporate experiential modules like fieldwork, environmental audits, and climate simulations.
- Install green infrastructure in universities, such as rainwater harvesting, energy-saving devices, and recycling units.
- Encourage student involvement in sustainability initiatives by offering incentives such as rewards, certificates, or academic credits.
- In accordance with NEP 2020, plan frequent training sessions for educators on ESD utilising student-centered and multidisciplinary approaches.

- ❖ Create inclusive environmental activities that engage male students through peer-led efforts and empower female students.
- ❖ Start digital campaigns and media literacy courses to dispel myths about energy and climate change and advance scientific understanding.
- ❖ Create green entrepreneurial initiatives, innovation laboratories, and career courses centred around sustainable occupations.
- ❖ Engage rural communities, parents, and local leaders in sustainability initiatives to raise awareness of environmental issues outside of campus.
- ❖ Create institutional structures to assess environmental engagement regularly and include student input into the improvement of programs and policies.
- ❖ Curricula should be redesigned with an emphasis on fostering pro-sustainability attitudes through localised value-based education and participatory teaching.
- ❖ Encourage environmentally conscious behaviour by implementing sustainable practices on campus, such as energy reduction, waste segregation, and green landscaping.
- ❖ Encourage emotional involvement through community environmental service, nature immersion, contemplative journaling, and storytelling.
- ❖ Encourage eco-clubs to take the lead in planning sustainability audits, tree plantation drives, and campus-wide green campaigns.
- ❖ Make climate change education region-specific and actionable by using Kashmir's local environmental issues as real-world case studies.
- ❖ Create instruments and metrics to evaluate shifts in students' perspectives and actions about sustainability, then utilise the information to modify teaching methods.

5.3: Delimitations of the Study

The study was carefully delimited in terms of the sample, research tools and techniques, and the geographical area of investigation to maintain focus and feasibility. Considering practical constraints such as time, resources, and effort, the research was intentionally confined to specific parameters. Establishing these boundaries enabled a systematic and manageable approach, allowing for a more precise and in-depth analysis of the selected variables while ensuring that the findings would be meaningful and reliable within the defined scope.

- The study is restricted to the examination of four major psychological and behavioural variables, Environmental Awareness, Pro-environmental Behaviour, Climate Change Perception, and Attitude towards Sustainable Development, and selected sociodemographic factors influencing them. Other potential determinants or mediating variables have not been considered.
- The study is delimited to undergraduate students enrolled in various degree colleges of the Kashmir Valley. Students of other educational levels (such as school or postgraduate levels) or from regions outside the Kashmir Valley have not been included in the investigation.
- The study was delimited to the use of the questionnaire method for data collection, excluding other techniques such as interviews or focus group discussions. This approach was adopted to ensure uniformity of responses, feasibility of administration, and efficient handling of a large sample within the available time and resources.
- Due to constraints of time, financial resources, and feasibility, the study has been delimited to a manageable sample size of 1200 and specific variables. Broader coverage of population groups or the inclusion of additional constructs was not feasible within the available resources.
- The present study is delimited by the use of purposive and convenience sampling techniques for data collection. As these are non-probability sampling methods, the sample may not fully represent the entire population of undergraduate students in the Kashmir Valley, thereby limiting the generalizability of the findings. Future research may employ probability sampling techniques, such as simple random or stratified sampling, to enhance representativeness and external validity.
- The survey was confined to twenty Govt. Degree Colleges with two colleges from each district of the Kashmir Valley, Jammu and Kashmir.

5.4: Future Research Directions

In light of the findings and limitations of the present study, several directions are recommended for future research to expand and deepen understanding of environmental awareness, pro-environmental behaviour, climate change perception, and attitudes toward sustainable development, particularly in the context of the Kashmir Valley and beyond. These directions are outlined below:

1. The current study employed a cross-sectional design, which offers only a snapshot of students' environmental awareness and behaviours. Future researchers are encouraged to adopt longitudinal research designs to examine how students' environmental attitudes, behaviours, and perceptions change over time. Long-term studies could help identify whether pro-environmental attitudes persist, intensify, or decline with age, exposure, and education, and how significant life events (e.g., political instability, climate disasters, or employment) influence these changes.

2. This study only looked at undergraduate students in the Kashmir Valley. In the future, both academic and policy-driven efforts should include a larger range of people. It is highly recommended that studies on environmental awareness and sustainability involve postgraduate students, teenagers in school, working adults, teachers, and people in the local community. Tribal people, economically disadvantaged groups, and the split between rural and urban areas need special attention because these communities typically bear the brunt of environmental damage in unique and unfair ways. Learning about the different viewpoints and lived experiences of these groups will not only add to the academic conversation, but it will also help make sure that sustainability efforts in the region are fairer, take into account the local context, and are culturally acceptable.

3. Future studies could explore environmental determinants and perceptions in comparative contexts, either between Jammu and Kashmir regions or between Kashmir and other environmentally sensitive regions of India or South Asia. Such comparative research would allow for the exploration of how cultural, political, religious, and ecological contexts influence sustainability attitudes and practices. These studies can highlight regional disparities and guide the design of context-sensitive environmental policies and education programs.

4. People are interested in how well environmental education may change the way students think and act. In the future, researchers may create and carry out educational interventions like eco-literacy workshops, sustainability clubs, awareness campaigns, and experiential learning modules. They could then look at how these interventions affect students' environmental behaviour in the short and long term. They can use pre-test/post-test or experimental methods to see how well these programs help young people learn about the environment.

5. Since young people use digital technology all the time, future studies might look into how social media, environmental blogs, apps, online games, and documentaries affect students' thinking about climate change and how they act in the environment. Researchers might look into how digital interaction leads to real-world acts that help the environment and whether these platforms raise awareness or spread false information. They might also look into the roles of influencers, internet activism, and digital campaigning.

6. While this study employed a quantitative methodology, qualitative research could complement these findings by uncovering the subjective meanings, motivations, values, and cultural narratives that shape students' environmental behaviour and attitudes. Methods such as in-depth interviews, focus group discussions, and ethnography can yield rich insights into the lived experiences and emotional connections students have with environmental issues, particularly in a region as ecologically sensitive and politically complex as Kashmir.

7. Future studies could use proven psychological models to learn more about what makes people act in ways that are good for the environment. They can use theories like the Theory of Planned Behaviour (Ajzen, 1991), the Value-Belief-Norm Theory (Stern, 2000), and the Environmental Identity Theory (Clayton, 2003) to look into how students' values, norms, perceived behavioural control, and environmental identity affect their sustainable practices. This theoretical basis can make explanations stronger and help build models that predict how people will act in the environment.

8. Researchers in the future might look into how schools, local governments, and non-profit organisations might help teach people about the environment and how to live in a way that is good for the environment. Studies with a policy-oriented focus could examine how curriculum reforms, green campus initiatives, and institutional support

mechanisms, such as eco-clubs, NSS programs, and environmental auditing practices, influence students' engagement and commitment to sustainability. Surveys or case studies of institutions that are good for the environment may show other institutions how to do the same.

9. The long-running conflict and political instability in Kashmir have serious effects on the environment and the management of resources. Future research should look into how conflict affects environmental stressors and how these affect students' views of the environment and their ability to bounce back. It is important to look into questions of environmental justice, getting access to clean resources, and how conflict-related environmental damage affects people's mental health. There is still not enough research in this field, but it is very important for making decisions in ecologies that have been damaged by conflict.

10. Future studies could also investigate environmental and climate issues through the lens of equity and justice. Climate change disproportionately affects marginalised groups, and understanding how caste, class, gender, and rural-urban divides influence perceptions and behaviours toward sustainability is critical. Research may explore whether vulnerable populations have equitable access to environmental resources, education, and participation in sustainability decision-making processes. This direction is vital for shaping inclusive and socially just environmental policies.

In conclusion, the research directions aim to enrich the field of environmental psychology and education by addressing current limitations, exploring under-researched dimensions, and leveraging interdisciplinary approaches. These directions also align with global and national sustainability agendas, including the SDGs, particularly SDG 4, SDG 12, and SDG 13. Future studies that consider these recommendations can contribute significantly to theoretical advancements, educational practice, and policy interventions in the realm of sustainability and climate action.

CHAPTER 6
BIBLIOGRAPHY

BIBLIOGRAPHY

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APPENDICES

Appendix I: Environmental Awareness Scale by P. K. Jha (1988)

Strongly Agree (1) Agree (2) Neutral (3) Disagree (4) Strongly Disagree (5)

S.No.	Statement	1	2	3	4	5
1.	Man is mainly responsible for environmental pollution.					
2.	Pollution is more in developing countries than in developed countries.					
3.	Large-scale industrialisation is a significant cause of environmental pollution.					
4.	Mass movement is a must for protection of the environment.					
5.	Big dams are essential for the production of hydroelectricity.					
6.	Special attention must be given to the non-conventional sources of energy, i.e. wind energy, solar energy etc.					
7.	Communication media have a vital role to make people aware of their environment.					
8.	There must be a planned programme to grow renewable and alternative sources of energy.					
9.	The use of wind energy in producing electricity enhances pollution.					
10.	The use of a nuclear reactor is not desirable in view of pollution.					
11.	Spray of synthetic fertilisers and pesticides should be banned.					
12.	Use of lead-free petrol is desirable.					
13.	Smoking at public places should be strictly prohibited.					
14.	Increasing population is the main cause of environmental pollution.					
15.	There should be a balance between available energy sources and their use.					
16.	Energy sources like coal, petrol, etc. should be used at large scale.					
17.	The greenhouse effect is responsible for the increase in temperature of the biosphere.					

18.	The leather and fertiliser industries are responsible for water pollution.					
19.	Tree plantation is essential for the regulation of environmental temperature.					
20.	The ozone layer in the biosphere is essential for our existence.					
21.	A ban on nuclear tests is desirable for preventing environmental pollution.					
22.	All should take an active part in the community cleanliness drive.					
23.	Fertiliser factories should be located near the housing colonies.					
24.	Our vehicles should be checked from time to time for preventing air pollution.					
25.	Nuclear waste should be disposed-off with utmost care.					
26.	To abide by the family welfare programme is the duty of every citizen.					
27.	In order to increase food grains, agriculture should be accelerated by removing forests.					
28.	Use of solar energy is pollution-free.					
29.	Rapid deforestation unbalances the rain cycle of a place.					
30.	Bio-fertiliser should be used for maintaining the fertility of the soil.					
31.	Catalytic converters must be used in vehicles to prevent smoke pollution (air pollution).					
32.	Deforestation is the main cause of soil erosion and floods.					
33.	Use of narcotics and drugs (Opium, charas, cocaine, etc.) should be banned.					
34.	Every year from 1st to 7th October, Forest Conservation Week must be observed with gaiety.					
35.	Protection of rare animals like, leopard, rhino and Kashmiri stag is essential.					
36.	Paper should be used properly with regard to forest conservation.					
37.	Mixed cropping and crop rotation are proper methods for upkeeping the fertility of the soil.					
38.	Noise pollution is harmful to our health.					
39.	Fumes emitted from vehicles and factories are responsible for acid rain.					
40.	Silencers must be used in vehicles.					

41.	Alcohol producing plants like sugarcane, potato, etc., should not be grown as a substitute for petrol fuel.					
42.	Indians have more percentage of D.D. T. in their body in comparison to the people of other countries.					
43.	The White Revolution played an important role in resolving the malnutrition problem.					
44.	Forest cover must be there in 1/3 of the net area of India.					
45.	Unpolluted water is essential for life.					
46.	A community immunisation programme should be launched to prevent communicable diseases.					
47.	Production of refrigerators and jet aircraft should be stopped for preserving the ozone layer.					
48.	A fall in mortality rate and an increase in average lifespan are the prime causes of pollution growth.					
49.	Attention should be given to the productivity of cattle.					
50.	Satellites and rockets should not be launched for preventing space pollution.					
51.	An increase in Greenhouse gases is great damage to the world community.					

Appendix II: Pro-Environmental Behavioural Scale by A.G. Mertig (2003)

Strongly Agree (1) Agree (2) Neutral (3) Disagree (4) Strongly Disagree (5)

S. No	Statement					
1.	Walked or cycled instead of travelled by car for environmental reasons.					
2.	Deliberately purchased food produced locally rather than imported products.					
3.	Attended a protest march or a demonstration for environmental reasons.					
4.	Purchased products packaged in reusable or recyclable containers.					
5.	Avoided buying from a company which shows disregard for the environment.					
6.	Picked up litter or trash.					
7.	Recycled glass bottles, aluminium cans or paper.					
8.	Tried to use less energy (electricity, water, etc.)					
9.	Turned off the lights when I am the last to leave a room.					
10.	Made an effort to use less water when brushing my teeth or bathing.					
11.	Considered politicians' positions related to environmental issues when voting or supporting.					
12.	Choose to read publications that focus on environmental issues.					
13.	Encouraged people involved in destructive environmental behaviour to stop that activity.					
14.	Encouraged others to take action on behalf of the environment.					

Annexure III: Perception about Climate Change by Tse Ka Ho Alan (2013)

	Part 1: Understanding climate change **1= True, 2= False, 3=Don't Know**					
S. No	Statements	1	2	3	4	5
1.	Carbon dioxide has a stronger global warming potential than all other greenhouse gases. **Cause**					
2.	Climate change will lead to the relocation of human settlements, plants, animals and diseases. **Impact**					
3.	Reducing consumption and production cannot help mitigate the climate change problem. **Solution**					
4.	Ozone depletion will enhance the greenhouse effect and global warming. **Cause**					
5.	Climate change will lead to global sea level rise and species extinction. **Impact**					
6.	The US government has ratified the "Kyoto Protocol already. **Cause**					
7.	Methane is a greenhouse gas. **Cause**					
8.	Sustainable development is a solution to the climate change Problem. **Cause**					
9.	Burning fossil fuels and deforestation will increase the concentration of carbon dioxide in the atmosphere. **Cause**					
10	Renewable energy sources are an example of sustainable development. It can alleviate the climate change problem. **Cause**					
	Part 2: Engagement in low-carbon (Green Living) behaviour **How often do you engage in the following low-carbon (green living) behaviour?** 1= Strongly Agree, 2=Agree, 3=Neutral, 4=Disagree, 5= Strongly Disagree					
1	Buy products with less Packaging	1	2	3	4	5
2	Bring my own bag when shopping.					
3	Separate Waste for recycling					

4	Meals with more vegetables and less meat					
5	Buy organic food					
6	Avoid Food residue					
7	Buy clothes made of natural or organic material.					
8	Use public transport, bike or walk to school.					
9	Adjust the thermostat of the air conditioner to 25.5 ^{0}C in summer.					
10	Participate in green (low-carbon) activities in schools and the community.					
	Part 3: Major hurdles in adopting low-carbon behaviour **This part attempts to identify major hurdles affecting your decision to adopt a low-carbon lifestyle. Please state the extent to which you agree with the following hurdles**. 1= Strongly Agree, 2=Agree, 3=Neutral, 4=Disagree, 5= Strongly Disagree					
1	It is hard to change my existing lifestyle because I have already got used to it.	1	2	3	4	5
2	Practising a low-carbon lifestyle needs additional commitment (e.g. time & money)					
3	Lack of opportunities and availability in society (e.g. facilities/choices).					
4	Lack of knowledge and skills on how to practice a low-carbon lifestyle					
5	Lack of interest in doing so					
	Part 4: The effects of climate change on various aspects in Kashmir **In the Kashmir Valley, how serious are the effects of climate change on the following aspects?** Very Serious (1), Serious (2), Moderate (3), Unserious (4), Very Unserious (5)					
1	Ecological environment and wildlife.	1	2	3	4	5
2	Industrial and commercial activities					
3	Built environment and infrastructure.					
4	Energy use and supply					
5	Food supply					
6	Water supply					
7	People's health					

Appendix IV: The Attitudes Toward Sustainable Development scale by Michele Biasutti and Sara Frate (2017)

Strongly Agree (1) Agree (2) Neutral (3) Disagree (4) Strongly Disagree (5)

S. No	Statements		1	2	3	4	5
1.	When people interfere with the environment, they often produce disastrous consequences.	Environmental					
2.	Environmental protection and people's quality of life are directly linked.						
3.	Biodiversity should be protected at the expense of industrial agriculture production.						
4.	Building development is less important than environmental protection.						
5.	Environmental protection is more important than industrial growth.						
6.	Government economic policies should increase sustainable production, even if it means spending more money.	Economic					
7.	People should sacrifice more to reduce economic differences between populations.						
8.	Government economic policies should increase fair trade.						
9.	Government economic policies should act if a country is wasting its natural resources.						
10	Reducing poverty and hunger in the world is more important than increasing the economic well-being of the industrialised countries.						
11	Each country can do a lot to keep the peace in the world	Social					
12	The society should further promote equal opportunities for males and females.						
13	The contact between cultures is stimulating and enriching.						
14	The society should provide free basic health services.						
15	The society should take responsibility for the welfare of individuals and families.						
16	Teachers in college should use student-centred teaching methods	Educational					
17	Teachers in college should promote future-oriented thinking in addition to historical knowledge.						
18	Teachers in college should promote interdisciplinarity between subjects.						

19	Teachers in college should promote the connection between local and global issues.						
20	Teachers in college should promote critical thinking rather than Lecturing.						

Ph.D. Candidacy Letter

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Research Degree Programmes

LPU/CRDP/PHD/EC/20230111/002213

Dated: 24 Sep 2022

Rouoof Habib Ganie
Registration Number: 42000350
Programme Name: Doctor of Philosophy (Environmental Sciences)

Subject: Letter of Candidacy for Ph.D.

Dear Candidate,

We are very pleased to inform you that the Department Doctoral Board has approved your candidacy for the Ph.D. Programme on 24 Sep 2022 by accepting your research proposal entitled: "Determinants of Environmental Awareness, Pro-environmental Behaviour, Climate Change perception and Attitude towards Sustainable Development among students of Kashmir Valley, Jammu and Kashmir"

As a Ph.D. candidate you are required to abide by the conditions, rules and regulations laid down for Ph.D. Programme of the University, and amendments, if any, made from time to time.

We wish you the very best!!

In case you have any query related to your programme, please contact Centre of Research Degree Programmes.

Head

Centre for Research Degree Programmes

Note:-This is a computer generated certificate and no signature is required. Please use the reference number generated on this certificate for future conversations.

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List of Publications

S.No.	Type of Paper	Name of the Journal	Journal indexing	Title of the Paper	Published Date	Volume & Issue Number	ISSN/ ISBN Number	Impact Factor/ SJR
01	Journal Paper	International Journal of Sustainable Building Technology and Urban Development	Scopus	Socio-demographic determinants of climate change knowledge and engagement in low-carbon behaviour among students in the Western Himalayas, Jammu & Kashmir, India	12/3/2025	Vol. 16, No. 1	ISSN 2093-761X eISSN 2093 7628	0.261 SJR
02	Conference Proceedings	AIP Conference Proceedings	Scopus	Statistical analysis of the environmental awareness among Undergraduate students of the Kashmir Valley using SPSS	8/9/2023	vol.2800, Issue 1	ISSN:0094-243X	0.153 SJR
03	Journal Paper	Engineered Science	Scopus	Analysing Climate Change Perception and Adaptation Methods of Indigenous People in the North-Western Himalayas, Kashmir	16/02/2025	Vol.34, No. 1489	ISSN: 2576988X	0.726 SJR
04	Conference Proceedings	International Conference on Emerging Trends and Innovations in Life Sciences		Youth Perspectives on Sustainability: The Impact of sociodemographic Variables in the Kashmir valley, Jammu and Kashmir	20/09/2025	Vol.1, No.1	978-93-94638-69-3	NA
05	Journal Paper	Discover Sustainability	Scopus	Understanding student sustainability attitudes and behaviours through demographic insights in Kashmir Valley, Jammu and Kashmir, India	05/04/2026	V7:1049	ISSN:2662-9984	0.815 SJR

List of Conferences

S.No.	Conference Type	Name of the Conference	Title of the paper	Organized By	Dated	Remarks
01	International	Recent Advances in Fundamental and Applied Sciences RAFAS 2021	Statistical analysis of the environmental awareness among Undergraduate students of the Kashmir Valley using SPSS	Lovely Professional University, Phagwara, Punjab	June 25-26, 2021	Paper Presented
02	International	International Conference on SDGs with special focus on Climate action	Comparative study of Climate Change perception among students in Kashmir Valley	Islamic University of Science and Technology, Awantipora, J&K	August 08-10, 2023	Paper Presented
03	International	Recent Advances in Fundamental and Applied Sciences RAFAS 2025	Understanding the Green Generation: Sociodemographic influence on Students' environmental Practices in Kashmir Valley.	Lovely Professional University, Phagwara, Punjab	April 18-19, 2025	Paper Presented
04	International	International Conference on Emerging Trends and Innovations in Life Sciences (ETILS 2025)	Youth Perspectives on Sustainability: The Impact of sociodemographic Variables in the Kashmir valley, Jammu and Kashmir	Seethalakshmi Ramaswami College, Tamil Nadu	February 05 - 06, 2025	Best Paper Award

Copyright Registration Details

S.No.	Registration Office	Application No.	Certificate No.	Title	Date of ROC
01	**Intellectual Property, Copyright Office, Govt. of India**	**LD-52824/2025-CO**	**LD-20260190745**	Exploring what shapes students' environmental awareness, climate change perception, and sustainability attitudes in Kashmir Valley	**30/06/2026**

Expert Validation Certificate for Scales

EXPERT VALIDATION CERTIFICATE

Title of the Research Work:
Determinants of Environmental Awareness, Pro-environmental Behaviour, Climate Change Perception, and Attitude towards Sustainable Development among Students in Kashmir Valley

Research Scholar:
Mr. Rouoof Habib Ganie
Department: Environmental Science
University: Lovely Professional University, Phagwara Punjab
Reg No. 42000350

This is to certify that the standardized research instruments (mentioned below), originally developed by various researchers and employed by the above-named scholar for his Ph.D. research work, were thoroughly examined by us, a panel of experts in the fields of Science and Social Sciences.

1. **Environmental Awareness Ability Measure by Dr Praveen Kumar Jha (1998)**
2. **Climate Change Perception Scale by Tse Ka Ho Alan (2013)**
3. **Pro-environmental Behaviour Scale by Angela G. Mertig (2003).**
4. **Attitude towards Sustainable development Scale by Michele Biasutti and Sara Frate (2017).**

The purpose of our review was to ensure their **appropriateness, clarity, and cultural relevance** when applied to the undergraduate student population of Kashmir Valley.

The survey items were assessed on the following criteria:

- Clarity and comprehensibility of language in the local context
- Relevance to the stated objectives of the present study
- Suitability for the cultural and educational background of the target group
- Overall adequacy for achieving the research objectives

Based on our careful review, we affirm that these standardised tools are appropriate for use in the present study. Accordingly, we hereby validate the use of these instruments for the purpose of this doctoral research work.

Expert Committee Members

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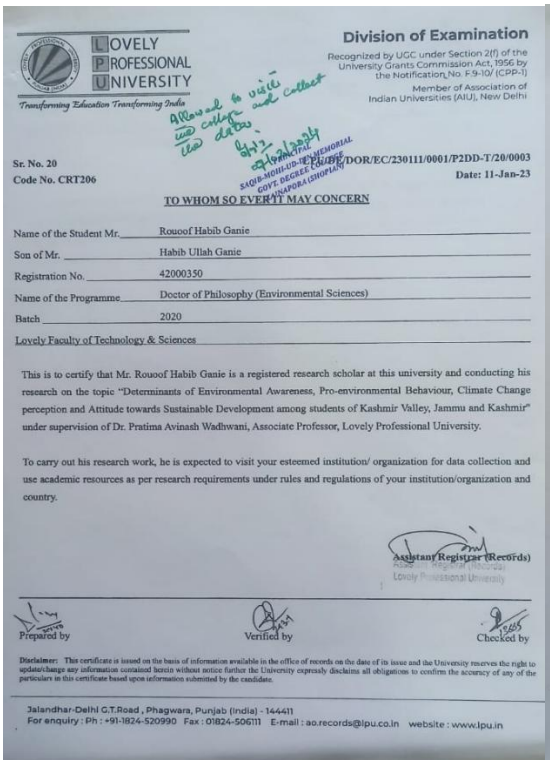
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Date: 22-03-2023
Place: Anantnag, J&K

Sample of Permission letters issued by Principals of the Colleges



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Code No. CRT206

LPU/DE/DOR/EC/230111/0001/P2DD-T/20/0003
Date: 11-Jan-23

TO WHOM SO EVER IT MAY CONCERN

Name of the Student Mr. Rouoof Habib Ganie
Son of Mr. Habib Ullah Ganie
Registration No. 42000350
Name of the Programme Doctor of Philosophy (Environmental Sciences)
Batch 2020
Lovely Faculty of Technology & Sciences

This is to certify that Mr. Rouoof Habib Ganie is a registered research scholar at this university and conducting his research on the topic "Determinants of Environmental Awareness, Pro-environmental Behaviour, Climate Change perception and Attitude towards Sustainable Development among students of Kashmir Valley, Jammu and Kashmir" under supervision of Dr. Pratima Avinash Wadhwani, Associate Professor, Lovely Professional University.

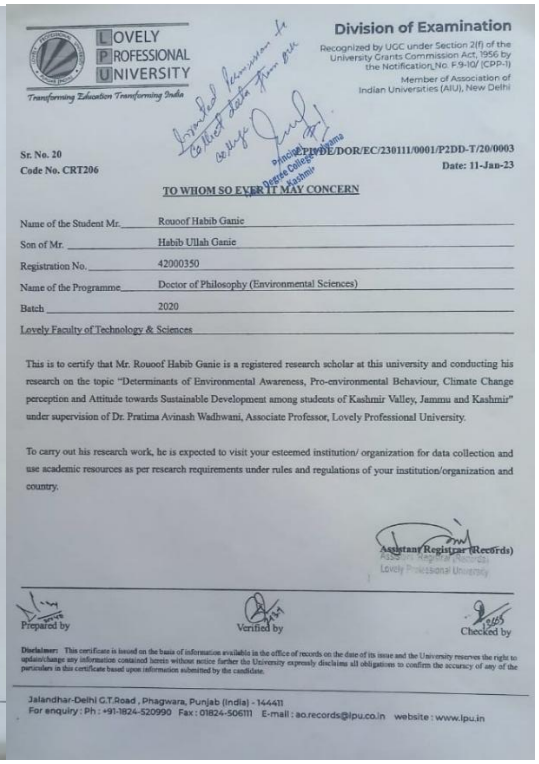
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Principal Govt. Degree College Kulgam

Sr. No. 20
Code No. CRT206

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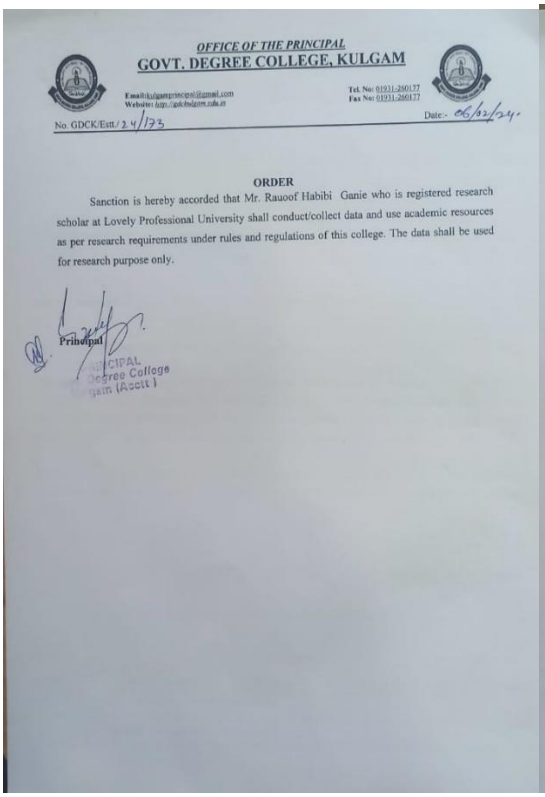
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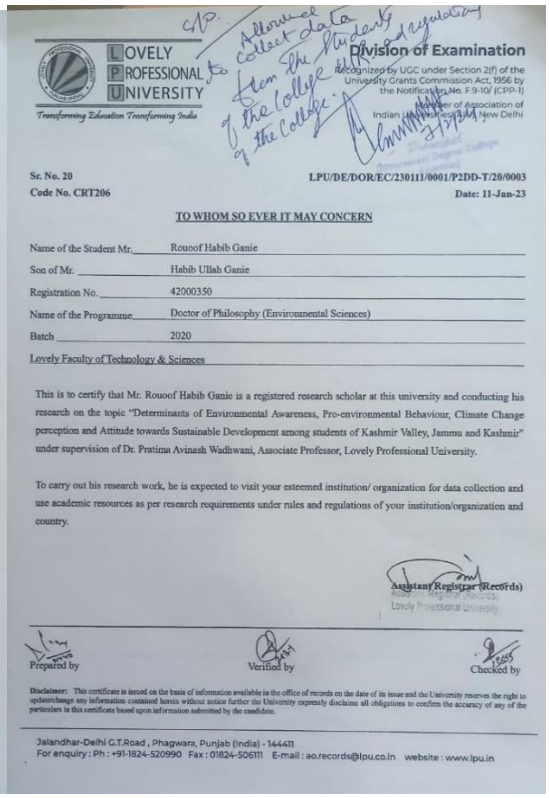
No. GDCK/Estt./ 24/173

Date:- 05/02/24

ORDER

Sanction is hereby accorded that Mr. Rauoof Habibi Ganie who is registered research scholar at Lovely Professional University shall conduct/collect data and use academic resources as per research requirements under rules and regulations of this college. The data shall be used for research purpose only.

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