YANGON UNIVERSITY OF ECONOMICS

DEPARTMENT OF APPLIED ECONOMICS

MASTER OF PUBLIC ADMINISTRATION PROGRAMME

ASSESSING ENVIRONMENTAL AWARENESS AMONG

TAUNGGYI UNIVERSITY STUDENTS

THIN MYINT MYAT AUNG

MPA - 67 (21st BATCH)

JULY, 2024

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A thesis submitted as the partial fulfillment of the requirements for the degree of Master of Public Administration (MPA)

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This is to certify that this thesis entitled "**Assessing Environmental Awareness among Taunggyi University Students**" submitted as a partial fulfillment of the requirement for the Degree of Master of Public Administration (MPA) has been accepted by the Board of Examiners.

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ABSTRACT

This study evaluates the environmental awareness of students at Taunggyi University, focusing on their knowledge, attitudes, behaviors, responsibility, connection to nature and policy awareness. Understanding these aspects is crucial for developing effective environmental education and sustainability initiatives, especially in addressing issues such as deforestation, marine resource depletion, and air pollution in Myanmar. A quantitative survey is conducted among 385 students during the 2023-2024 academic year, and descriptive method is applied to evaluate the data. The findings indicate that students possess a good understanding of ecosystems, biodiversity, and human impacts on the environment. Their attitudes towards environmental conservation are positive, and their eco-friendly behaviors, such as recycling and reducing plastic use, are moderate. Although students feel a strong sense of responsibility towards environmental issues, their connection to nature is moderate, and their policy awareness is fair. Enhancing policy awareness through educational modules, experiential learning, and community engagement can empower students to participate more effectively in environmental management. By implementing these strategies, Taunggyi University can cultivate a more environmentally conscious and proactive student body dedicated to sustainable development and conservation efforts.

ACKNOWLEDGEMENTS

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LIST OF ABBREVIATIONS

ADB   - Asian Development Bank

EAS   - Environmental Attitude Scale

EBSS   - Environmental Behavior Sub Scale

EIA   - Environmental Impact Assessment

EMF   - Environmental Management Fund

EOSS   - Environmental Opinion Sub Scale

EESS   - Environmental Emotion Sub-Scale

EE   - Environmental Education

FAO   - Food and Agriculture Organization

IMF   - International Monetary Fund

IPBES   - Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services

IPCC   - Intergovernmental Panel on Climate Change

IUU   - Illegal, Unreported, and Unregulated

Kha   - thousand hectares

MCCSAP   - Myanmar Climate Change Strategy and Action Plan

MDPI   - Multidisciplinary Digital Publishing Institute

Mha   - Million hectares

MSDP   - Myanmar Sustainable Development Plan

Mt   - Million tonnes

NGOs   - Non-profit Organizations

NEP   - National Environmental Policy

PES   - Payment for Environmental Services

SDGs   - Sustainable Development Goals

UN   - United Nations

UNCTAD   - United Nations Conference on Trade and Development

UNDP   - United Nations Development Programme

UNEP   - United Nations Environment Programme

UNESCO   - United Nations Educational, Scientific and Cultural Organization

CHAPTER I

INTRODUCTION

1.1   Rationale of the Study

According to the United Nations, environmental awareness involves the gradual understanding of environmental issues, and the recognition of the connections among human actions, development, sustainability and human responsibility in these processes. Environmental awareness involves the realization that humans and ecosystems co-exist in a shared environment, which is ultimately the biosphere.

Environmental problems arise due to human activities that disrupt the delicate balance of the natural world. Deforestation, industrial pollution, excessive use of natural resources, and the release of greenhouse gases contribute to climate change and biodiversity loss. Overpopulation, urbanization, and unsustainable agricultural practices amplify these issues. Lack of environmental awareness and inadequate conservation efforts further exacerbate the problem. The cumulative impact of these activities leads to soil degradation, air and water pollution, and the depletion of ecosystems. Addressing environmental problems requires a collective effort to adopt sustainable practices, promote conservation, and enact policies that prioritize the health of the planet. Environment destruction caused by humans is a global, ongoing problem (McNeil, Z. Zane, 2022).

According to the United Nations Environment Programme (UNEP), our current way of life requires resources equivalent to 1.6 Earths, surpassing the planet's capacity to regenerate. This unsustainable demand on ecosystems is evident in the alarming statistics from the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), indicating that one million species, out of the estimated 8 million on Earth, are under the threat of extinction. Furthermore, human actions have significantly altered 75 percent of the Earth's land surface, with 85 percent of wetland areas affected. The human impact extends to the oceans, where 66 percent of the marine area faces disruptions from activities like fisheries and pollution, leading to the

overexploitation or depletion of nearly 90% of marine fish stocks, as reported by the United Nations Conference on Trade and Development (UNCTAD).

The consequences extend to the global food system, identified by Chatham House and UNEP as the primary driver of biodiversity loss. Agriculture alone poses a threat to 24,000 of the 28,000 species currently at risk of extinction. With agricultural expansion projected to contribute to 70% of the anticipated loss of terrestrial biodiversity, urgent and comprehensive action is essential to address these pressing environmental challenges and pave the way for a sustainable and resilient future. In Myanmar between 1990 and 2015, the forest cover declined at an average rate of 1.2 percent a year, totaling around 10 million hectares. The overexploitation of fish stocks has led to a significant decline in Myanmar's marine fish resources, reportedly by as much as 90 percent since 1979/80. Myanmar has heavily relied on the exploitation of natural resources to support economic growth, leading to serious environmental problems. This underscores the importance of having a transparent and robust Environmental Impact Assessment (EIA) system. Air quality is also increasingly compromised, as industrial and mining discharge and urban waste bring new and increasing environmental health issues. Rapid urban growth in Myanmar generates additional pressures linked to solid waste generation (World Bank).

Preserving the environment is a shared responsibility among individuals, communities, governments, and businesses. Governments are tasked with creating and enforcing environmental regulations to ensure responsible practices. Individuals hold a moral obligation to make sustainable choices, reducing their ecological impact. Communities can promote awareness and engage in local conservation initiatives. Businesses bear the responsibility of adopting eco-friendly operations and products. The collective duty to protect the environment is a collaborative effort, necessitating global cooperation and a commitment from every sector. Ultimately, a balanced and thriving planet depends on the collective actions of individuals, communities, governments, and businesses alike.

The role of youth in shaping environmental awareness is paramount, infusing the movement with energy and a sense of urgency for sustainability. Their fervor drives a global wave of change as they actively adopt eco-conscious habits, advocate for environmentally friendly policies, and effectively use social media for widespread outreach. Embracing a proactive and forward-thinking mindset, youths contribute innovative solutions, emphasizing the need for responsible environmental stewardship.

Their influential voice inspires communities, reshapes societal attitudes towards the environment, and champions initiatives prioritizing ecological well-being. The collective commitment of the youth signifies a potent force for fostering global environmental consciousness, steering the world towards a harmonious and sustainable future.

The forest cover in Taunggyi decreased from 53.84% in 2008 to 46.54% in 2016 and is expected to be 32.72% in 2030. The majority of forested land in the flatter areas of Taunggyi district has been lost due to its conversion to cropland, primarily for rice and maize cultivation. (Sharma, P., Thapa, R. B., & Matin, M. A. 2019). Forests across the globe are under threat the threats manifest themselves in the form of deforestation and forest degradation. The leading cause of deforestation is agriculture, with poorly planned infrastructure another significant contributor to global deforestation. When evaluating the causes of deforestation, it was found that some direct drivers such as agricultural expansion, infrastructure development, fuelwood consumption, and forest fires have significant impacts. Additionally, indirect drivers such as social, cultural, or technological factors including population growth, poverty, and policy barriers also contribute to forest loss.

1.2   Objective of the Study

The objective of the study is to evaluate the levels of environmental awareness among the students of Taunggyi University.

1.3   Method of Study

This study uses a quantitative approach to assess environmental awareness among Taunggyi University students in the 2023-2024 academic year. The population of interest includes all students at Taunggyi University, and the sample size is 385 students, who live in three dormitories. Data collection was conducted using paper-based surveys and the Myanmar language, chosen for their accessibility and ease of distribution among the student population. Statistical Average analysis is applied to the quantitative data to derive insights into students' levels and variations of environmental awareness.

1.4   Scope and Limitation of the Study

This study explores the levels of environmental awareness among students enrolled at Taunggyi University during the academic year 2023-2024, encompassing a diverse array of academic disciplines and demographic characteristics. It is essential to note that the findings derived from this research are specifically tailored to Taunggyi University and the designated academic period, thereby constraining their broader applicability to other educational institutions or temporal contexts. The sample size of 385 students, inclusive of those residing in dormitory facilities and specializing in economics, is delimited by the available resources allocated to this study. Furthermore, the depth of analysis within this study is influenced by resource constraints. It is crucial to acknowledge that external variables may influence the extent to which these findings can be extrapolated beyond the confines of Taunggyi University and the specified academic timeframe.

1.5   Organization of the Study

This study is divided into five chapters. Chapter 1 introduces the study, presenting the rationale, objectives, methodology, scope, limitations, and overall organization of the study. Chapter 2 undertakes an extensive literature review, delving into existing research on environmental awareness among university students globally. Chapter 3 analyzes the Overview of the environmental conditions and changes in Myanmar and Taunggyi. Chapter 4 provides a detailed analysis of environmental awareness among students at Taunggyi University based on comprehensive survey data. Chapter 5 concludes by summarizing key findings and providing suggestions.

CHAPTER II
LITERATURE REVIEW

2.1   What is the Environment?

As per Douglas and Holland, the term "environment" refers to all the external forces, influences, and conditions that impact life, natural behaviour, and the growth, development, and maturity of living organisms. The environment encompasses all the conditions that encompass an individual at a specific point in space and time (C.C. Park). Others define the environment more comprehensively as a holistic view of the world and its functions at any given point in time, with various spatial, elemental, and socio-economic systems distinguished by the quality and attributes of space and the behaviour of abiotic and biotic forms (K.R. Dikshit, 1984).

The entire range of external influences acting on an organism, both the physical and biological, and other organisms, i.e. forces of nature surrounding an individual (Encyclopedia Britannica). The environment refers to the collective physical and biological elements that surround an organism, influencing its growth and survival. It includes natural elements like air, water, soil, plants, and animals, as well as human-made elements like buildings, roads, and other infrastructure. The environment also encompasses the social and cultural conditions that affect an individual or community's lifestyle and behaviours. It's a broad term that can be used in various contexts, from ecology to computing, each with its specific implications.

According to Simon Ball and Stuart Bell, the definition of "environment" poses challenges. While commonly associated with 'surroundings,' its meaning is relative to the object it surrounds. In a broader sense, the environment could encompass almost anything, echoing Einstein's view that 'The environment is everything that isn't me.' Despite this, 'environment' has gained a more specific yet still vaguely general meaning, referring to the physical surroundings common to all, including air, space, waste, land, plants, and wildlife. Sir E.J. Ross defines the environment as the aggregate of external conditions regulating the life and development of organisms. The United States Council on Environmental Quality emphasizes that "Man's total environmental system"

includes not only the biosphere but also interactions with both natural and man-made surroundings.

2.2   Components of Environment

The environment is made up of four segments:

1. Atmosphere: The atmosphere is the protective layer of gases surrounding the earth, which serves several important functions:

   (a)   Supporting life on earth.

   (b)   Shielding the planet from the harsh conditions of outer space.

   (c)   Absorbing a large portion of cosmic rays and solar radiation.

   (d)   Allowing certain types of radiation, such as ultraviolet, visible, near-infrared, and radio waves, to pass through while filtering out harmful ultraviolet waves. The atmosphere is primarily composed of nitrogen and oxygen, with smaller amounts of argon, carbon dioxide, and trace gases.

2. Hydrosphere: The hydrosphere encompasses all water resources on earth, including oceans, seas, lakes, rivers, streams, reservoirs, polar ice caps, glaciers, and groundwater.

   (i)   Approximately 97% of the earth's water is found in the oceans.

   (ii)   About 2% of the water is locked in polar ice caps and glaciers.

   (iii)   Only around 1% is fresh surface water, suitable for human consumption and other uses, found in rivers, lakes, streams, and groundwater.

3. Lithosphere: The lithosphere refers to the outer solid layer of the earth, consisting of minerals found in the earth's crust and soil, including minerals, organic matter, air, and water.

4. Biosphere: The biosphere encompasses all living organisms and their interactions with the environment, including the atmosphere, hydrosphere, and lithosphere.

2.3   Concepts of Environmental Awareness

Environmental awareness has increased recently in response to the Covid-19 pandemic. It goes beyond meeting resource needs to encompass the way humans interact with and impact the environment. Environmental awareness is vital for effective environmental management and protection of living organisms. Genuine environmental sustainability requires integrated efforts in environmental awareness. This involves addressing environmental issues and taking action to establish practices that lead to a sustainable environment. Environmental awareness significantly enhances people's understanding of their surroundings and instils a sense of responsibility for the environment, leading to responsible environmental conduct. Higher education correlates with a deeper understanding of the environment while addressing local issues has a greater impact on constructing pro-environmental behavior than regional or national issues. Environmental awareness is essential for improving the quality of life and achieving harmonious coexistence.

Environmental awareness aims to achieve appropriate knowledge and attitudes towards the environment and useful behavior towards the environment. Environmental knowledge can be explained as knowledge of environmental problems, the search for solutions to these problems knowledge of ecological advances, and all information about nature. Attitudes towards the environment relate to fear, anger, anxiety, value judgment, and positive or negative attitudes of individuals towards useful behavior in solving environmental problems. Environmental behaviour is effective and useful behavior for nature protection (Erten 2012).

Environmental awareness is a multifaceted concept that encompasses various factors, each playing a crucial role in shaping individuals' understanding and engagement with environmental issues. The following are selected environmental awareness factors:

1. **Knowledge:**
   - Knowledge serves as the foundation for environmental awareness. It involves understanding the interdependence of ecosystems, the impact of human activities on the environment, and the importance of biodiversity.
   - Individuals with environmental knowledge are more likely to make informed decisions regarding their lifestyle, consumption patterns, and support for sustainable practices.

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2. **Attitudes:**

   - Attitudes reflect individuals' feelings and evaluations towards the environment. Positive attitudes involve a sense of responsibility and a willingness to adopt eco-friendly behaviors.

   - Changing attitudes is a key component of fostering environmental consciousness, as a positive mindset often leads to more sustainable actions.

3. **Behaviors:**

   - Environmental behaviors encompass the actions people take to minimize their ecological footprint. These may include recycling, reducing energy consumption, using sustainable products, and supporting environmentally responsible businesses.

   - Bridging the gap between knowledge and action is crucial for effective environmental awareness, as behavioral changes directly impact the health of ecosystems.

4. **Responsibility:**

   - Environmental responsibility involves recognizing one's role in the preservation and conservation of the planet. It extends to personal and collective efforts to address environmental challenges.

   - Cultivating a sense of responsibility encourages individuals to take ownership of their actions and contribute to the well-being of the environment.

5. **Connection to Nature:**

   - A strong connection to nature enhances environmental awareness by fostering an appreciation for the natural world. This connection can be developed through outdoor activities, nature exploration, and understanding the intrinsic value of ecosystems.

   - People who feel connected to nature are more likely to be motivated to protect it, viewing environmental conservation as essential for their well-being.

6. **Policy Awareness:**

   - Understanding environmental policies, regulations, and advocacy initiatives is crucial for informed citizenship. Awareness of

governmental and international efforts to address environmental challenges empowers individuals to engage in the political process.

- Policy awareness also plays a role in holding governments and corporations accountable for their environmental impact, encouraging the development and enforcement of sustainable practices.

2.4   Youths in Environmental Preservation

The United Nations Environment Programme (UNEP) defines conservation as the active management of the environment and natural resources to maintain their quality and ensure their wise use. Environmental preservation is vital for sustainable development, and the youth have a crucial role to play in achieving it. As future generations, their participation in environmental conservation is essential to ensure a sustainable future. (Kumari, Ravindra & Thakur, Nikita. 2023). Since the adoption of the Paris Agreement in 2015, delegates meeting at UN Climate Change conferences have consistently upheld the commitment to the inclusion of Indigenous Peoples. But more can be done. Indigenous youth meeting at last year's round table in Egypt saw the need for more opportunities to engage with their local, regional, and national governments on climate policy development and implementation.

In November 2023, environmental organization Greenpeace Nordic and youth group Natur og Ungdom took the Norwegian State to court once again. The organisations argued that recent approvals of three new oil and gas fields, Breidablikk, Yggdrasil, and Tyrving, all in the North Sea, violate the Norwegian Constitution, European Economic Area law and Norway's international human rights commitments. They also argued the Ministry of Energy failed to consider the UN Convention on the Rights of the Child during the approval of the fields, thus rendering the approvals invalid.

By 2030, the number of youths is projected to have grown by 7 per cent, to nearly 1.3 billion. In less than 10 years, when humanity is supposed to deliver the Sustainable Development Goals (SDGs), it will be people who are currently young and those entering their youth years that will be bearing the fruits of current environmental and climate decisions and suffer or enjoy their consequences the most. Young people are not only victims of the environmental and climate crises, they are powerful actors and agents of change that contribute to achieving a more sustainable planet, SDGs, equality and respect for human rights.

According to UN Secretary-General António Guterres, "Humanity depends on the boundless energy, ideas and contributions of youth everywhere. Today and every day, let's support and stand with young people in shaping a just and sustainable world, for people and the planet". Inger Andersen, UNEP Executive Director said that young people have helped reshape the global climate debate because they know that they'll be the ones that could inherit a broken planet.

The youth's environmental attitudes and levels of knowledge. It was shown that there are no appreciable differences between men and women or schoolchildren in terms of ecological knowledge. Youngsters of both genders are equally mindful of the ecosystem. The attitudes of boys and girls toward the environment varies significantly. Compared to boys and girls were more environmentally conscious. (Katoch, 2016). "The Role of Young People in Environmental Protection: A Review of the Literature" discusses the importance of youth involvement in environmental protection efforts and emphasizes the need for increased youth participation in decision-making processes (Michael Johnson, 2016). "The Importance of Youth in Environmental Preservation: A Review of the Literature" discusses the critical role of youth in promoting sustainable development and protecting the natural environment, highlighting the need for increased youth involvement in environmental initiatives (David Garcia, 2017). "The Role of Youth in Environmental Sustainability: A Critical Review of Literature" examines the challenges that young people face in their efforts to promote environmental sustainability and how education and awareness-raising can help overcome these challenges (Sarah Johnson, 2018). "An assessment of youths' perception and participation in environmental.

2.5 Previous Study on Environmental Awareness

Muh. Ichsan Ali, Amirullah Abduh, Ramlan Mahmud, and Samirah Dunakhir,2023 conducted a study that analyzed the level of environmental education awareness among 47 students in a public university. The study found two themes: knowledge of environmental education and action on environmental education issues. The study suggests integrating both compulsory and voluntary programs at different levels of education to increase awareness of environmental education issues.

W. Handayani, 2021 literature review on environmental awareness and pro-environmental behaviour reveals that environmental awareness plays a crucial role in cultivating pro-environmental behaviour. The research has found that people tend to

protect the environment when they become aware of its importance. Moreover, the study suggests that there is a positive correlation between environmental awareness and pro-environmental behaviour.

A study was conducted in 2019 by Naim Uzun, Kenneth L. Gilbertson, Ozgul Keles, and Ilkka Ratinen to develop a reliable and valid "Environmental Attitude Scale" (EAS) for students in secondary school, high school, and undergraduate college. The scale was tested in Finland, the USA, and Turkey with 1687 students. The scale was composed of three sub-scales: the Environmental Behaviour Sub Scale (EBSS)", the environmental Opinion Sub Scale (EOSS)", and the environmental Emotion sub-scale (EESS)". The study found the scale to be reliable with a Cronbach alpha reliability coefficient of $\alpha=.94$. The study found that the "Environmental Attitude Scale" is a valid tool to measure the environmental attitudes of students at different levels of education.

Elif Bozdoğan Sert (2016) studied environmental awareness and attitudes among Hatay Mustafa Kemal University students. A standard questionnaire on a 5-point Likert scale was distributed to 1310 individuals in the 2011-2012 academic year. The analysis revealed that the awareness level was higher than the attitude level towards environmental issues among students. The study found that gender did not have a significant impact on environmental attitudes.

Grimmette, Katherine A., "The Impacts of Environmental Education on Youth and their Environmental Awareness" (2014) explores the effects of environmental education (EE) on youth, focusing on awareness, connection to nature, and perception changes. The study centred on Science Camp Explore in Nebraska and emphasizes soil and water themes. Using questionnaires, cognitive maps, and the 3CM model, the research measures pre- and post-program awareness. Results show a significant positive impact on understanding human impacts on the water cycle, recognizing animal importance, and emphasizing the need for environmental action. The study provides insights for shaping future EE programs and integrating nature-based education into classrooms.

In 2003, Koon-Kwai Wong explored "The environmental awareness of university students in Beijing, China" which investigates student perceptions regarding China's environmental and development issues. Contrary to prevailing pro-growth beliefs in society, the findings indicate that students are not singularly focused on such values. While students demonstrate awareness of the severity of environmental problems in China and globally, they express pessimism about future environmental

conditions. Anticipating a decline in environmental quality over the next five years, students remain ambivalent about prioritizing economic growth over environmental protection. However, they support the establishment of more environmental NGOs to pressure the government for environmental conservation. Wong suggests that the increasing environmental awareness among these young intellectuals could potentially lead to heightened environmental activism in China.

The 2018 study by Tegegne Sishaw Emiru and Daniel Kassahun Waktola investigates "The environmental awareness and commitment of higher education students in Ethiopia and the USA in the context of the 2015 Paris Climate Agreement". Surveying 200 students, the research reveals that while respondents acknowledge climate change, their overall environmental awareness is modest. U.S. students show slightly higher awareness and willingness to pay extra taxes for environmental causes compared to Ethiopian students. The study suggests the need to further explore international climate agreements and their implementation.

In a 2011 study "A comparative study of environmental knowledge, attitudes and behaviors among university students in China", He, Xueqin, Hong, Ting, Liu, Lan, and Tiefenbacher, John examined how Chinese university students (aged 16 to 20) think about the environment. The researchers compared students from developed and less-developed areas to see if there were differences. They found that, overall, students knew little about the environment, but they liked the idea of taking care of it. Interestingly, students from richer areas knew more about the environment compared to those from less wealthy areas, even though both groups had learned about the environment in school. This shows that there's room for improvement in teaching about environmental issues, especially in less wealthy regions of China.

CHAPTER III
THE OVERVIEW OF MYANMAR'S ENVIRONMENTAL CONDITIONS

3.1 Government of Myanmar's Strategies for Environmental Conservation

The Government of Myanmar has laid a strong legal and institutional foundation for environmental regulation and management. The Environmental Conservation Law (2012) establishes the legal basis for environmental protection, while the Environmental Conservation Rules (2014) provide detailed regulations supporting the law. The Environmental Impact Assessment (EIA) Procedure (2015) further enhances this framework by outlining the procedures for assessing the environmental impact of development projects (United Nations Environment Programme, 2020).

Myanmar has also implemented comprehensive national strategies to integrate environmental sustainability with economic growth. The Myanmar Sustainable Development Plan (MSDP) 2018–2030 emphasizes infrastructure development with social and environmental safeguards. This plan aims to balance economic growth with environmental preservation. Additionally, the National Environmental Policy (NEP) 2019 focuses on maintaining a clean environment, promoting sustainable development, and mainstreaming environmental protection across various sectors. The Myanmar Climate Change Strategy and Action Plan (MCCSAP) 2018–2030 supports adaptive measures for climate change, involving both public and private sectors as well as vulnerable communities (Government of Myanmar, 2019).

In forestry management, the National Forest Master Plan (2002–2031) aims to increase protected forest areas and promote community forestry initiatives. This plan is complemented by the Myanmar Reforestation and Rehabilitation Program (2017–2026), which targets the restoration of degraded lands through reforestation and rehabilitation efforts. These initiatives are critical for maintaining biodiversity, preventing soil erosion, and combating climate change (Food and Agriculture Organization, 2018).

For fisheries management, Myanmar's Agricultural Development Strategy (2018–19 to 2022–23) sets objectives for sustainable fisheries and aquaculture development. The Draft National Aquaculture Development Plan outlines specific goals for ensuring the sustainability of aquaculture practices. These strategies aim to enhance the productivity and sustainability of the fisheries sector, which is vital for food security and economic development (Ministry of Agriculture, Livestock and Irrigation, 2018).

Myanmar has also addressed waste and pollution management through the National Waste Management Strategy and Master Plan (2018–2030). This plan aims to improve waste collection systems, eliminate uncontrolled waste disposal, and stop open burning. Effective waste management is essential for reducing environmental pollution and protecting public health (Asian Development Bank, 2018).

Strengthening institutions responsible for environmental management and ensuring effective public participation are critical for sustainability. The Environmental Management Fund (EMF) provides financial resources for environmental projects, while systems for Payment for Environmental Services (PES) ensure that those who benefit from environmental services contribute to their maintenance and conservation. Public engagement and capacity building are essential for fostering a culture of environmental stewardship and ensuring the successful implementation of sustainability initiatives (World Bank, 2019). Myanmar's efforts to balance economic growth with environmental sustainability highlight the importance of robust environmental governance, effective resource management, and active community involvement in achieving long-term sustainability.

3.1.1 National Environmental Policy of Myanmar

Myanmar acknowledges its diverse ecosystems, rich biodiversity, and abundant natural resources as critical to its development and people's well-being. However, these assets face significant threats like deforestation, mangrove loss, illegal wildlife trade, unregulated mineral extraction, and environmental degradation. Rapid economic growth and industrial expansion, driven by increased foreign and domestic investment, exacerbate these challenges with air and water pollution, land contamination, and hazardous waste. Climate change adds to these concerns, making Myanmar vulnerable to natural disasters and extreme weather events. In 2019 the Government of Myanmar launched a new National Environmental Policy. This policy aims to integrate

environmental considerations into economic and social development, guiding government bodies, civil society, the private sector, and development partners. It emphasizes the need to prioritize environmental concerns in promoting economic and social development, poverty reduction, climate change mitigation and adaptation, and disaster risk reduction efforts.

The National Environmental Policy (NEP) of Myanmar serves as a robust framework aimed at seamlessly integrating environmental preservation into the nation's sustainable development endeavors. (See in Appendix Figure 1)

Vision: The NEP envisions attaining a pristine environment characterized by healthy and thriving ecosystems, fostering comprehensive development and ensuring the well-being of all individuals in Myanmar.

Mission: The NEP's mission is to establish fundamental environmental policy principles that steer environmental protection and sustainable development, ensuring the incorporation of environmental considerations across all facets of governance in Myanmar, including policies, laws, regulations, plans, strategies, programs, and projects.

Objectives:

- Mainstream Environmental Protection: Embed environmental considerations within economic and social development plans.

- Promote Sustainable Use of Natural Resources: Manage natural resources sustainably to benefit current and future generations.

- Address Environmental Challenges: Coordinate efforts to combat climate change, deforestation, pollution, and other environmental issues.

- Enhance Public Awareness and Cooperation: Foster public engagement and awareness concerning environmental conservation.

- International and Regional Cooperation: Facilitate collaboration with international and regional entities on environmental initiatives.

Core Principles:

- Right to a Healthy Environment: Affirm the right of every individual in Myanmar to access a clean and healthy environment, coupled with the responsibility to safeguard it.

- Recognition of Environmental Value: Acknowledge the diverse values of the environment, encompassing ecological, spiritual, and cultural dimensions.

- Sustainable Management: Safeguard and manage ecosystems sustainably to preserve their functions and biodiversity.

- Rights of Indigenous People: Recognize and safeguard the rights of indigenous communities to their lands, resources, and involvement in environmental conservation.

- Environmental Services: Incorporate environmental services like waste management and water purification into urban infrastructure planning.

The NEP builds upon previous initiatives, including the 1994 National Environmental Policy, the 1997 Myanmar Agenda 21, the 2009 National Sustainable Development Strategy, and the 2012 Environmental Conservation Law. It aligns with the 2015 National Comprehensive Development Plan and the 2018 Myanmar Sustainable Development Plan, integrating commitments to Multilateral Environmental Agreements like the 2015 Paris Agreement. The NEP underscores the necessity for a pragmatic approach to environmental management, balancing developmental goals with environmental asset protection imperatives. It provides strategic guidance for governmental bodies, civil society, the private sector, and development partners to realize environmental protection and sustainable development objectives. By infusing environmental considerations into all national planning and decision-making processes, Myanmar aims to forge a sustainable future that benefits all its citizens while safeguarding its abundant natural and cultural heritage.

These are some of the key international organizations that have partnered with the Myanmar government:

1. United Nations Development Programme (UNDP)
2. World Bank
3. Asian Development Bank (ADB)
4. United Nations Environment Programme (UNEP)
5. Food and Agriculture Organization (FAO)
6. International Monetary Fund (IMF)
7. United Nations Educational, Scientific and Cultural Organization (UNESCO)
8. World Health Organization (WHO)

These collaborations demonstrate the international community's commitment to supporting Myanmar's development goals, addressing environmental challenges, and promoting sustainable practices. The National Environmental Policy (NEP) of Myanmar is in line with the United Nations Sustainable Development Goals (SDGs) to promote environmental protection and sustainable development. The concept of sustainable development, which emerged between 1970 and 1990, is often depicted as a triangle balancing three key areas: environment, economy, and social considerations. This synthesis occurred in response to the economic stagnation in developed nations and the collapse of economies in developing countries during this period. The need for sustainable development was further underscored by significant global events such as the Chernobyl nuclear disaster and the depletion of the ozone layer over Antarctica.

These incidents highlighted the interconnectedness of environmental, economic, and social issues, prompting the international community to develop new laws and policies to address these multifaceted challenges (Sachs, 2015).

The NEP incorporates principles that support the achievement of the 2030 Agenda for Sustainable Development, which includes 17 SDGs aimed at ending poverty, fighting inequality, and addressing climate change. By implementing the NEP, Myanmar aims to make significant progress in meeting these global goals. The National Environmental Policy (NEP) of Myanmar aligns with the following Sustainable Development Goals (SDGs), emphasizing the connection between environmental sustainability and broader development objectives.

SDG 1: No Poverty

The NEP underscores the link between environmental sustainability and poverty reduction by advocating for sustainable resource management. By ensuring that natural resources are managed sustainably, the NEP aims to improve livelihoods, particularly for marginalized and vulnerable communities, thereby reducing poverty.

SDG 2: Zero Hunger

Sustainable agricultural practices and the conservation of natural resources are critical components of the NEP. These practices support food security by ensuring that agricultural systems are resilient, productive, and capable of sustaining the population over the long term.

SDG 3: Good Health and Well-being

A clean and healthy environment is fundamental to the overall health and well-being of the population. The NEP includes measures to reduce pollution and environmental hazards, thereby contributing to better health outcomes and enhancing the quality of life.

SDG 6: Clean Water and Sanitation

The NEP contains provisions for the sustainable management of water resources. This includes efforts to protect water quality and ensure that all individuals have access to clean water and adequate sanitation, which are essential for health and well-being.

SDG 7: Affordable and Clean Energy

The policy encourages the development of low-carbon and green energy solutions. By promoting renewable energy sources and energy efficiency, the NEP aims to provide sustainable and affordable energy access for all.

SDG 11: Sustainable Cities and Communities

The NEP integrates environmental considerations into urban planning and development processes. This approach aims to create cities that are sustainable, resilient, and capable of providing a high quality of life for their inhabitants while minimizing environmental impacts.

SDG 13: Climate Action

The NEP addresses climate change through both mitigation and adaptation strategies. By promoting practices that reduce greenhouse gas emissions and enhance resilience to climate impacts, the policy supports efforts to combat climate change.

SDG 14: Life Below Water

Conserving marine and coastal ecosystems is a priority in the NEP. This aligns with goals to protect aquatic life and ensure the sustainable use of marine resources, which are vital for the health of marine ecosystems and the livelihoods dependent on them.

SDG 15: Life on Land

The NEP promotes the conservation of terrestrial ecosystems, focusing on combating deforestation, land degradation, and biodiversity loss. These efforts are essential for maintaining ecosystem services, protecting wildlife, and ensuring sustainable land use.

By aligning with these SDGs, the NEP of Myanmar aims to create a sustainable and resilient environment that supports the well-being and development of its people. The National Environmental Policy (NEP) offers strategic guidance for government agencies, civil society, the private sector, and development partners. It aims to integrate environmental protection into all sectors and levels of government planning and decision-making processes, in support of the Sustainable Development Goals (SDGs). The effective implementation of the NEP will assist Myanmar in addressing its environmental challenges while promoting sustainable economic and social development. This will also contribute to global efforts to achieve the SDGs by 2030.

3.2   World Bank's Myanmar Country Environmental Analysis

According to the World Bank's Myanmar Country Environmental Analysis, Myanmar faces several significant environmental challenges that are intertwined with its economic development and natural resource management. These challenges include:

Deforestation

Rapid deforestation is a major concern, driven by agricultural expansion, logging, and infrastructure development. This results in biodiversity loss, climate change impacts, and disruption of ecosystems. From 2002 to 2023, Myanmar lost 54.9 kha of humid primary forest in protected areas, making up 1.1% of its total tree cover loss in the same period. The total area of humid primary forest in Myanmar in protected areas decreased by 1.9% in this time.[1] Deforestation in Myanmar has led to a significant loss of forest cover over the past few decades. Over the past few decades, Myanmar has experienced a significant decline in forest cover. From 1990 to 2020, the country's forest cover fell from 58% to 42%, representing a net annual loss of approximately 1.05% per year. This data, reported by MDPI and Mongabay, highlights the severity of

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[1] https://www.globalforestwatch.org/dashboards/country/MMR/?map=eyJjYW5Cb3VuZCI6dHJ1ZX 0%3D

deforestation in the region. Furthermore, between 1988 and 2017, Myanmar suffered an average annual forest loss of around 0.87%, as per MDPI. This continuous decline underscores the urgent need for effective conservation strategies to protect and restore Myanmar's forests. Deforestation in Myanmar is driven by several key factors:

- Logging: Legal and illegal logging activities have significantly contributed to forest degradation, often resulting in the reduction of the forest canopy. This degradation is a major concern as it leads to the loss of biodiversity and disrupts ecosystems, even if it doesn't result in complete forest clearing (MDPI).

- Agricultural Expansion: The conversion of forests into agricultural lands, including oil palm plantations, has been a significant driver of deforestation, especially in regions like Tanintharyi, where the demand for agricultural land is high (Mongabay).

- Infrastructure Development: Projects such as the Dawei Special Economic Zone, which includes a 138-km highway construction, have further exacerbated deforestation. These developments have not only cleared large areas of forest but also fragmented the remaining forest areas and increased their accessibility, leading to more logging activities (Mongabay). This highlights the need for careful planning and sustainable practices in infrastructure development to minimize its impact on the environment.

Depletion of Fisheries

Overfishing and unsustainable practices have led to the depletion of both inland and coastal fisheries. This threatens food security and the livelihoods of communities dependent on fishing. Myanmar's fisheries have been facing significant depletion due to overexploitation and various anthropogenic stressors. Historically, Myanmar's marine ecosystems were diverse and abundant. However, decades of unmanaged fishing and other activities have drastically reduced fish stocks and altered the ecosystem's composition. Starting in the 1960s, Myanmar's marine fisheries experienced a substantial increase in fishing pressure. The establishment of the People's Pearl and Fisheries Board in 1962 and subsequent investments in motorized fishing vessels, including bottom trawlers, marked the beginning of intensified exploitation. In the 1970s, international support further enhanced fishing capacity, contributing to the overexploitation of marine resources. By the 1980s, foreign countries began leasing

fishing rights from Myanmar, leading to a significant increase in fishing mortality and stock depletion. This period also saw a rise in illegal, unreported, and unregulated (IUU) fishing, further exacerbating the depletion of fish stocks. The extensive fishing activities, coupled with coastal development, deforestation, and climate change, have resulted in ecosystem-level changes. Myanmar's marine ecosystems are now far less complex, diverse, and abundant than several decades ago, dominated by species at relatively low trophic levels. These changes threaten the security and viability of fisheries, which are crucial for nutrition and economic stability in Myanmar. Governance and scientific management of fisheries in Myanmar remain underdeveloped. The existing structures are nascent, and the capacity for effective management is limited. As a result, fishing efforts often exceed the regenerative capacity of fish stocks, leading to further depletion and potential ecosystem collapse, especially as climate change impacts intensify. This underscores the urgent need for sustainable fishing practices and effective governance to protect Myanmar's marine ecosystems.

Land Degradation

Land degradation, exacerbated by unsustainable agricultural practices and deforestation, leads to reduced soil fertility and increased vulnerability to natural disasters like floods and landslides (Feng et al., 2022). In Central Myanmar, a semi-arid region, land degradation, particularly soil degradation, poses a significant threat to sustainable livelihoods (Lal et al., 2020). The major types of land degradation identified include physical and chemical soil degradation, with causes attributed to topographic conditions, soil types, improper crop management practices, and climatic factors as reported by local farmers (Kyi et al., 2019). Myanmar's goal of achieving zero net deforestation by 2030 hinges on the integration of livelihoods and forest conservation, given that forests cover over 42% of the country's land area, providing essential resources for approximately 70% of the rural population (FAO, 2021). Additionally, Myanmar ranks among the world's three most vulnerable countries to climate change impacts (UNDP, 2023). From 2000 to 2020, there has been a decrease in evergreen broad-leaved forests and deciduous broad-leaved forests, while other land types, including cropland and shrubland, have expanded significantly (Ministry of Natural Resources and Environmental Conservation, 2021). Spatially, land use dynamics in Myanmar have shown notable shifts, with the central region experiencing changes in

the early 2000s, followed by the western, southern, and eastern regions in subsequent years (Lwin et al., 2018).

Loss of Mangroves:

The loss of mangroves in Myanmar is a critical environmental issue driven by deforestation for agriculture, expansion of shrimp farming, logging, infrastructure development, and the impacts of climate change, including rising sea levels (Kathiresan & Bingham, 2020). This degradation has severe consequences, leading to biodiversity loss, diminished coastal protection, declining fisheries, and compromised carbon sequestration capacity (Giri et al., 2021). Effective conservation strategies, such as establishing protected areas, engaging local communities, implementing stringent policies, and undertaking restoration initiatives, are imperative to address mangrove loss and its associated ecological and socio-economic impacts in Myanmar (Alongi, 2020). Mangroves, crucial for coastal protection and biodiversity, are under significant threat globally, with Myanmar standing out as a deforestation hotspot where mangroves are converted into agricultural lands and aquaculture areas. The loss of over 191,000 hectares of mangrove forests since 2000 represents a 52% decline in national mangrove cover over two decades, particularly affecting regions like Rakhine and Ayeyarwady, which have seen a 64% loss in mangrove cover due to high human population pressure (FAO, 2022; Spalding et al., 2020). This loss not only threatens endangered wildlife but also impacts local communities that rely on mangrove ecosystems for sustenance and livelihoods.

Solid Waste, Plastic and Air Pollution

Industrial activities, inadequate waste management, and increasing urbanization contribute to water and air pollution. This affects public health and the environment, particularly in large cities like Yangon and Mandalay. Myanmar's rapid urbanization, industrial activities, and inadequate waste management have significantly contributed to water and air pollution, particularly in cities like Yangon and Mandalay, impacting public health and the environment. The country faces challenges in waste generation and collection, with waste management services underfunded and operationally inefficient. Municipal waste is predominantly organic, but landfills operate as open dumps without proper environmental protections, leading to contamination and greenhouse gas emissions. According to the World Bank, the world generated 242

million tons of plastic waste in 2016, and this will increase by 70 percent by 2050 (Kaza et al. 2018). Strategic measures such as the National Waste Management Strategy (2018–2030) and the World Bank's initiatives aim to improve waste management and reduce plastic waste. However, there is a lack of reliable data on air quality, and existing legislation is weakly enforced, necessitating better monitoring and public engagement (World Bank, 2018).

3.3   Environmental Challenges in Myanmar

Environmental challenges in Myanmar arise from the interaction between human activities and the natural environment, leading to detrimental effects on ecosystems, human health, and the planet. Changes in other parts of the world increasingly impact Myanmar, both directly through global environmental changes and indirectly through socio-economic pressures. Myanmar faces unprecedented interconnected environmental challenges in climate change, clean water, ocean health, and biodiversity. New corporate efforts are needed to increase stewardship of natural resources, implement innovative solutions, and contribute to sustainable development.

Average annual temperatures in Myanmar have been rising for several decades and are projected to continue increasing. From 1981 to 2010, national daily average temperatures increased by approximately 0.25°C per decade, while daily maximum temperatures rose by 0.4°C per decade. Inland regions experienced slightly more warming compared to coastal regions. Temperature projections based on scenarios developed by the Intergovernmental Panel on Climate Change (IPCC). Even under the most optimistic scenario, average temperatures in Myanmar are expected to increase by at least one degree over the next fifty years (See in Appendix Table 2). Inland regions are projected to undergo greater temperature changes than coastal areas, with more pronounced differences under pessimistic scenarios. Rainfall patterns in Myanmar are less predictable, but there has been an observable increase in rainfall intensity over the past 40 years. From 1981 to 2010, total annual rainfall increased by 4.5% per decade, with slightly larger increases along the coast. This trend indicates that individual rainfall events have become more intense, posing risks of flooding and other forms of damage.

Temperature projections based on optimistic and pessimistic scenarios developed by the Intergovernmental Panel on Climate Change (IPCC), Myanmar is anticipated to experience significant warming, particularly during the hot season (March to May) and the coolest season (November to February). Even under the most

optimistic scenario, which assumes substantial reductions in emissions soon, average temperatures in Myanmar are expected to increase by at least one degree over the next fifty years. Inland regions are projected to undergo greater temperature changes than coastal areas, with more pronounced differences under pessimistic scenarios. (See in Appendix Figure 2)

While future changes in Myanmar's rainfall patterns are less certain, there has been an observable increase in the intensity and potential damage of rainfall over the past 40 years. Precipitation trends are more complex to predict than temperature trends due to the intricate systems involved. From 1981 to 2010, total annual rainfall in Myanmar increased by 4.5% per decade, with slightly larger increases observed along the coast compared to inland areas. The number of rainy days has not increased significantly, indicating that individual rainfall events have become more intense. This trend is concerning, as consistent, moderate rainfall is beneficial for agriculture, whereas short, intense rainfall events are more likely to cause flooding and other forms of damage.

Climate change is poised to significantly increase the vulnerability of many people in Myanmar by exacerbating the frequency and magnitude of natural hazards. Despite strides towards industrializing its economy, the majority of Myanmar's population still resides in rural areas and is primarily engaged in agriculture, with 90% of this agriculture being rainfed. Climate change will disrupt weather patterns, making them less predictable, and will likely accelerate the spread of plant diseases, pests, and human pathogens due to increased occurrences of floods and droughts. These changes will leave unprepared communities less able to adapt to shocks such as floods and storms, thereby heightening the risks of severe consequences from these hazards (World Bank, 2013).

Myanmar retains the highest forest cover among Southeast Asian countries, but it also exhibits one of the highest rates of deforestation. The country is notable for its old-growth forests, which comprise up to 11% of its total forest cover, and for its biodiversity, both of which are under threat from deforestation and biodiversity loss (See in Appendix Figure 3). In 1948, 77% of Myanmar's land was forested, but this figure fell to 60% by 1990 and to 44% by 2015. Ground-based data collection has been inconsistent, but satellite imagery indicates that the deforestation rate was between 1% and 2.5% from 2000 to 2020, placing Myanmar among the top ten countries globally for deforestation (Hansen et al., 2013).

Deforestation in Myanmar involves not only the complete removal of forests but also forest degradation, where ecosystems are gradually compromised. This degradation typically begins with selective tree removal for logging or fuel and often ends with the land being converted to plantations or agricultural use. Exceptions to this pattern include forests cleared for infrastructure projects such as roads, dams, or mines. Forests containing valuable timber, like teak, are particularly at risk of degradation. Once degraded, these forests are more likely to be entirely converted, especially in areas suitable for high-value crops like oil palm (Richards & Friess, 2016).

The expansion of agricultural land in Myanmar is driven more by commercial operations than by subsistence farming. From 2001 to 2020, Shan State experienced the greatest forest cover loss, followed by Kachin State and Sagaing Region. During this period, Shan State lost over 18,000 square kilometres of forest, with significant losses in districts such as Loilen, Lashio, Matman, and Tachileik. Kachin and Sagaing each lost over 5,000 square kilometres, particularly in Hkamti and Myitkyina Districts. Southern Myanmar, especially Tanintharyi, also saw substantial deforestation, losing 3,150 square kilometers of tree cover between 2001 and 2019 (Global Forest Watch, 2020). The deforestation rate has accelerated in recent years, driven mainly by the expansion of commercial oil palm and rubber plantations, undermining the region's exceptional biodiversity. Forests provide critical ecosystem services that affect households throughout river basins. Deforestation impacts water management by reducing sediment control, which can compromise public health and transportation networks. Forests also enhance rainwater infiltration, reducing flood hazards and recharging groundwater, which supports farms and ecosystems during extreme weather (Ellison, Futter, & Bishop, 2012). Researchers from the Natural Capital Project have highlighted the importance of Myanmar's forests in preventing sediment contamination of drinking water, particularly in Rakhine State, Chin State, Kachin State, and northern Sagaing Region. The forests most valuable for maintaining water flows are not necessarily in the driest areas, like Kayah and the Central Dry Zone, but in neighboring regions.

Mangroves in Myanmar provide numerous ecosystem services that mitigate natural disaster risks. They protect coastal communities from hazards, reduce coastal erosion, regulate water quality, provide habitats for wildlife, and support climate change mitigation. Mangroves also store more carbon per area than terrestrial forests. Between 2000 and 2014, Myanmar's mangrove loss was estimated to cost nearly USD 2.4 billion.

Survivors of Cyclone Nargis noted higher survival rates in villages surrounded by mangroves, which helped prevent the ocean water from advancing as far inland (Das & Vincent, 2009). However, Myanmar has been losing mangroves more rapidly than other forest types for at least 25 years. Recent satellite analyses suggest an average annual loss of 3.6% to 3.9% between 1996 and 2016, significantly higher than previous estimates. The most substantial losses occurred in Rakhine State, Bago Region, and Yangon Region. While some areas have seen stabilization or reversal of mangrove loss due to restoration projects, others, particularly Tanintharyi, remain at risk (Richards & Friess, 2016).

3.4   Environmental Conditions and Changes in Taunggyi

Deforestation stands as a prominent environmental challenge in Taunggyi, driven primarily by urbanization and agricultural expansion. Rapid urbanization and agricultural expansion have led to extensive clearing of forests, impacting biodiversity and ecosystem stability. This has consequences for local wildlife, water resources, and soil quality. Additionally, deforestation contributes to climate change by reducing carbon sinks and increasing greenhouse gas emissions. The clearing of forests not only diminishes biodiversity but also disrupts crucial ecosystem functions. Loss of forest cover contributes significantly to climate change, impacting regional weather patterns and exacerbating environmental degradation.

The urban areas of Taunggyi grapple with escalating levels of air pollution, stemming from various sources such as vehicular emissions, industrial activities, and biomass burning. Particulate matter and pollutants in the air pose health risks to residents and degrade air quality, leading to visibility issues and respiratory ailments. Mitigating air pollution requires comprehensive strategies focusing on emission control, cleaner technologies, and sustainable urban planning.

Water pollution is another pressing concern, particularly in areas where agricultural runoff and improper waste disposal contaminate water sources. This pollution not only jeopardizes aquatic ecosystems but also threatens the availability of clean water for drinking and agriculture. Implementing effective wastewater treatment, promoting responsible waste management practices, and enhancing public awareness are essential steps in combating water pollution.

Addressing these environmental challenges requires a multi-faceted approach involving government policies, community participation, and technological interventions. Firstly, sustainable land management practices must be promoted to reduce deforestation and promote reforestation efforts. This includes initiatives such as afforestation programs, land-use planning, and conservation measures. To tackle air pollution, stricter regulations on vehicle emissions, promotion of public transport, and adoption of clean energy technologies are essential. Encouraging industries to adopt cleaner production methods and implementing emission control measures can also contribute to reducing air pollution levels. Water pollution can be mitigated through improved waste management practices, wastewater treatment facilities, and public awareness campaigns on water conservation and pollution prevention. Efforts to protect and restore water ecosystems are crucial for maintaining water quality and biodiversity.

Between 2002 and 2023, Taunggyi experienced a significant loss of humid primary forest, amounting to 14.0 thousand hectares (kha), which accounted for 12% of its total tree cover loss during this period. Consequently, the total area of humid primary forest in Taunggyi decreased by 11%. Over a slightly extended period from 2001 to 2023, Taunggyi lost 116 kha of tree cover, representing a 12% reduction since 2000. This deforestation contributed to the release of 60.2 million tonnes (Mt) of CO_2 emissions. Between 2000 and 2020, Taunggyi saw a net change in tree cover of -68.0 kha, equating to a 5.4% decrease. (See in Appendix Figure 4)

In 2020, Taunggyi exhibited a substantial tree cover of over 30%, distributed across different land cover categories as shown in Appendix Figure 5. The primary land cover was forest, occupying 80% of the total area, equivalent to 1.08 million hectares (Mha). Following forest cover, grassland constituted the second-largest land cover type, covering 13% of the area or 169 thousand hectares (kha). Settlement areas accounted for 3.8% of the land cover, spanning 51.3 kha. Cropland was present on 2.6% of the land, totaling 35.5 kha. Wetlands were the least represented, covering less than 0.1% of the area, roughly 1.11 kha. The "Other" category comprised 0.12% of the land cover, approximately 1.65 kha in size. This data underscores the dominance of forest cover in Taunggyi, emphasizing the region's substantial forest resources. However, the presence of cropland, grassland, and settlements also indicates a diverse land use pattern that supports various economic activities and human settlements.

Between 2001 and 2023, the forests in Taunggyi released 2.62 million metric tons of CO_2 equivalent per year (MtCO₂e/year) into the atmosphere while absorbing -

2.38 MtCO₂e/year. This indicates that the forests were a net contributor of 234 thousand metric tons of CO_2 equivalent per year (ktCO₂e/year) to the atmosphere. This data highlights the importance of addressing carbon emissions from forests to combat climate change effectively. (See in Appendix Figure 6)

3.5   Environmental Challenges in the 21ˢᵗ Century

The cumulative environmental challenge of sustainable development in the twenty-first century is larger than anything humanity has ever faced. The good news is that significant progress has been made in understanding these issues scientifically and identifying necessary actions. However, two major problems persist. First, while many environmental problems of the past are being addressed, new challenges are emerging that overshadow the older ones. Second, much of the progress is being achieved by wealthier parts of the world, leaving developing countries behind. Population growth, climate change, and unprecedented habitat and species loss pose significant threats to environmental sustainability in the twenty-first century.

The Global Risks Report 2024 by the World Economic Forum highlights critical and urgent environmental risks. Extreme weather events, exacerbated by climate change, are projected to be the most severe risk over the next decade. These events, including wildfires, floods, and heatwaves, are expected to cause significant loss of life, ecosystem damage, and financial losses. Biodiversity loss and ecosystem collapse, driven by habitat destruction and species extinction, have become increasingly severe risks. Long-term threats, such as sea-level rise from melting ice sheets and carbon release from thawing permafrost, pose potentially irreversible impacts on planetary health and human welfare. Natural resource shortages, particularly in food and water, pollution from industrial activities, and non-weather-related natural disasters also present substantial risks. The report calls for coordinated global action to address these environmental challenges with urgency and effectiveness.

Human emissions of carbon dioxide and other greenhouse gases have significantly increased global average temperatures. These emissions are the primary drivers of the current rise in temperatures worldwide. The correlation between global temperatures and greenhouse gas concentrations, particularly CO_2, has been a consistent pattern throughout Earth's history (IPCC, 2021). Over the past 50 years, global emissions have surged at an alarming rate and have yet to reach their peak. Achieving stabilization or reduction of atmospheric CO_2 concentrations necessitates attaining net-zero emissions globally. Net-zero emissions mean that the total carbon

emissions released into the atmosphere are balanced by carbon sinks, effectively making our net carbon contributions zero. Achieving this balance requires substantial reductions in emissions. However, emissions from fossil fuels continue to rise and have not yet peaked.

Table (3.1) Annual CO_2 Emissions in Myanmar (1990-2022)

Year	Annual CO_2 emissions	Annual CO_2 emissions from flaring	Annual CO_2 emissions from cement	Annual CO_2 emissions from gas	Annual CO_2 emissions from oil	Annual CO_2 emissions from coal
1990	4235719	7328	168679	1740400	2044512	274800
1991	4137416	7328	180296	1641472	2018864	289456
1992	4841915	10992	188635	1615824	2905552	120912
1993	5303029	14656	162437	1993216	3081424	51296
1994	6173965	0	190653	2491520	3451488	40304
1995	6892622	0	209486	2788304	3828880	65952
1996	7187982	0	204398	3026464	3909488	47632
1997	7419640	400	208619	3269890	3889410	51321
1998	8046167	21078	147406	3149608	4673139	54935
1999	8933607	29305	136350	2978832	5422720	366400
2000	10219368	50958	158361	2740672	5910032	1359344
2001	8855704	46007	151664	2224048	4869456	1564528
2002	9328067	60510	188165	2300992	5543632	1234768
2003	9997118	60285	227330	3056899	6051487	601117
2004	12565488	63485	205548	5157405	6410127	728923
2005	11555010	44832	214145	5457428	5252179	586426
2006	12813455	48958	222550	6135444	5454135	952367
2007	12841137	57784	234075	6164751	5564026	820502
2008	9772056	53409	258200	3649344	5162576	648528
2009	10207303	55109	255730	5422720	3865520	608224
2010	13121587	53459	203825	4140320	7492880	1231104
2011	15121961	93921	203496	5496000	7665088	1663456
2012	11818522	134383	347723	3576064	6056592	1703760
2013	12722151	158379	428604	4202608	6789392	1143168
2014	15849346	133835	502583	4829152	9225952	1157824
2015	21887144	108306	377415	10849104	9625328	926992
2016	21140418	81714	961663	8079120	10893072	1124848
2017	23630088	67814	2091236	8463840	11453664	1553536
2018	34016840	45394	1717256	8115760	20888464	3249968
2019	33616924	43053	1946223	7980192	19715984	3931472
2020	34609780	47597	2289674	8699322	19249174	4324010
2021	35619332	39453	2556803	8491233	20083606	4448237
2022	34922210	24528	2556803	8077027	19857186	4406665

Source: Our World in Data, Global Carbon Budget 2023

According to the Global Carbon Budget 2023, Myanmar's annual CO2 emissions have experienced a substantial increase from 4,235,719 units in 1990 to 34,922,210 units in 2022, with a particularly notable surge between 2014 and 2015. Emissions from flaring remained relatively low, peaking at 93,921 units in 2011, while emissions from cement production consistently rose, reaching 2,556,803 units in 2022. Emissions related to gas usage exhibited variability but showed a significant upward trend from 2015 onwards, peaking at 8,699,322 units in 2020. Emissions from oil combustion saw substantial growth, particularly post-2010, with a peak of 20,888,464 units in 2018. Emissions from coal fluctuated over the years, starting at 274,800 units in 1990 and reaching a high of 4,448,237 units in 2021. These trends highlight significant changes in CO2 emissions across various sources over the past three decades.

CHAPTER 4
SURVEY ANALYSIS

4.1 Survey Profile

The primary objective of this study is to assess the level of environmental awareness among students at Taunggyi University. Established as Taunggyi College in 1961, the institution has undergone significant expansion over the decades. In 1998, it was officially upgraded to university status, broadening its academic programs and research initiatives. Today, Taunggyi University is a key center for higher education in the Shan State region of Myanmar.

Located in Taunggyi, the capital of Shan State, known for its picturesque landscapes and cool climate, the university campus features a range of facilities, including academic buildings, libraries, laboratories, administrative offices, and student amenities. Taunggyi University offers a variety of undergraduate and postgraduate programs across its faculties. The Faculty of Arts includes departments such as Myanmar, English, History, Law, Philosophy, Psychology, Geography and Environmental Studies, Oriental Studies, and Economics. The Faculty of Science encompasses Physics, Chemistry and Biochemistry, Mathematics, Botany and Microbiology, Zoology, and Geology. For the academic year 2023-2024, there are 4,047 students enrolled. The vision and mission of Taunggyi University are as follows:

Vision:

- To be an internationally recognized university nurturing experts in Arts, Science, and Law.

Mission:

- To collaborate with other countries to foster mutual international relationships.
- To cultivate well-educated and well-mannered youths.
- To offer advanced teaching programs and a conducive research environment.

- To promote regional development, unity among ethnic groups, and educational advancement.

4.2   Sample Size Determination

The determination of an appropriate sample size is crucial for the validity and reliability of any statistical study. This study aims to determine a statistically valid sample size for a population of 4,047 students. Ensuring a sample size that is both sufficient and efficient is fundamental to achieving results that accurately represent the entire population while maintaining feasible data collection efforts. To ascertain the required sample size, Cochran's sample size formula for finite populations was used. This formula integrates various key parameters: the population size (N), the desired confidence level (expressed through the Z-value), the estimated population proportion (p), and the acceptable margin of error (EEE). The formula is as follows:

$$n = \frac{N.Z^2.p(1-p)}{(N-1).E^2 + Z^2.p(1-p)}$$

where:

n = sample size

N = population size (4,047)

Z = Z-value for the desired confidence level (1.96 for 95% confidence)

p = estimated population proportion (0.5)

E = margin of error (0.05)

$$n = \frac{4047.1.96^2.0.5(1-0.5)}{(4047-1).0.05^2 + 1.96^2.0.5(1-0.5)}$$

$$n = \frac{3884.4848}{11.0754}$$

$$n \approx 350.73$$

$$n = 351$$

The required sample size is 351. Given the calculated sample size of 351, a sample size of 385 was selected to ensure that our study results are accurate, reliable, and representative of the population of 4,047 students. This choice balances the need for statistical rigor with practical considerations of data collection and analysis.

4.3   Questionnaire Design

The survey consisted of demographic questions, multiple-choice questions, closed questions (yes or no), frequency scale and Likert scale questions.

Demographic Information: Participants provided information on their gender, age, academic major, academic year, hometown, monthly household income, modes of transportation to the university, and participation in extracurricular activities.

Knowledge: A series of Likert scale questions (ranging from "Strongly Disagree" to "Strongly Agree") assessed students' understanding of ecosystems, the impact of human activities on the environment, biodiversity, and the consequences of human actions on the environment.

Attitudes: Likert scale questions (ranging from "Strongly Disagree" to "Strongly Agree") evaluated students' sense of responsibility towards the environment, their likelihood to adopt eco-friendly behaviors, and their attitudes towards fostering environmental consciousness.

Connection to Nature: Frequency scale (1-5) questions assessed the frequency of activities like taking pictures of nature, visiting forests, using reusable bags, walking for environmental reasons, and recycling household waste.

Policy Awareness: Likert scale questions measured how well-informed students felt about current environmental policies, their likelihood to engage in the political process, and the influence of policy awareness on holding governments and corporations accountable.

Behaviours: The section used Yes/No questions to inquire about students' recycling habits, energy consumption, use of eco-friendly products, efforts to minimize single-use plastic, and support for organic farming.

Responsibility: Yes/No questions examined whether students actively recycle, reduce plastic use, participate in community clean-up events, consider their environmental impact, and support businesses with eco-friendly practices.

4.4   Characteristics of Respondents

A sample of 385 students out of a total population of 4,047 was collected. The survey results predominantly reflect female perspectives, with 71.95% female respondents compared to 28.05% male respondents. The age distribution indicates that the majority of respondents are between 18 and 21 years old, with 26.23% aged 20,

22.34% aged 19, and 17.14% aged 21. This suggests the survey primarily captures the viewpoints of younger university students.

Table (4.1)   Respondents' Gender and Age

Variable	Category	Number of Responses	Percentage
Gender	Male	108	28.05%
	Female	277	71.95%
Age	18	29	7.53%
	19	86	22.34%
	20	101	26.23%
	21	66	17.14%
	22	46	11.95%
	23	33	8.57%
	24	17	4.42%
	25	6	1.56%
	27	1	0.26%

Source: Survey data

Regarding academic majors, Chemistry (14.29%) and Economics (14.03%) are the most represented fields, followed by Mathematics (11.17%) and Law (10.13%). The diversity in academic backgrounds offers a broad spectrum of perspectives, though the prominence of these specific fields indicates their students' opinions may significantly influence the survey outcomes. The majority of students who lived in dormitories were second-year students. The academic year distribution reveals that over half of the respondents (52.21%) are second-year students, indicating a focus on students who are familiar with university life but not yet in their advanced years. First-year students constitute 15.84%, and third-year students make up 14.55%, providing a comprehensive view that includes both newcomers and more experienced students. Geographically, the majority of respondents come from Taunggyi (16.88%) and Nyaungshwe (15.32%), followed by Yatsauk (7.79%) and Kalaw (7.01%).

Table (4.2) Respondents 'Academic Major and Year

Variable	Category	Number of Responses	Percentage
Academic Major	Myanmar	16	4.16%
	English	32	8.31%
	Mathematics	43	11.17%
	Physics	28	7.27%
	Chemistry and Biochemistry	55	14.29%
	Geography and Environmental Studies	12	3.12%
	Geology	14	3.64%
	Psychology	17	4.42%
	Philosophy	13	3.38%
	Economics	54	14.03%
	Law	39	10.13%
	Botany and Microbiology	20	5.19%
	Zoology	21	5.45%
	History	10	2.60%
	Oriental Studies	11	2.86%
Academic Year	First year	61	15.84%
	Second year	201	52.21%
	Third year	56	14.55%
	Fourth year	42	10.91%
	Other (Honors and Master)	25	6.49%
Transportation Modes to University	By Motorcycle/ Scooter	177	45.97%
	Walking	197	51.17%
	By Bicycle	5	1.30%
	By automobile	6	1.56%
Participation in Extracurricular Activities	No, not involved	70	18.18%
	Yes, actively involved	63	16.36%
	Yes, somewhat involved	252	65.45%
Do you use technology to stay informed about environmental issues?	Yes	290	75.32%
	No	95	24.68%

Source: Survey data

Transportation to the university is primarily by walking (51.17%) and motorcycles/ scooters (45.97%), reflecting the accessibility and proximity of student housing to the campus. This suggests that most students live relatively close to the university or have access to affordable transportation. Participation in extracurricular activities shows that a majority of students (65.45%) are somewhat involved, while 18.18% are not involved at all. This indicates a balanced engagement with activities outside of academics, which can be an important factor in overall student development and satisfaction. Lastly, a significant majority of respondents (75.32%) use technology to stay informed about environmental issues. This high level of digital engagement underscores the importance of online resources and platforms in keeping students updated on environmental matters. Participants' information was anonymized to ensure privacy, and data integrity was rigorously maintained. Participants were informed that their data would be used exclusively for research purposes and would remain confidential. This survey design adopts a structured and comprehensive methodology to assess environmental awareness among students at Taunggyi University.

4.5   Assessment of Environmental Awareness Among Taunggyi University Students

Environmental awareness is a critical component of sustainable development, influencing how individuals and communities interact with their surroundings. In Myanmar, a country rich in natural resources yet facing significant environmental challenges, fostering environmental awareness among the youth is particularly vital. This study focuses on assessing the environmental awareness among students at Taunggyi University, located in Taunggyi, Shan State. The university, with its diverse academic departments and programs, provides an ideal setting for investigating how higher education institutions can contribute to enhancing environmental consciousness. By examining students' knowledge, attitudes, behaviors, and responsibilities towards environmental issues, this study aims to identify the level of awareness and the factors influencing it. Additionally, it explores students' connection to nature and their awareness of environmental policies, which are essential for informed and proactive participation in environmental conservation efforts.

Table (4.3)   Knowledge Assessment of Environmental Awareness

No.	Knowledge (Strongly disagree-1 to Strongly agree-5)	Mean	S. D
1	Knowing ecosystems and their interdependence is crucial for environmental awareness.	3.85	0.71
2	Individuals with a good understanding of the impact of human activities on the environment are likely to make informed decisions about their lifestyle.	3.94	0.66
3	Knowledge of biodiversity is important in influencing individuals to support sustainable practices.	3.7	0.77
4	Environmental knowledge contributes to a greater understanding of the consequences of human actions on the environment.	4.05	0.71
5	Individuals without environmental knowledge are likely to make uninformed decisions about their consumption patterns.	3.86	0.90
Overall		**3.88**	**0.75**

Source: Own compilation based on survey data from Taunggyi University students

The survey assessed respondents' knowledge about ecosystems, human impact on the environment, biodiversity, and the consequences of human actions. The mean score of 3.88 on a Likert scale ranging from 1 to 5 indicates a robust comprehension of fundamental environmental concepts among students at Taunggyi University. This high average score reflects the success of educational initiatives aimed at enhancing students' understanding of ecosystems, human impact on the environment, and biodiversity. The data demonstrates that students acknowledge the pivotal role of environmental knowledge in making well-informed decisions and shaping behaviors. The overall mean for knowledge items is 3.88, with an SD of 0.75, suggesting a general agreement on the importance of environmental knowledge and moderate variability.

Table (4.4)   Attitude Assessment of Environmental Awareness

No.	Attitudes (Strongly disagree-1 to Strong agree-5)	Mean	S. D
1	Positive attitudes towards the environment involve a sense of responsibility for its well-being.	3.99	0.72
2	Individuals with positive attitudes towards the environment are likely to adopt eco-friendly behaviors in their daily lives.	3.82	0.67
3	Changing attitudes is a key component of fostering environmental consciousness.	3.43	0.87
4	A positive mindset towards the environment often leads to more sustainable actions.	3.87	0.82
5	Individuals with negative attitudes towards the environment are likely to be resistant to adopting eco-friendly behaviors.	3.59	0.88
	Overall	3.74	0.79

Source: Own compilation based on survey data from Taunggyi University students

The survey evaluated attitudes towards the environment, including responsibility, behavior adoption, consciousness, mindset, and resistance to eco-friendly behaviors. The overall mean for attitudes is 3.74, with an SD of 0.79, indicating general agreement on positive attitudes towards the environment and moderate variability. The data presents a mean score of 3.74, indicating that students generally exhibit positive attitudes towards the environment. This implies a widespread sense of responsibility and a propensity to engage in environmentally friendly behaviors. Despite the prevailing positive attitudes, there exists an opportunity to further instill stronger environmental attitudes among the student population. This enhancement is imperative for fostering a more profound environmental consciousness and a steadfast commitment to sustainable practices.

Table (4.5)   Behaviors Assessment of Environmental Awareness

No.	Behaviors (Binary Option- Yes or No)	Option	Frequency	Percentage (%)
1	Do you regularly recycle household waste?	Yes	273	70.91
		No	112	29.09
2	Have you consciously reduced your energy consumption in the past month?	Yes	231	60.00
		No	154	40.00
3	Do you use eco-friendly products that have been manufactured with a focus on minimizing their negative impact on the environment whenever possible?	Yes	279	72.47
		No	106	27.53
4	Have you made efforts to minimize single-use plastic in your daily life?	Yes	296	76.88
		No	89	23.12
5	Do you actively support Organic Farming businesses?	Yes	350	90.91
		No	35	9.09

Source: Own compilation based on survey data from Taunggyi University students

A significant majority of students regularly recycle, reflecting a high level of environmental consciousness regarding waste management. More than half of the respondents have consciously reduced their energy consumption, showcasing a moderate awareness and practice of energy conservation. A considerable majority use eco-friendly products, indicating attentiveness to the environmental impact of their purchases. A large percentage of students actively minimize single-use plastic, demonstrating a strong commitment to reducing plastic waste. An overwhelming majority support organic farming, revealing a strong preference for sustainable agricultural practices.

Table (4.6) Responsibility Assessment of Environmental Awareness

No.	Responsibility (Binary Option-Yes or No)	Option	Frequency	Percentage (%)
1	Do you actively recycle and reduce single-use plastic in your daily life?	Yes	350	90.91
		No	35	9.09
2	Do you regularly turn off lights and use reusable items to minimize energy and resource consumption?	Yes	357	92.73
		No	28	7.27
3	Have you participated in community clean-up events or conservation projects?	Yes	332	86.23
		No	53	13.77
4	Do you take responsibility for your environmental impact, considering choices like transportation and consumption?	Yes	256	66.49
		No	129	33.51
5	Have you supported businesses with eco-friendly practices or advocated for sustainable living?	Yes	369	95.84
		No	16	4.16

Source: Own compilation based on survey data from Taunggyi University students

A large majority of students feel responsible for recycling and reducing plastic use, demonstrating high environmental responsibility. Nearly all respondents take steps to minimize energy and resource consumption, reflecting a strong sense of commitment to conserving resources. A significant majority participate in community clean-up events, indicating active involvement in community-based environmental initiatives. While most students take responsibility for their environmental impact, a notable portion may not fully consider the consequences of their choices. Nearly all students support businesses with eco-friendly practices, showcasing a strong commitment to promoting sustainable living.

Table (4.7)   Connection to Nature Assessment of Environmental Awareness

No.	Connection to nature (Never-1, Rarely-2, Occasionally-3, Frequently-4, Always-5)	Mean	S. D
1	How frequently do you take pictures of nature?	3.48	0.84
2	How often did you visit forests in the last month?	3.05	0.85
3	How frequently do you use reusable bags?	3.63	0.92
4	How often do you choose to walk for a lower environmental impact in your daily routine?	3.88	0.94
5	How often do you recycle household waste?	3.23	1.01
Overall		**3.45**	**0.91**

Source: Own compilation based on survey data from Taunggyi University students

The survey measured the frequency of nature-related activities such as taking pictures of nature, visiting forests, using reusable bags, walking for lower environmental impact, and recycling. The overall mean for connection to nature is 3.454, with an SD of 0.91, indicating moderate frequency and moderate to high variability. The mean score of 3.454 on a 5-point scale indicates that students frequently participate in activities that facilitate a connection with nature. These activities encompass photographing nature, visiting forests, utilizing reusable bags, and walking to minimize their environmental footprint. This moderate to high level of nature affiliation signifies a substantial and meaningful engagement with the natural world, which is pivotal for cultivating a robust environmental ethos.

Table (4.8)   Policy Awareness Assessment of Environmental Awareness

No.	Policy Awareness: (Strongly disagree-1 to Strongly Agree-5)	Mean	S. D
1	You feel well-informed about current environmental policies and regulations.	2.53	0.97
2	You are likely to engage in the political process if you are aware of governmental and international efforts addressing environmental challenges.	3.78	0.96
3	Policy awareness is influential in holding governments and corporations accountable for their environmental impact.	3.5	0.96
4	Policy awareness actively encourages the development and enforcement of sustainable practices by governments and corporations.	3.54	0.91
5	Individuals lacking awareness of environmental policies may not actively participate in holding governments and corporations accountable for their environmental impact.	3.54	0.78
	Overall	3.38	0.91

Source: Own compilation based on survey data from Taunggyi University students

The survey assessed respondents' awareness of environmental policies and their influence on political engagement and accountability. The overall mean for policy awareness is 3.378, with an SD of 0.91, indicating moderate awareness and high variability. The average score of 3.378 indicates that students have a moderate level of awareness about environmental policies. Although students acknowledge the significance of being informed about policies to hold governments and corporations accountable, the relatively lower score compared to other factors suggests a need for improved educational initiatives in this area. Enhancing policy awareness is crucial for empowering students to actively engage in environmental advocacy and policy enforcement.

Table (4.9)   Knowledge, Attitudes, Connection to Nature and Policy Awareness Assessment of Environmental Awareness Among Students

No.	Assessment Factors	Mean	S.D
1	Knowledge	3.88	0.75
2	Attitudes	3.74	0.79
3	Connection to nature	3.45	0.91
4	Policy Awareness	3.38	0.91

Source: Data compiled from survey responses of Taunggyi University students, 2024

The mean score of 3.88 for Knowledge suggests that the population demonstrates a relatively high level of knowledge on the assessed topic. A standard deviation of 0.75 indicates moderate variability around the mean. This suggests that while most individuals have a high knowledge level, there is still some variation, meaning that not all individuals possess the same level of knowledge. This could be due to differences in education, access to information, or engagement with the environmental issues.

With a mean score of 3.74, the Attitudes factor indicates generally positive attitudes towards the subject matter. The slightly higher standard deviation of 0.79 compared to Knowledge implies a bit more variability in attitudes among the population. This could reflect diverse personal beliefs, values, or cultural backgrounds that influence how individuals perceive and feel about the topic. The positive mean score is encouraging, suggesting a generally favourable disposition that could be built upon with targeted interventions or educational programs.

The mean score for Connection to Nature is 3.45, which is moderately high, indicating that the population feels a reasonable sense of connection to nature. However, the standard deviation of 0.91 is the highest among the four factors, pointing to significant variability in this connection. This high variability could suggest that while some individuals feel a strong bond with nature, others do not feel as connected. This disparity could be influenced by urban versus rural living environments, personal experiences with nature, or educational background regarding environmental issues.

The mean score of 3.38 for Policy Awareness is the lowest among the four factors, indicating a moderate level of awareness about relevant policies. Like the Connection to the Nature factor, the standard deviation of 0.91 reveals considerable

variability. This suggests that there are marked differences in how well individuals are informed about policies, which could be due to varying levels of access to policy information, interest in policy matters, or differences in education and socioeconomic status. This lower mean score and high variability signal a potential area for improvement, perhaps through enhanced communication and education strategies about relevant policies.

CHAPTER 5

CONCLUSION

5.1   Findings

This study evaluates environmental awareness among students at Taunggyi University, focusing on their knowledge, attitudes, behaviors, sense of responsibility, connection to nature, and policy awareness. Most respondents are female, aged 18-21, majoring in Chemistry and Economics, and are primarily second-year students from Taunggyi and Nyaungshwe. Many commute by walking or using motorcycles and are somewhat involved in extracurricular activities. A significant number use technology to stay informed about environmental issues.

Students exhibit robust knowledge of ecosystems, biodiversity, and human impacts on the environment, indicating they are well-prepared for informed decision-making and advocacy. Their attitudes toward environmental conservation are positive, showing a willingness to adopt eco-friendly practices and support sustainability initiatives. However, their environmental behaviours are inconsistent, with only some engaging in activities like recycling and reducing plastic use. There is a need for more consistent and comprehensive sustainable practices, which could be encouraged through targeted programs. Most students feel a strong sense of personal responsibility towards environmental issues, reflected in their support for conservation efforts. This could be reinforced through leadership opportunities, community projects, and awareness campaigns. Students' connection to nature is moderate, evidenced by activities like nature photography and visits to natural settings. This connection could be deepened through more outdoor learning experiences and nature-based activities in the curriculum. Policy awareness among students is fair, but there is room to enhance their understanding of environmental policies and advocacy strategies. Educating them on policy frameworks and providing real-world case studies can empower them to engage more effectively in environmental management.

In conclusion, while students at Taunggyi University have commendable environmental knowledge and attitudes, there is a need to improve the consistency of

their eco-friendly behaviors and deepen their policy awareness. Addressing these areas can cultivate a more environmentally conscious and proactive student body dedicated to sustainable development and conservation efforts.

5.2 **Suggestions**

Based on a comprehensive evaluation of environmental awareness among students at Taunggyi University, we can formulate several strategic recommendations to enhance students' commitment and involvement in environmental sustainability initiatives. First, the institution should consider implementing targeted behavioral change programs aimed at fostering consistent eco-friendly practices, including robust recycling protocols and conscientious reduction of plastic consumption. Second, integrating leadership opportunities within the framework of environmental clubs and community engagement projects is crucial to cultivating a heightened sense of responsibility and proactive engagement in conservation efforts among the student body. Moreover, infusing outdoor learning experiences and nature-centric activities into the academic curriculum is essential to deepen students' intrinsic connection with the natural world, thereby nurturing a profound appreciation for ecological balance and sustainable living principles. Furthermore, efforts should be directed towards augmenting students' comprehension of environmental policies and proficiency in advocacy strategies through structured educational modules encompassing pertinent case studies. Additionally, leveraging technological platforms for disseminating pertinent environmental information and fostering collaborative partnerships with local stakeholders and pertinent civic entities are pivotal in fostering a culture of proactive environmental stewardship within the university community.

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APPENDIX

Demographic Information:

1. Gender:
   - Male
   - Female

2. Age:
   -

3. Academic Major:
   - Myanmar
   - English
   - Mathematics
   - Physics
   - Chemistry and Biochemistry
   - Geography and Environmental studies
   - Geology
   - Psychology
   - Philosophy
   - Economics
   - Law
   - Botany and Microbiology
   - Zoology
   - History
   - Oriental Studies

4. Academic Year
   - First year
   - Second year
   - Third year
   - Fourth year
   - Other: _

5. Hometown:

6. Monthly Household Income:
   - Less than 200,000 kyats
   - 200,000 kyats - 400,000 kyats
   - 400,000 kyats - 600,000 kyats
   - 600,000 kyats - 800,000 kyats
   - 800,000 kyats and above

7. Transportation modes to the university
   - Walking
   - By Bicycle
   - By Motorcycle/ Scooter
   - By Automobile

8. Participation in Extracurricular Activities:
   - Yes, actively involved
   - Yes, somewhat involved
   - No, not involved

9. Do you use technology to stay informed about environmental issues?
   - Yes
   - No

Knowledge

1. Knowing ecosystems and their interdependence is crucial for environmental awareness.
   - 1 (Strongly Disagree)
   - 2 (Disagree)
   - 3 (Neutral)
   - 4 (Agree)
   - 5 (Strongly Agree)

2. Individuals with a good understanding of the impact of human activities on the environment are likely to make informed decisions about their lifestyle.
   - 1 (Strongly Disagree)
   - 2 (Disagree)
   - 3 (Neutral)
   - 4 (Agree)

- 5 (Strongly Agree)

3. Knowledge of biodiversity is important in influencing individuals to support sustainable practices.
   - 1 (Strongly Disagree)
   - 2 (Disagree)
   - 3 (Neutral)
   - 4 (Agree)
   - 5 (Strongly Agree)

4. Environmental knowledge contributes to a greater understanding of the consequences of human actions on the environment.
   - 1 (Strongly Disagree)
   - 2 (Disagree)
   - 3 (Neutral)
   - 4 (Agree)
   - 5 (Strongly Agree)

5. Individuals without environmental knowledge are likely to make uninformed decisions about their consumption patterns.
   - 1 (Strongly Disagree)
   - 2 (Disagree)
   - 3 (Neutral)
   - 4 (Agree)
   - 5 (Strongly Agree)

Attitudes:

1. Positive attitudes towards the environment involve a sense of responsibility for its well-being.
   - 1 (Strongly Disagree)
   - 2 (Disagree)
   - 3 (Neutral)
   - 4 (Agree)
   - 5 (Strongly Agree)

2. Individuals with positive attitudes towards the environment are likely to adopt eco-friendly behaviors in their daily lives.
   - 1 (Strongly Disagree)
   - 2 (Disagree)
   - 3 (Neutral)
   - 4 (Agree)
   - 5 (Strongly Agree)

3. Changing attitudes is a key component of fostering environmental consciousness.
   - 1 (Strongly Disagree)
   - 2 (Disagree)
   - 3 (Neutral)
   - 4 (Agree)
   - 5 (Strongly Agree)

4. A positive mindset towards the environment often leads to more sustainable actions.
   - 1 (Strongly Disagree)
   - 2 (Disagree)
   - 3 (Neutral)
   - 4 (Agree)
   - 5 (Strongly Agree)

5. Individuals with negative attitudes towards the environment are likely to be resistant to adopting eco-friendly behaviors.
   - 1 (Strongly Disagree)
   - 2 (Disagree)
   - 3 (Neutral)
   - 4 (Agree)
   - 5 (Strongly Agree)

Behaviors (yes or no)

1. Do you regularly recycle household waste?
2. Have you consciously reduced your energy consumption in the past month?
3. Do you use eco-friendly products that have been manufactured with a focus on minimizing their negative impact on the environment whenever possible?
4. Have you made efforts to minimize single-use plastic in your daily life?
5. Do you actively support Organic Farming businesses?

Responsibility (yes or no)

1. Do you actively recycle and reduce single-use plastic in your daily life?
2. Do you regularly turn off lights and use reusable items to minimize energy and resource consumption?
3. Have you participated in community clean-up events or conservation projects?
4. Do you take responsibility for your environmental impact, considering choices like transportation and consumption?
5. Have you supported businesses with eco-friendly practices or advocated for sustainable living?

Connection to nature

1. How frequently do you take pictures of nature?
   - 1 (Never)
   - 2 (Rarely)
   - 3 (Occasionally)
   - 4 (Frequently)
   - 5 (Always)
2. How often did you visit forests in the last month?
   - 1 (Never)
   - 2 (Rarely)
   - 3 (Occasionally)
   - 4 (Frequently)
   - 5 (Always)

3. How frequently do you use reusable bags?
   - 1 (Never)
   - 2 (Rarely)
   - 3 (Occasionally)
   - 4 (Frequently)
   - 5 (Always)

4. How often do you choose to walk for a lower environmental impact in your daily routine?
   - 1 (Never)
   - 2 (Rarely)
   - 3 (Occasionally)
   - 4 (Frequently)
   - 5 (Always)

5. How often do you recycle household waste?
   - 1 (Never)
   - 2 (Rarely)
   - 3 (Occasionally)
   - 4 (Frequently)
   - 5 (Always)

Policy Awareness:

1.You feel well-informed about current environmental policies and regulations.
   - 1 (Strongly Disagree)
   - 2 (Disagree)
   - 3 (Neutral)
   - 4 (Agree)
   - 5 (Strongly Agree)

2. You are likely to engage in the political process if you are aware of governmental and international efforts addressing environmental challenges.
   - 1 (Strongly Disagree)
   - 2 (Disagree)
   - 3 (Neutral)
   - 4 (Agree)
   - 5 (Strongly Agree)

3. Policy awareness is influential in holding governments and corporations accountable
   for their environmental impact.
   - 1 (Strongly Disagree)
   - 2 (Disagree)
   - 3 (Neutral)
   - 4 (Agree)
   - 5 (Strongly Agree)

4. Policy awareness actively encourages the development and enforcement of
   sustainable practices by governments and corporations.
   - 1 (Strongly Disagree)
   - 2 (Disagree)
   - 3 (Neutral)
   - 4 (Agree)
   - 5 (Strongly Agree)

5. Individuals lacking awareness of environmental policies may not actively participate
   in holding governments and corporations accountable for their environmental
   impact.
   - 1 (Strongly Disagree)
   - 2 (Disagree)
   - 3 (Neutral)
   - 4 (Agree)
   - 5 (Strongly Agree)

Respondents' Hometown

| Hometown	Number of Responses	Percentage
Aungpan	21	5.45%
Ayetharyar	16	4.16%
Bahtoo	2	0.52%
Hehoe	15	3.90%
Hopong	12	3.12%
Hsihseng	10	2.60%
Kalaw	27	7.01%
Kengtawng	3	0.78%
Kume	2	0.52%
Kyaingtong	2	0.52%
Langkho	4	1.04%
Loikaw	8	2.08%
Loilen	2	0.52%
Mandalay	2	0.52%
Mawkmai	5	1.30%
Meiktila	2	0.52%
Mong Hsat	2	0.52%
Nampan	2	0.52%
Namsang	2	0.52%
Nay Pyi Taw	5	1.30%
NyaungOo	1	0.26%
Nyaungshwe	59	15.32%
Pekon	8	2.08%
Pindaya	17	4.42%
Pinlaung	21	5.45%
Pyin Oo Lwin	1	0.26%
Shwenyaung	17	4.42%
Tachileik	2	0.52%
Taunggyi	65	16.88%
Taungtha	1	0.26%
Yamethin	2	0.52%
Yangon	2	0.52%
Yatsauk	30	7.79%
Ywangan	15	3.90%

Source: Survey data

Figure (1) **Linkages between the National Environmental Policy, Strategic Framework and Master Plans**
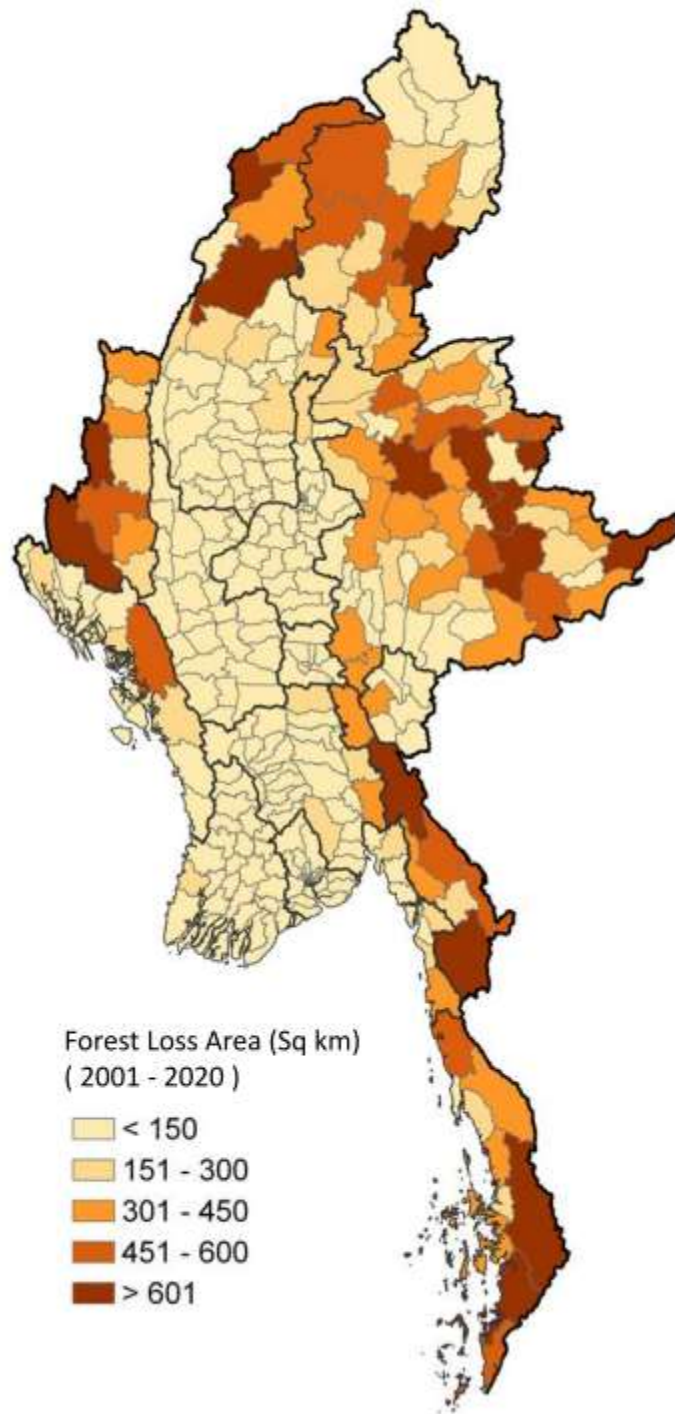

Source: NEP for Myanmar 2019

Figure (2)   Projected Average Temperature Change in Myanmar by Season for 2041-2051 and 2071-2081 Under High and Low Carbon Climate
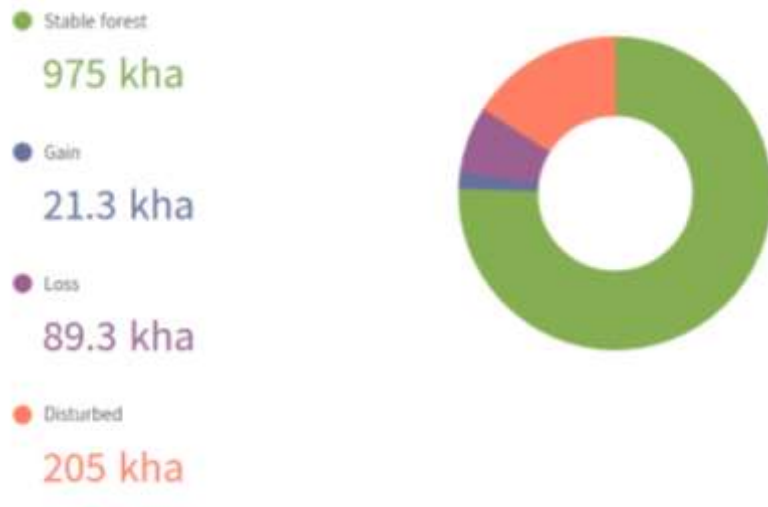

Change Scenarios
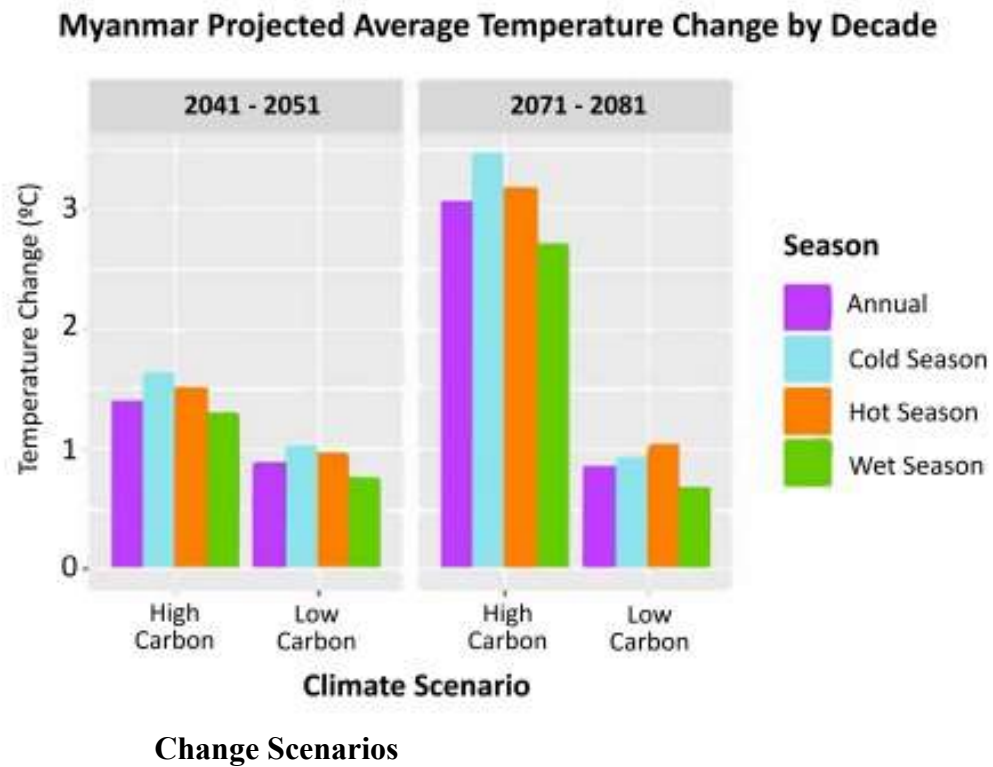
Source: Climate Change Knowledge Portal

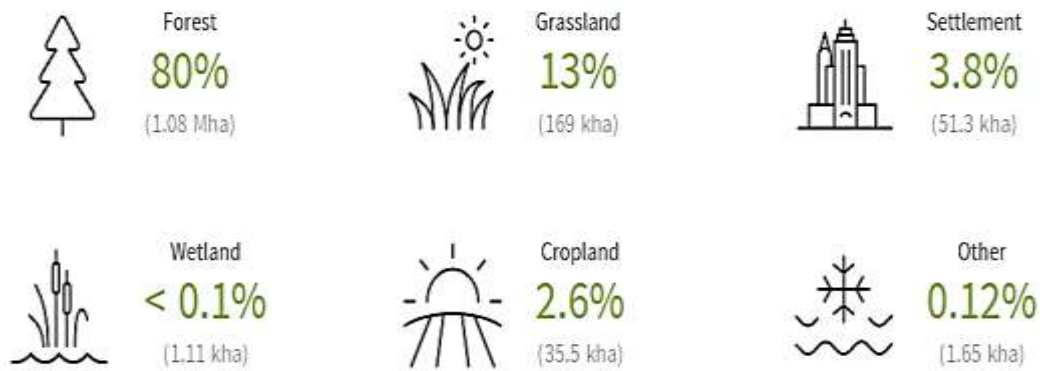**Figure (3)   Forest Loss Area in Square Kilometers from 2001-2020**

Forest Loss Area (Sq km)
(2001 - 2020)

< 150
151 - 300
301 - 450
451 - 600
> 601

Source: Global Forest Watch

Figure (4)   Components of Net Change in Tree Cover in Taunggyi, Shan

- Stable forest
  975 kha
- Gain
  21.3 kha
- Loss
  89.3 kha
- Disturbed
  205 kha

Source: Global Forest Watch

Figure (5)   Tree Cover by Land Cover Class in Taunggyi, Shan

Forest
80%
(1.08 Mha)

Grassland
13%
(169 kha)

Settlement
3.8%
(51.3 kha)

Wetland
< 0.1%
(1.11 kha)

Cropland
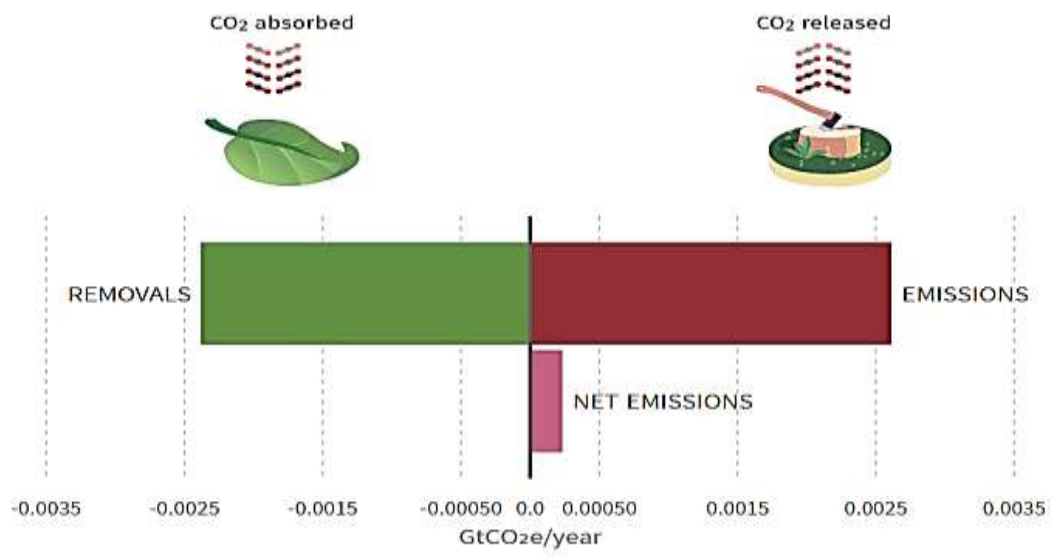**2.6%**
(35.5 kha)

Other
0.12%
(1.65 kha)

2020 tropical tree cover extent | >30% threshold

Source: Global Forest Watch

Figure (6) Forest-related Greenhouse Gas Fluxes in Taunggyi, Shan

Source: Global Forest Watch