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To Identify and Study the Factors Contributing to The Creation of a Sustainable Environment in Ranchi District

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ABSTRACT

Ranchi, the capital of Jharkhand, is experiencing rapid urbanization and industrial growth, necessitating a focus on sustainable environmental practices. This study examines the factors contributing to a sustainable environment in Ranchi district, considering natural resource management, pollution, socio-economic dynamics, and policy frameworks. Through a comprehensive analysis involving literature review, data analysis, and case studies, the research identifies key areas such as sustainable agriculture, renewable energy, waste management, and community engagement as crucial for environmental sustainability. The study aims to assess the current environmental status, highlight challenges, and provide actionable recommendations to enhance sustainability in Ranchi. The findings underscore the importance of integrating sustainability into development practices to ensure ecological health and socio-economic well-being for present and future generations.

Keywords: Ranchi, Sustainability, Environmental Management, Urbanization

Introduction

Ranchi, the capital of Jharkhand, is a rapidly growing district characterized by its rich natural resources and vibrant socio-economic landscape. As urbanization and industrial activities intensify, the need for a sustainable environment becomes increasingly urgent. The concept of sustainability encompasses not only environmental preservation but also social and economic well-being, ensuring that resources are used efficiently and responsibly to benefit current and future generations. This study aims to identify and examine the factors contributing to a sustainable environment in Ranchi district. It explores the interplay between natural resources, pollution, socio-economic dynamics, and policy frameworks to understand their collective impact on sustainability. Given Ranchi's unique challenges, including resource management and urban development, this research will highlight both

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the successes and gaps in current practices. The objectives are to assess the current state of environmental sustainability in Ranchi, identify key factors influencing it, and provide actionable recommendations for improvement. By addressing these areas, the study seeks to offer a comprehensive analysis that supports sustainable development efforts and policy-making. Through a combination of literature review, data analysis, and case studies, this research will contribute valuable insights to enhance environmental sustainability in Ranchi and similar regions facing rapid growth and environmental challenges.

Importance Of Sustainability in Environmental Studies

Sustainability is a cornerstone of environmental studies, reflecting a holistic approach to managing natural resources and human activities in a way that supports both present and future generations. At its core, sustainability addresses the need to balance environmental, economic, and social dimensions to ensure that human progress does not come at the expense of ecological health.

- **Environmental Preservation:** Sustainability emphasizes the responsible use of natural resources to prevent their depletion and degradation. Environmental studies highlight the critical need to maintain biodiversity, manage water resources, and protect ecosystems from pollution and over-exploitation. By integrating sustainability principles, environmental studies advocate for practices that minimize environmental impact, such as conservation efforts, sustainable agriculture, and renewable energy adoption. These practices help to preserve natural habitats, protect endangered species, and mitigate climate change, ensuring that ecosystems remain resilient and functional.

- **Economic Stability:** Economic development and environmental health are deeply interconnected. Sustainable practices promote the efficient use of resources, reduce waste, and encourage innovations that support long-term economic stability. For instance, sustainable agriculture and forestry practices can enhance productivity while preserving soil health and reducing environmental impacts. Moreover, transitioning to renewable energy sources can reduce dependency on fossil fuels, which are both finite and environmentally damaging. Sustainable economic practices not only support immediate financial benefits but also safeguard future economic opportunities by maintaining the health of natural systems.

- **Social Well-Being:** Sustainability is also crucial for promoting social equity and improving quality of life. Environmental studies underscore the importance of involving communities in decision-making processes and ensuring that environmental benefits and burdens are shared equitably. Sustainable practices help to improve public health by reducing pollution, ensuring safe drinking water, and promoting clean air. They also enhance quality of life by creating healthier living environments, preserving natural beauty, and providing recreational opportunities. Additionally, sustainability fosters social cohesion by encouraging community engagement and cooperation in addressing environmental challenges.

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- **Climate Change Mitigation:** One of the most pressing issues in environmental studies is climate change, which poses significant risks to global ecosystems and human societies. Sustainability strategies play a critical role in mitigating climate change by reducing greenhouse gas emissions, enhancing energy efficiency, and promoting climate-resilient practices. Environmental studies focus on understanding the impacts of climate change and developing solutions that can help communities adapt to changing conditions. By prioritizing sustainability, societies can better manage the risks associated with climate change and work towards a more stable and predictable climate.

- **Intergenerational Responsibility:** Sustainability emphasizes the responsibility to future generations. Environmental studies advocate for practices that do not compromise the ability of future generations to meet their needs. This involves considering the long-term impacts of current actions and making decisions that support the health and stability of the planet over the long term. By fostering a culture of sustainability, societies can ensure that future generations inherit a world that is capable of supporting life and prosperity.

  Sustainability is integral to environmental studies as it provides a framework for balancing ecological, economic, and social needs. By promoting sustainable practices, environmental studies aim to preserve natural resources, enhance economic stability, improve social well-being, address climate change, and ensure a legacy of environmental stewardship for future generations. This holistic approach is essential for achieving long-term environmental health and creating a resilient and equitable world.

Environmental Status of Ranchi District

Ranchi, the capital city of Jharkhand, India, is situated in a region known for its diverse natural resources and unique environmental characteristics. The environmental status of Ranchi district is shaped by its geography, climate, and socio-economic activities. Following an overview of the current environmental status:

- **Geography and Climate**

  Ranchi district is characterized by its undulating terrain, which includes hills, plateaus, and forests. The district is located in the Chot Nagpur Plateau region, known for its rich mineral resources. The climate is tropical with a monsoon season from June to September, characterized by moderate to heavy rainfall. Temperatures can vary significantly between seasons, with hot summers and cool winters.

- **Natural Resources**

  - **Forests:** Ranchi district has a significant forest cover, including both dense and degraded forests. The forests are home to a variety of flora and fauna, including several species of birds, mammals, and reptiles. However, deforestation due to agricultural expansion and industrial activities poses a threat to this biodiversity.

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- **Minerals:** The region is rich in minerals such as coal, iron ore, and mica. Mining activities contribute to the local economy but also lead to environmental challenges like soil erosion, water contamination, and deforestation.
- **Water Resources:** The district is drained by several rivers, including the Subarnarekha, Damodar, and Koel rivers. These water bodies are crucial for agriculture, drinking water, and supporting local ecosystems. However, water pollution and over-extraction of groundwater are emerging concerns.

- **Air Quality and Pollution**

  Air quality in Ranchi has been affected by increasing vehicular emissions, industrial activities, and construction work. Particulate matter (PM2.5 and PM10) levels often exceed safe limits, leading to health concerns for the local population. The city's rapid urbanization and industrialization have contributed to higher pollution levels.

- **Waste Management**

  Waste management is a significant challenge in Ranchi. The city produces a substantial amount of solid waste, including municipal waste and construction debris. While there are efforts to improve waste management through initiatives like waste segregation and recycling programs, inadequate infrastructure and management practices lead to issues such as waste accumulation and improper disposal.

- **Biodiversity and Conservation**

  Ranchi’s biodiversity is under pressure from habitat loss, pollution, and human-wildlife conflicts. Conservation efforts are in place, including the establishment of protected areas and wildlife sanctuaries, but they face challenges such as limited resources and enforcement issues. Conservation programs aim to protect endangered species and restore degraded habitats.

- **Urbanization and Development**

  Rapid urbanization and infrastructure development in Ranchi have significant environmental implications. Expansion of residential, commercial, and industrial areas has led to increased demand for resources, altered land use patterns, and greater environmental degradation. Balancing development with environmental conservation is a key challenge for the district.

- **Climate Change Impact**

  Ranchi, like many other regions, is experiencing the effects of climate change, including altered rainfall patterns, increased temperatures, and extreme weather events. These changes impact agriculture, water resources, and local ecosystems. Adaptation and mitigation strategies are essential to address these challenges.

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- **Environmental Policies and Initiatives**

  Local and state-level environmental policies aim to address some of these issues. Initiatives include efforts to promote sustainable practices, improve waste management, and protect natural resources. However, effective implementation and enforcement remain crucial for these policies to make a significant impact.

Ranchi district faces a range of environmental challenges related to its natural resources, pollution, waste management, and the impacts of urbanization and climate change. Addressing these issues requires a comprehensive approach involving community engagement, effective policy implementation, and sustainable development practices.

Factors Affecting Environmental Sustainability

Environmental sustainability is influenced by a complex interplay of various factors, each contributing to the overall health and stability of ecosystems and human societies. Here are some of the key factors affecting environmental sustainability:

- **Natural Resource Management**
  - **Resource Depletion:** Over-extraction of natural resources such as water, minerals, and fossil fuels can lead to resource depletion and environmental degradation. Sustainable management practices are crucial to ensure that resources are used efficiently and are replenished over time.
  - **Ecosystem Services:** Natural ecosystems provide essential services such as clean water, air purification, and soil fertility. Protecting these ecosystems is vital for maintaining the services they offer and supporting biodiversity.
- **Pollution**
  - **Air Pollution:** Emissions from industrial activities, transportation, and agriculture contribute to air pollution, which can harm human health and ecosystems. Air pollutants such as particulate matter, nitrogen oxides, and sulfur dioxide can lead to respiratory problems and environmental damage.
  - **Water Pollution:** Contamination of water bodies from industrial discharges, agricultural runoff, and improper waste disposal affects water quality and aquatic life. Polluted water can have serious implications for human health and biodiversity.
  - **Soil Pollution:** The use of pesticides, heavy metals, and other chemicals can degrade soil quality, affecting plant growth and agricultural productivity.

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- **Climate Change**
  - **Greenhouse Gas Emissions:** Increased levels of greenhouse gases, such as carbon dioxide and methane, from human activities contribute to global warming and climate change. This leads to rising temperatures, altered weather patterns, and more frequent extreme weather events.
  - **Sea Level Rise:** Melting ice caps and glaciers contribute to rising sea levels, which can cause coastal erosion, flooding, and loss of habitat for coastal species.
- **Land Use and Urbanization**
  - **Deforestation:** Clearing forests for agriculture, logging, or urban development reduces biodiversity, disrupts ecosystems, and contributes to carbon emissions. Forests play a critical role in carbon sequestration and climate regulation.
  - **Urban Expansion:** Rapid urbanization can lead to habitat destruction, increased pollution, and strain on natural resources. Sustainable urban planning is essential to balance development with environmental conservation.
- **Agricultural Practices**
  - **Sustainable Agriculture:** Traditional agricultural practices, such as monoculture and excessive use of chemical fertilizers and pesticides, can lead to soil degradation, water pollution, and loss of biodiversity. Sustainable agriculture focuses on practices that maintain soil health, conserve water, and support ecological balance.
  - **Food Waste:** Inefficient food systems and high levels of food waste contribute to environmental impact through resource use, greenhouse gas emissions, and waste management challenges.
- **Economic and Social Factors**
  - **Population Growth:** Rapid population growth increases demand for resources, leading to greater environmental pressure. Sustainable development strategies must consider population dynamics and resource needs.
  - **Economic Development:** While economic growth can improve living standards, it often leads to increased environmental impact. Integrating sustainability into economic policies helps to mitigate negative effects and promote long-term prosperity.
  - **Social Awareness and Education:** Public awareness and education about environmental issues play a crucial role in promoting sustainable behaviors and supporting conservation efforts.

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- **Technological and Policy Frameworks**
  - **Technological Innovations:** Advances in technology can contribute to environmental sustainability through improved resource efficiency, cleaner energy sources, and waste reduction. Innovations such as renewable energy technologies, energy-efficient systems, and pollution control mechanisms are essential.
  - **Environmental Policies:** Effective environmental policies and regulations are crucial for managing environmental impacts and promoting sustainability. Policies should address key issues such as pollution control, resource management, and conservation efforts.
- **Global and Local Interactions**
  - **Global Cooperation:** Environmental challenges often require international cooperation and agreements to address issues such as climate change, biodiversity loss, and transboundary pollution. Global initiatives and agreements help to coordinate efforts and share resources.
  - **Local Actions:** Local actions and community involvement are vital for addressing environmental issues at the grassroots level. Local initiatives can complement broader efforts and drive meaningful change within communities.

Environmental sustainability is influenced by a range of factors, including natural resource management, pollution, climate change, land use, agricultural practices, economic and social factors, technological innovations, and policy frameworks. Addressing these factors through integrated and sustainable approaches is essential for achieving long-term environmental health and stability.
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Objective

To evaluate the level of public support and awareness regarding environmental conservation, renewable energy, sustainable agriculture, waste management, water conservation, and green infrastructure in Ranchi, and to identify areas for improvement and increased engagement.

Literature Review

Author(s) & Year	Research Area	Location	Methodology	Findings
Kumar et al. (2022)	Sustainable Agriculture	Indian Mountain Regions	Extensive research on Climate-Smart Agriculture (CSA), analysis of climate change impacts, investigation of digital solutions for farmers	CSA can help increase productivity and build resilience against climate change. Digital solutions through gamification assist farmers in informed crop selection and reducing greenhouse emissions.

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Kumari & Pandey (2022)	Hydrological Modelling	Jumar River, Ranchi District	Modelling approach to analyse hydrological regime, qualitative factors like pH, turbidity, DO, BOD, COD, statistical and geospatial tools	The Jumar River's sustainability is highly sensitive to water scarcity and droughts. Extreme events lead to eutrophication, soil erosion, and sediment pollution. Various tools identified can help in river water quality modelling and assessment.
Aman & Srivastava (2020)	Solid Waste Management	Ranchi City	Analysis of current municipal solid waste management processes, population growth impact, waste quality and quantity assessment	Over 4000 tons of waste per month is generated, requiring significant landfill area by 2030. Effective management and implementation of new technologies, training, and policies are suggested for sustainable development.
Pujara et al. (2019)	Integrated Solid Waste Management	Indian Cities	Case scenarios analysis for waste management from 2001–2051, methods like incineration, composting, anaerobic digestion	ISWM methods can reduce landfill requirements and manage waste more effectively. Case III scenario suggests 80% waste reduction and minimal landfill requirements by 2031 with controlled population conditions. Formal handling and treatment of ISWM are crucial for sustainable development.
Shree & Kumar (2018)	Rainfall Trend Analysis	Ranchi District	Mann-Kendall and Sen's slope estimator for trend analysis, coefficient of variation (CV) for variability pattern	Significant decrease in annual, winter, and southwest monsoon rainfall, while pre-monsoon and post-monsoon rainfall showed an increase. High CV indicates vulnerability to droughts and floods in the region.
Kumar & Pandey (2016)	Groundwater Potential Analysis	Ranchi Urban Agglomeration	Time series regression, analytical hierarchical process (AHP) in GIS, terrain characteristics analysis	Central parts have low groundwater potential due to urbanization. Northern, southwestern, southern, and eastern parts have high potential with less fluctuation. Site-specific methods are needed to recharge and replenish groundwater in urban areas.

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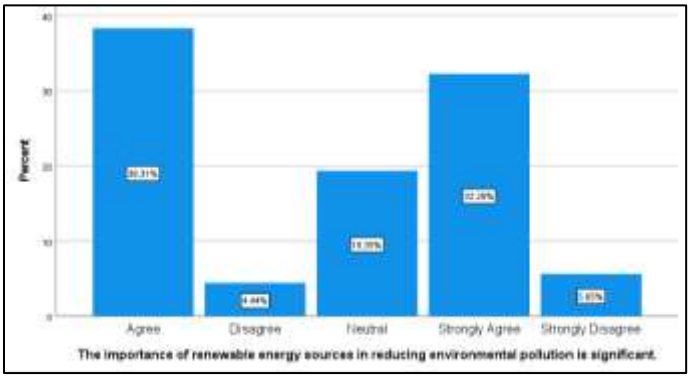
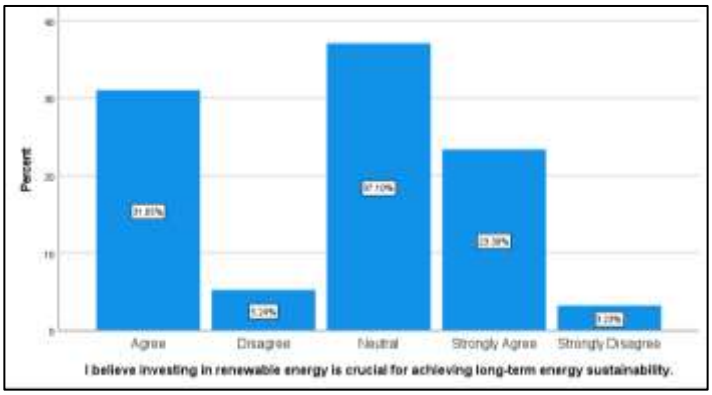
Tigga & Malini (2014)	Drought Impact Analysis	Various Regions	Analysis of precipitation data, climatic systems, and environmental changes impact on drought occurrences	Environmental changes and urbanization aggravate drought occurrences and vulnerability. Increased temperature and greenhouse effects contribute to changes in climate mean and extreme events like floods and droughts.
Mahesh & Jasmin (2013)	Renewable Energy Potential and CO2 Mitigation	India	Analysis of renewable energy investment, CO2 mitigation potential estimation	Renewable energy sector in India has significant potential for CO2 mitigation. Investment in renewable energy technologies is crucial for building a low carbon economy. Government policies need strengthening to scale up renewable technologies.

Analysis of Data



The data shows that 70.6% of respondents agree on the importance of renewable energy in reducing pollution, with 38.3% agreeing and 32.3% strongly agreeing. Only 10% disagree, while 19.4% remain neutral, indicating a need for more awareness and education on renewable energy's environmental benefits.



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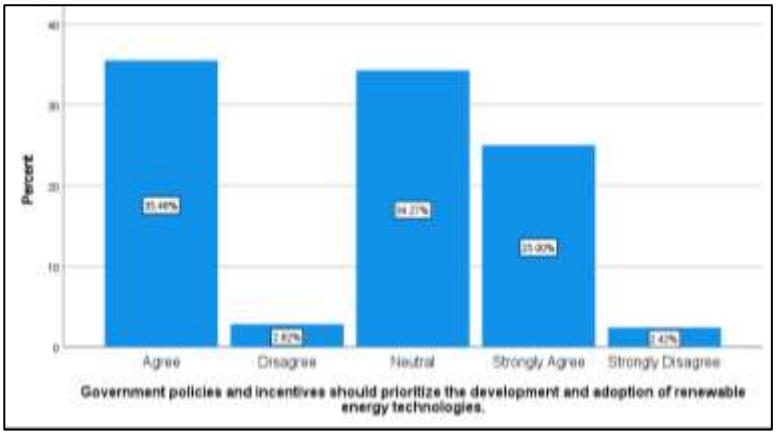
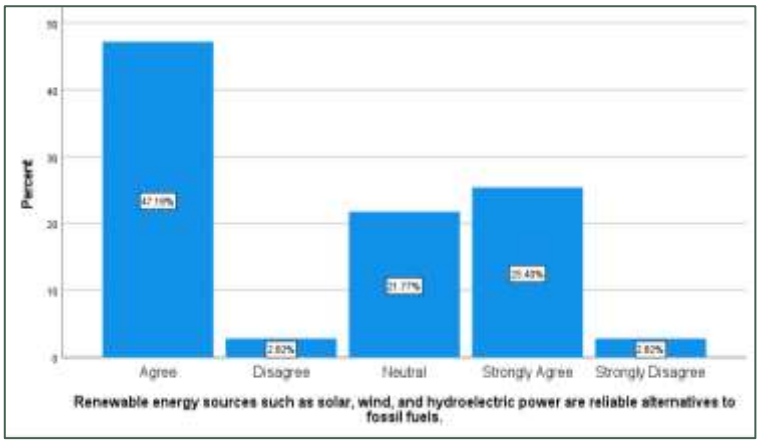
The data shows strong support for renewable energy investment, with 54.4% agreeing or strongly agreeing. However, 37.1% are neutral, indicating some uncertainty. Only 8.4% disagree or strongly disagree. Overall, there is significant backing for renewable energy, though a notable portion remains indifferent.



The data reveals that 60.5% of respondents support prioritizing renewable energy technologies in government policies, with 35.5% agreeing and 25.0% strongly agreeing. Only 5.2% disagreed, while 34.3% remained neutral. This majority consensus highlights a significant inclination towards renewable energy initiatives, emphasizing their importance for sustainable development.



The data reveals 60.5% of respondents favour prioritizing renewable energy in government policies, while only 5.2% oppose it. With 34.3% neutral, the majority consensus highlights significant support for renewable energy initiatives, recognizing their importance for sustainable development.

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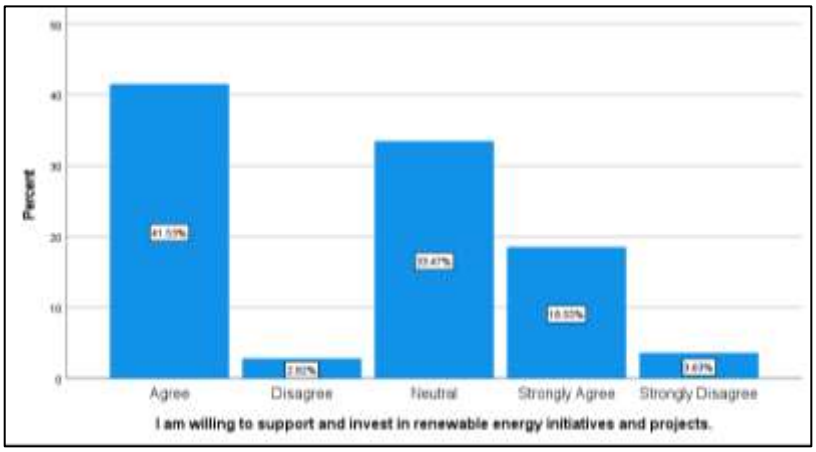
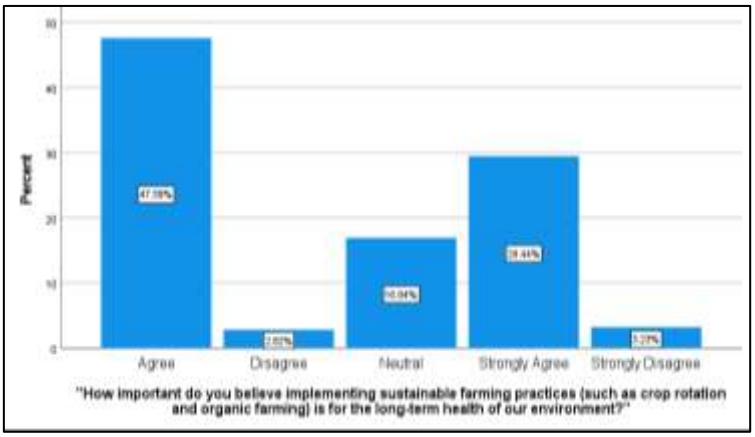
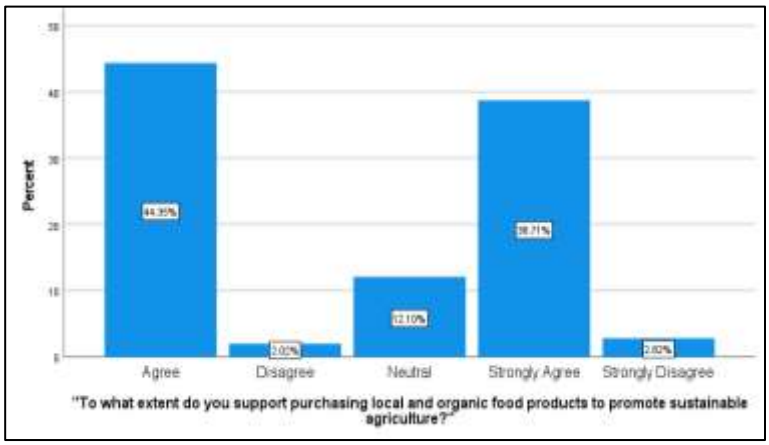


The data reveals strong support for renewable energy, with 60% favouring investments and only 6.4% opposing. A notable 33.5% are neutral, indicating a positive overall attitude towards sustainable energy initiatives and minimal resistance.



Survey results show a strong consensus on sustainable farming's importance, with 77% of respondents agreeing or strongly agreeing on its necessity. Only 6% disagreed, while 17% were neutral, indicating widespread recognition of sustainable farming's positive environmental impact.



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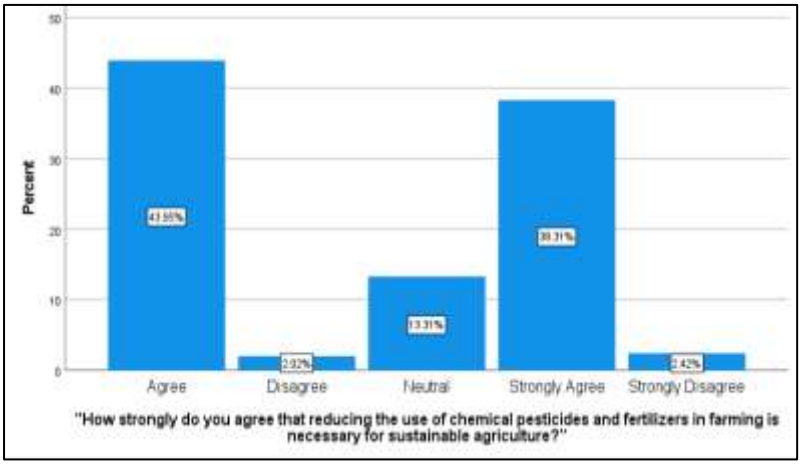
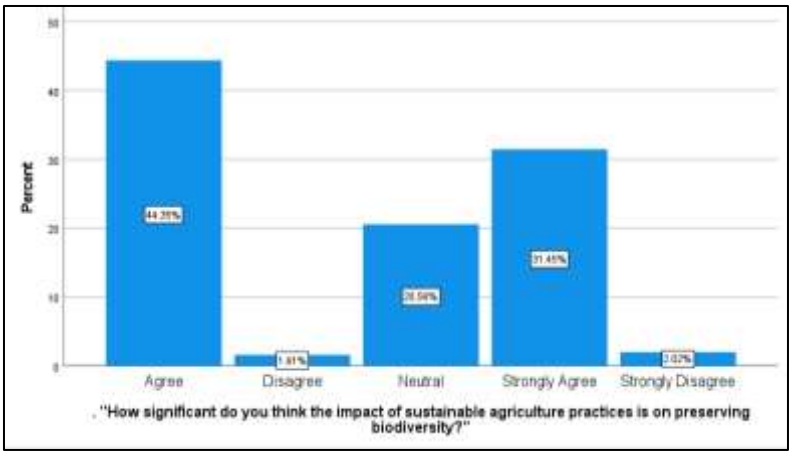
Data shows 83.1% of respondents support buying local and organic food to promote sustainable agriculture, with 44.4% agreeing and 38.7% strongly agreeing. This strong consensus highlights the importance of such practices for environmental and economic sustainability.



The survey shows that 82.3% of respondents support reducing chemical pesticides and fertilizers in agriculture, with 44.0% agreeing and 38.3% strongly agreeing. Only 4.4% disagree, while 13.3% are neutral, reflecting strong consensus on minimizing chemical use for sustainability.



Survey results show strong support for sustainable agriculture's role in preserving biodiversity, with 76.0% of respondents agreeing or strongly agreeing on its importance. Minimal opposition (3.6%) and 20.6% neutrality underscore broad recognition of its environmental benefits.

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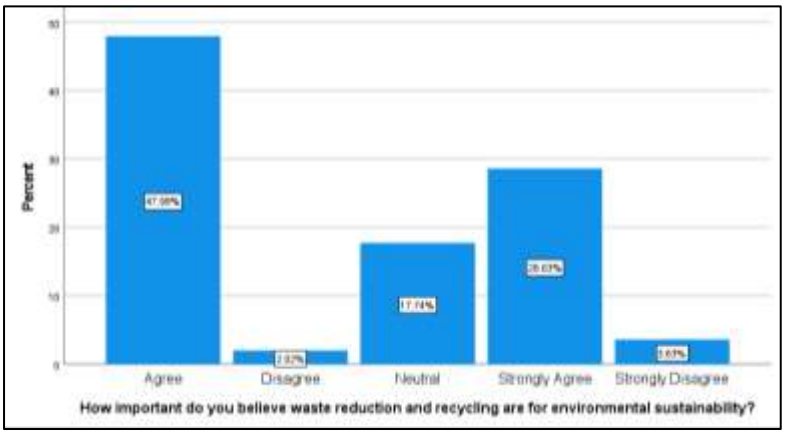
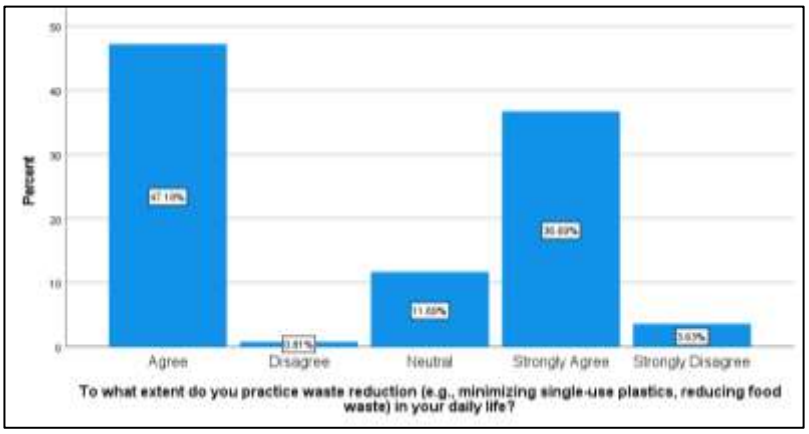
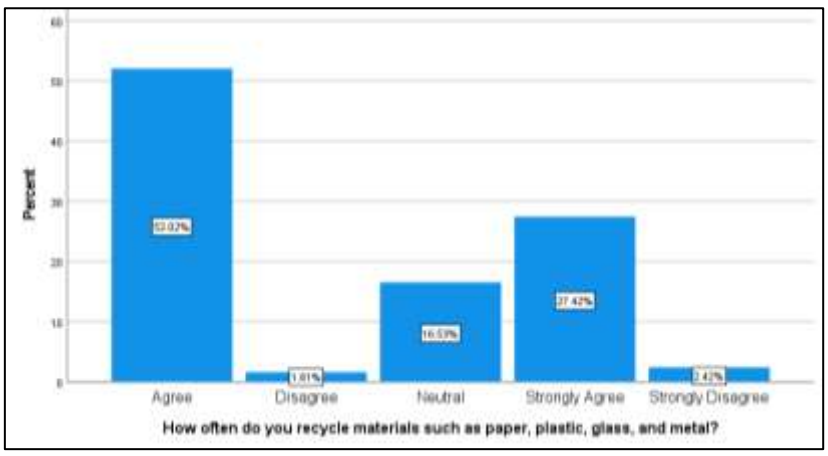


Data shows strong support for waste reduction and recycling, with 76.6% of respondents agreeing or strongly agreeing on their importance for environmental sustainability. Only 5 (2.0%) disagreed, and 9 (3.6%) strongly disagreed, highlighting broad recognition of their role.



Survey results show 83.9% of respondents actively engage in waste reduction, with 47.2% agreeing and 36.7% strongly agreeing. Only 4.4% express resistance, while 11.7% remain neutral, indicating widespread commitment to sustainable waste management practices.



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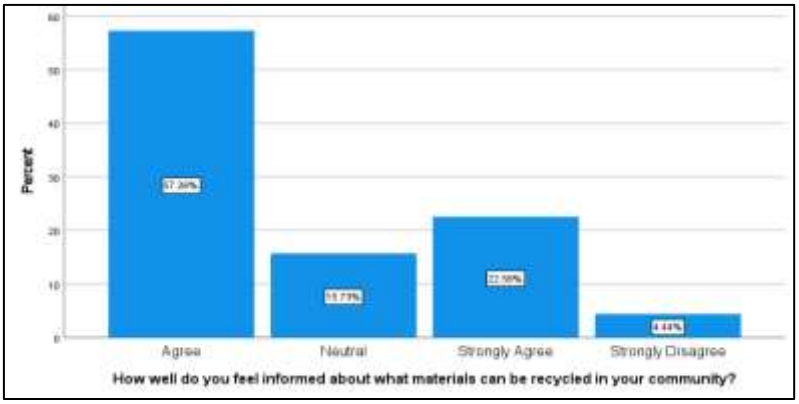
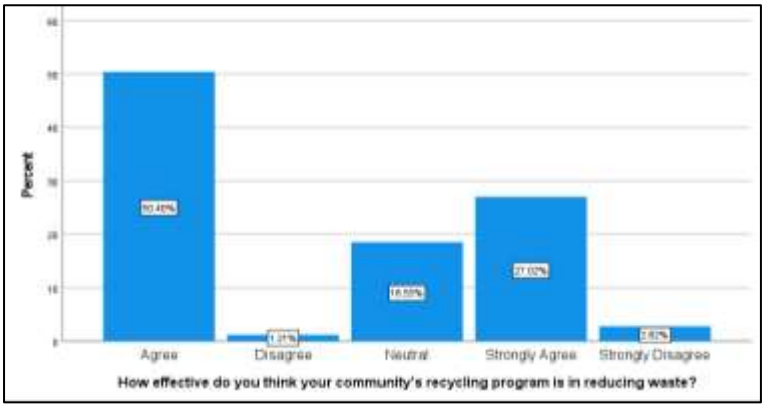
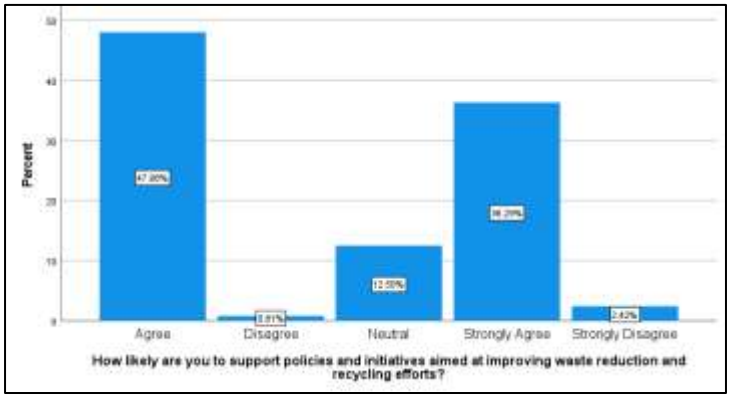
The data shows a strong positive attitude towards recycling in the community, with 79.4% of respondents either "Agree" (52.0%) or "Strongly Agree" (27.4%) about regularly recycling materials. Conversely, 4.0% "Disagree" or "Strongly Disagree," and 16.5% are neutral.



Survey results show 79.9% of respondents feel well-informed about recyclable materials, with 57.3% agreeing and 22.6% strongly agreeing. Conversely, 15.7% are neutral, and 4.4% strongly disagree, indicating a generally high awareness but with some needing more information.



Survey data shows 77.4% of respondents view the recycling program positively, with 50.4% agreeing and 27.0% strongly agreeing on its effectiveness. Only 4.0% see it as ineffective, while 18.5% are neutral, indicating general support but some uncertainty.



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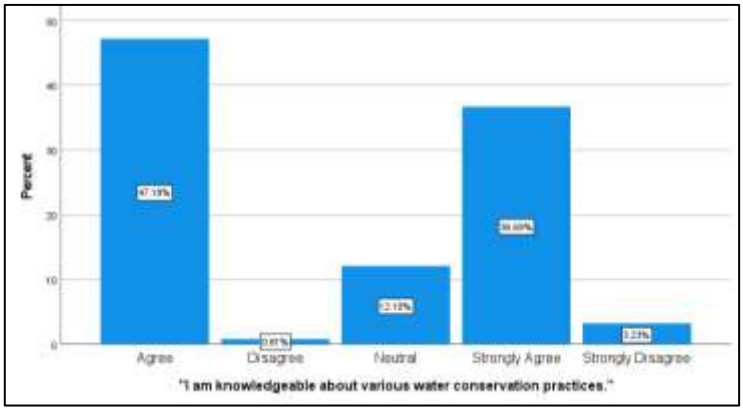
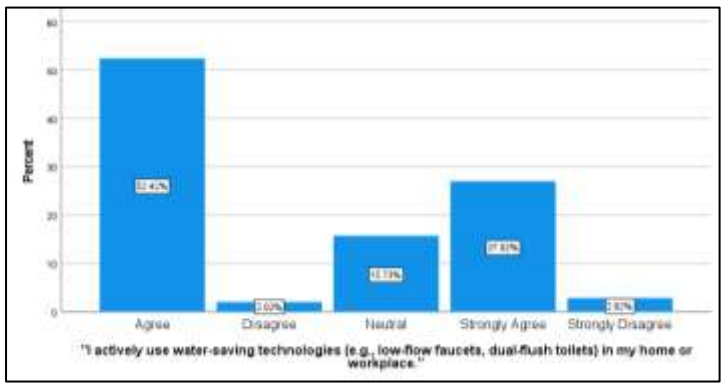
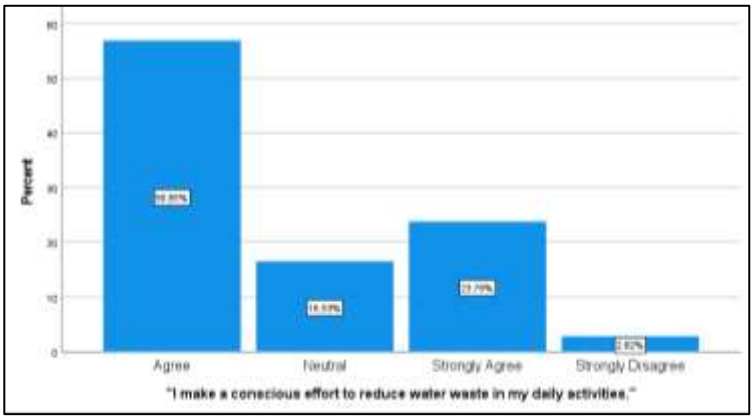
The survey shows strong community support for waste reduction and recycling initiatives, with 84.3% favoring such policies. Only 3.2% oppose, and 12.5% are neutral. This indicates a positive attitude towards enhancing waste management and environmental sustainability.



Survey results show strong agreement with the statement on water conservation knowledge, with 47.2% agreeing and 36.7% strongly agreeing. Only 0.8% disagree, and 3.2% strongly disagree, indicating general confidence but some neutral or uncertain responses.



The data shows a strong commitment to water conservation, with 52.4% of respondents using water-saving technologies and 27.0% strongly agreeing. However, 2.0% disagree and 2.8% strongly disagree, while 15.7% are neutral, suggesting room for increased awareness and education.



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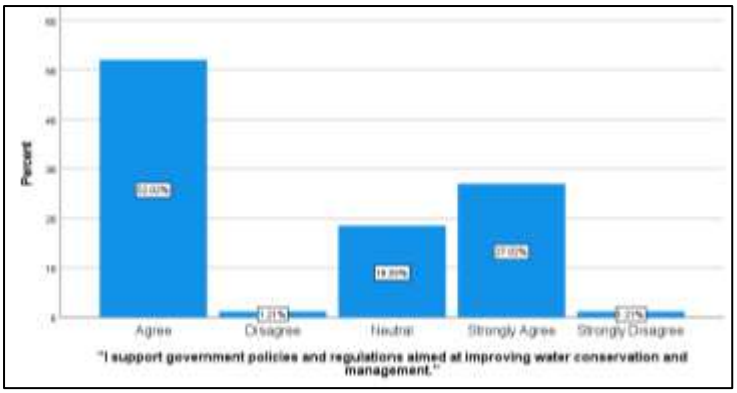
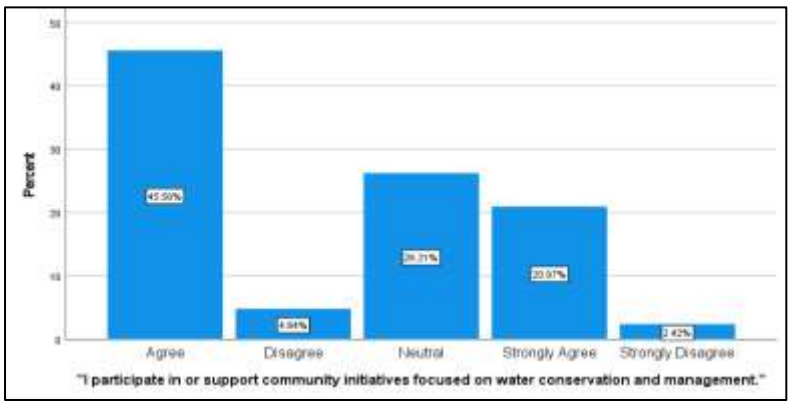
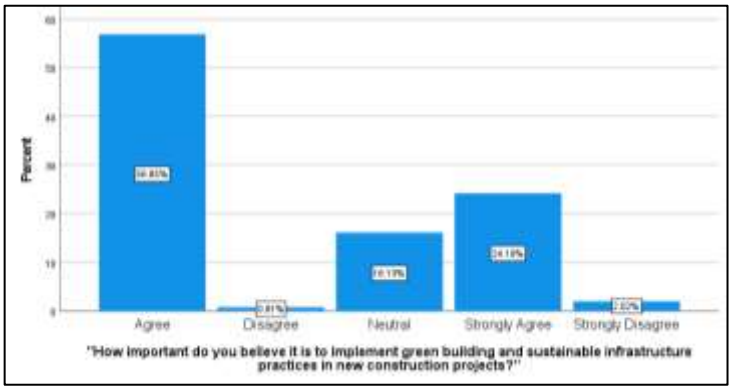
Data shows strong awareness and commitment to water conservation among respondents, with 80.7% agreeing or strongly agreeing to reduce water waste in daily activities. This high engagement indicates a positive trend towards environmental responsibility, despite a small minority remaining neutral or disagreeing.



Data shows strong support for water conservation policies, with 79% of 248 respondents agreeing or strongly agreeing. Only 2.4% oppose, while 18.5% are neutral. This indicates widespread endorsement of government efforts to enhance water management and conservation.



Data shows strong community support for water conservation, with 66.6% agreeing or strongly agreeing with involvement in initiatives. Only 7.2% express disagreement, while 26.2% are neutral. High support indicates a valued concern, but further engagement with neutrals is needed.



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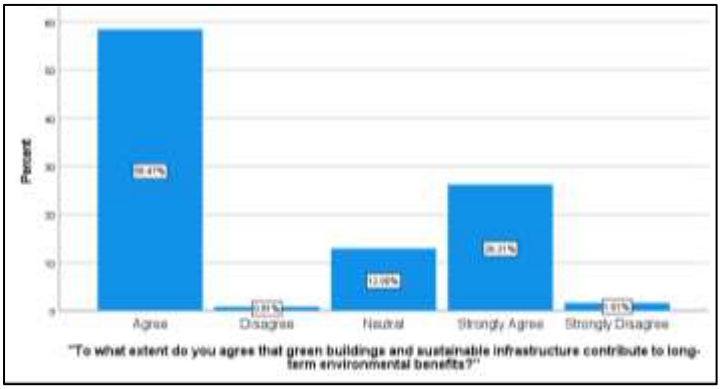
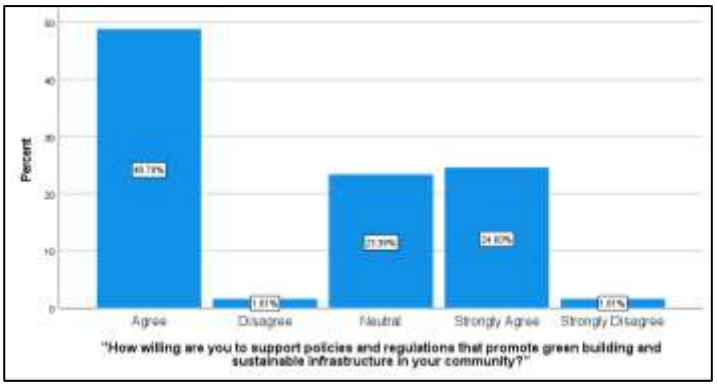
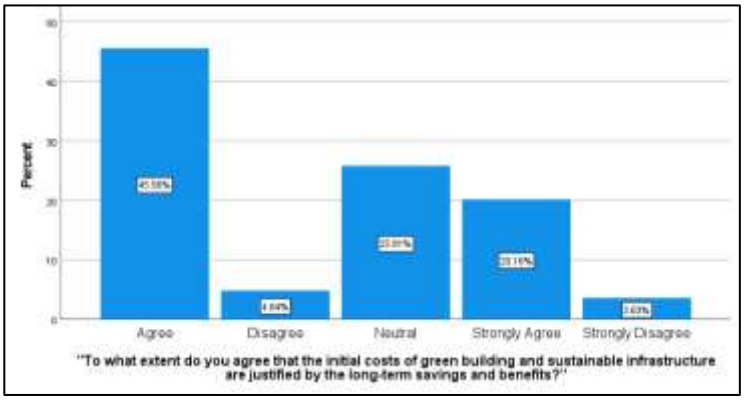
Data shows strong support for green building and sustainable infrastructure, with 81.1% agreeing or strongly agreeing on their necessity. Only 2.8% disagreed, and 16.1% were neutral, indicating broad recognition and commitment to environmental responsibility in construction.



Data shows that 84.7% of respondents support green buildings and sustainable infrastructure for their significant environmental benefits, with only 2.4% expressing disagreement. The overwhelming positive response highlights a strong belief in their role in reducing resource consumption and environmental impact.



The survey shows strong community support for green building and sustainable infrastructure, with 73% agreeing or strongly agreeing with such policies. Only 3.2% opposed, and 23.4% were neutral, indicating a favourable attitude towards integrating sustainable practices.



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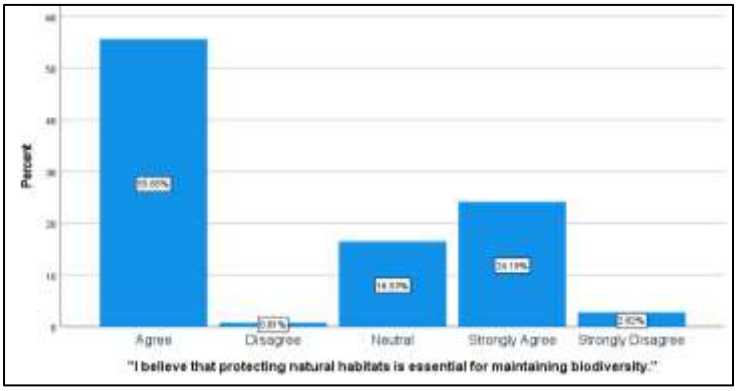
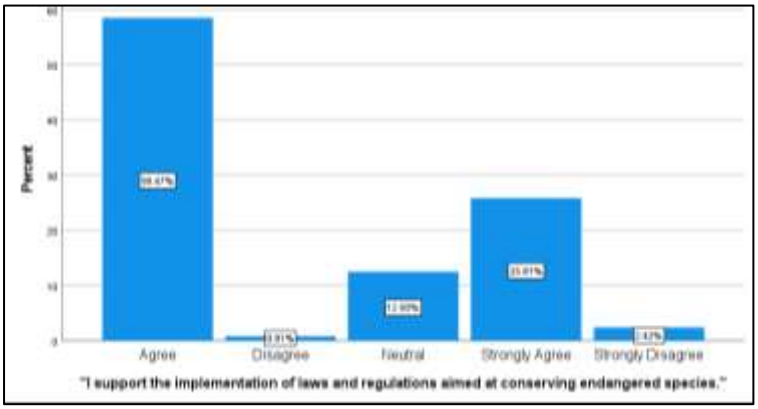
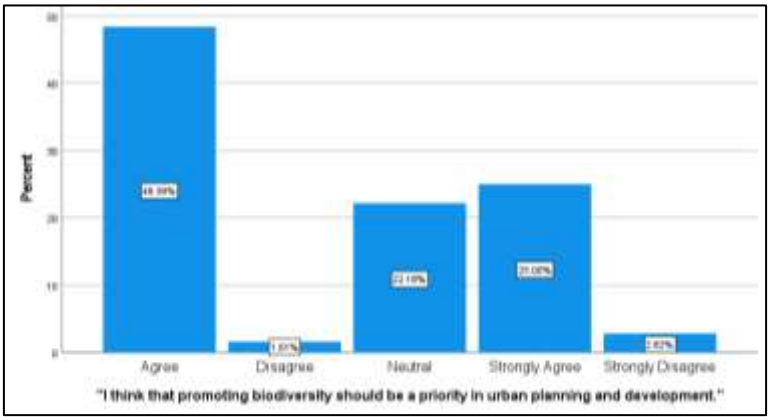
Data shows 65.8% of respondents support the long-term benefits of green building despite higher initial costs, recognizing future savings and environmental advantages. Conversely, 8.4% disagree, with 25.8% remaining neutral, indicating varying perspectives on sustainability investments.



Data reveals a strong consensus on protecting natural habitats, with 79.8% of respondents agreeing or strongly agreeing. Only 3.6% opposed, while 16.5% were neutral. This indicates widespread support and recognition of the importance of conservation for biodiversity.



Data shows strong public support for laws to conserve endangered species, with 84.3% of respondents in favour. Only 0.8% oppose and 2.4% strongly oppose, while 12.5% are neutral. This indicates broad commitment to conservation through legislation.



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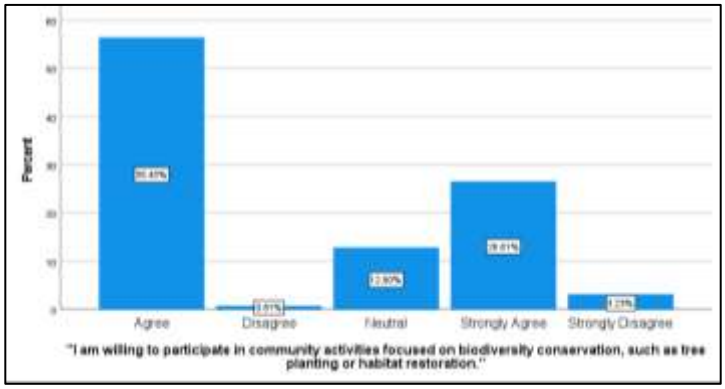
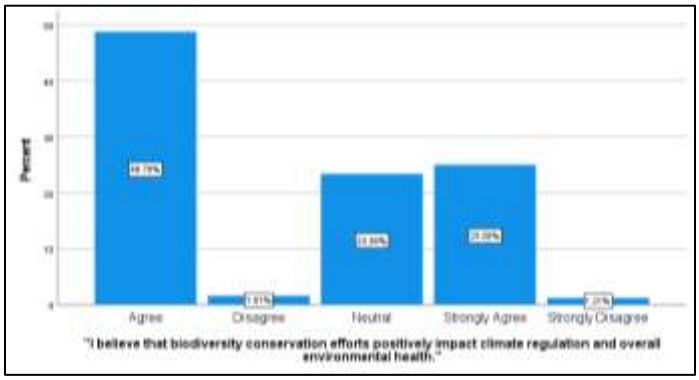
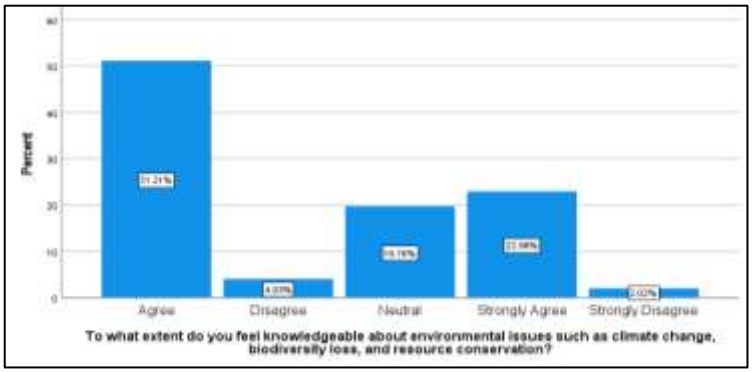
The data shows strong public support for laws conserving endangered species, with 84.3% either agreeing or strongly agreeing. Minimal opposition exists (3.2%), while 12.5% are neutral. This indicates widespread commitment to legislative conservation efforts.



The data reveals strong community support for biodiversity conservation, with 83.1% favouring activities like tree planting and habitat restoration. Only a small percentage opposed these efforts, indicating a general consensus on the importance of community involvement in enhancing environmental sustainability.



Data from 248 respondents shows strong support for biodiversity conservation's positive impact on climate regulation and environmental health, with 73.8% agreeing or strongly agreeing. This highlights broad recognition of biodiversity's role in enhancing climate stability and environmental well-being.



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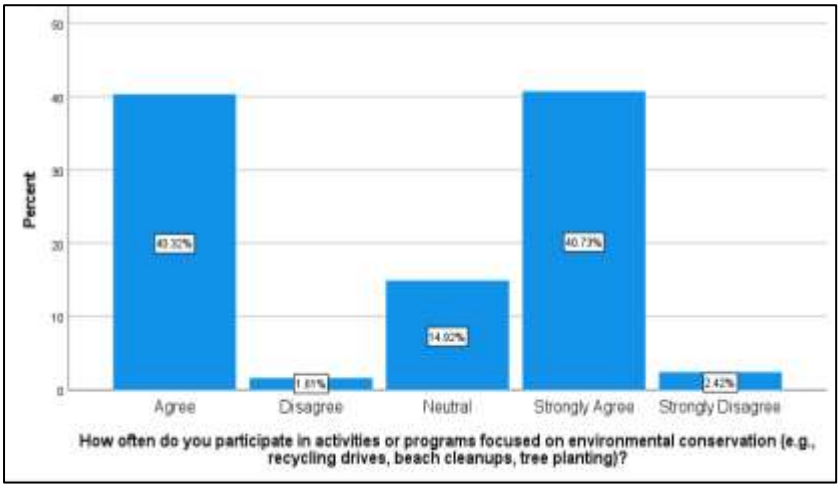
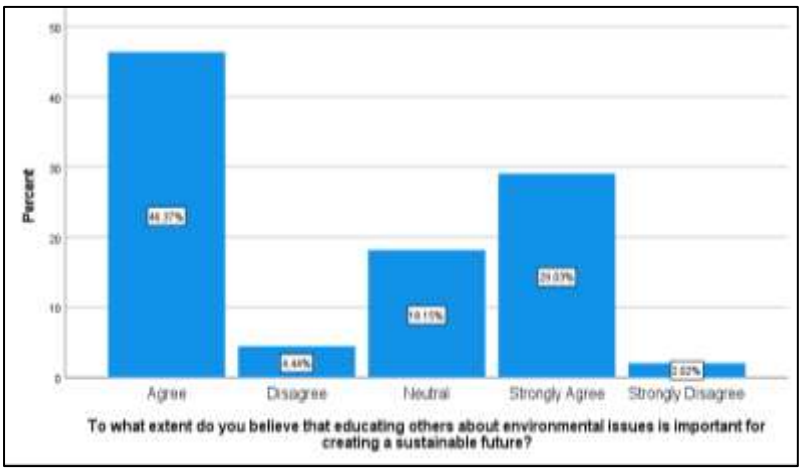
Survey results show a majority (74.2%) of respondents feel moderately to highly knowledgeable about climate change, biodiversity, and resource conservation. However, 6.0% feel less informed, and 19.8% are neutral, indicating opportunities for enhanced environmental education and awareness.



Data shows strong community engagement in environmental conservation, with 81% of respondents frequently participating in activities like recycling and tree planting. While 14.9% remain neutral and a small fraction does not engage, the overall trend indicates significant environmental commitment.



Survey data reveals a strong consensus on the importance of environmental education for sustainability, with 75.4% agreeing or strongly agreeing on its crucial role. Only 6.4% disagreed, while 18.1% were neutral, underscoring the need for increased awareness.

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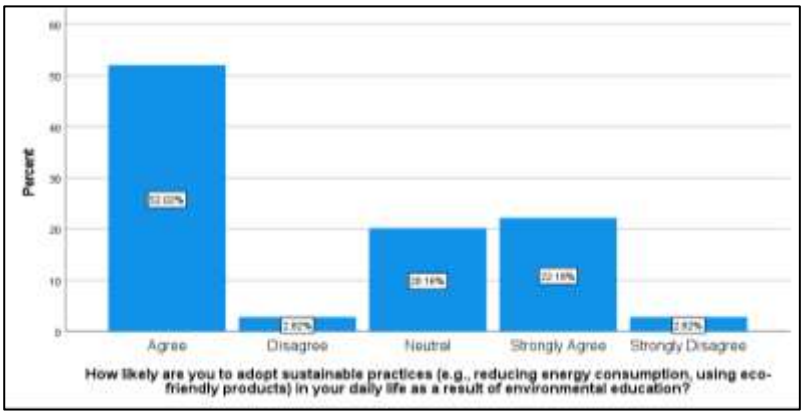
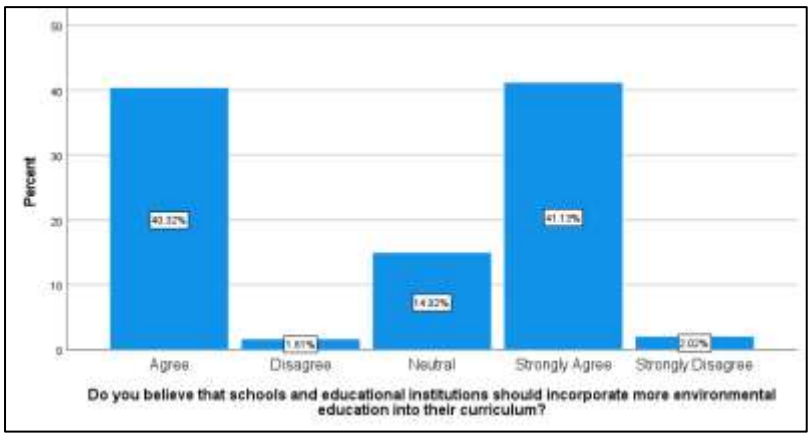
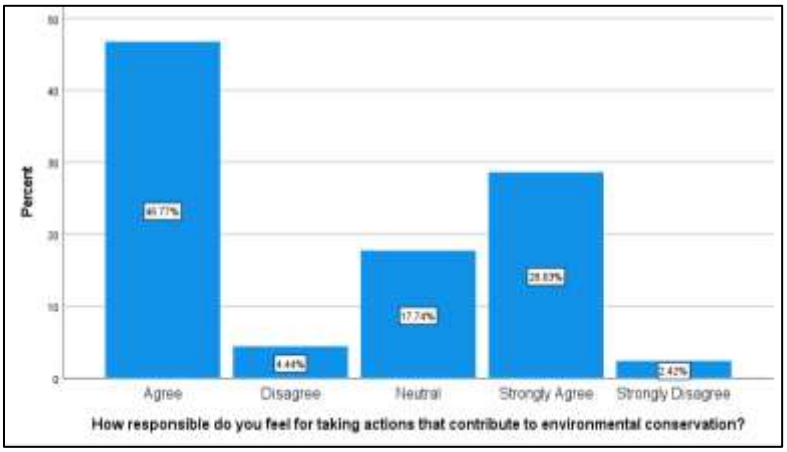


The data shows that 74.2% of respondents are likely to adopt eco-friendly practices due to environmental education, with 52% agreeing and 22.2% strongly agreeing. Only 2.8% disagree, indicating minimal resistance, while 20.2% remain neutral.



Survey results show a strong consensus for integrating more environmental education in schools, with 81.4% of respondents supporting this view. Only 3.6% opposed, indicating broad agreement on the importance of fostering environmental awareness among students for a sustainable future.



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Survey results show that 75% of respondents feel responsible for environmental conservation, with 46.8% "Agreeing" and 28.6% "Strongly Agreeing." Only 6.8% "Disagree" or "Strongly Disagree," while 17.7% are neutral, indicating overall commitment but some uncertainty.

Summary

This study assesses public attitudes and behaviours related to environmental conservation in Ranchi. Through survey data, it examines community support for various sustainability initiatives, including renewable energy, sustainable agriculture, waste management, water conservation, and green building practices. The results indicate a high level of commitment to environmental stewardship among respondents, with strong support for renewable energy investments, sustainable farming practices, and waste reduction efforts. Despite broad support, there are areas where further education and engagement are needed, particularly concerning renewable energy benefits and the adoption of eco-friendly practices.

Findings

- Environmental Responsibility: 75% of respondents feel responsible for environmental conservation, reflecting a strong commitment to protecting the environment.
- Renewable Energy: 70.6% support renewable energy for reducing pollution, with 54.4% in favour of investing in it and 60.5% backing its prioritization in government policies.
- Sustainable Agriculture: There is significant support for sustainable farming, with 77% acknowledging its importance, and 83.1% favouring the reduction of chemical pesticides and fertilizers.
- Waste Management: 76.6% of respondents value waste reduction and recycling, with 83.9% actively engaging in these practices.
- Water Conservation: 80.7% are committed to reducing water waste, and 79% support water conservation policies.
- Green Building: 81.1% endorse green building and sustainable infrastructure, despite some concerns about higher initial costs.
- Biodiversity: 84.3% support laws for endangered species conservation, with 83.1% favouring biodiversity-enhancing activities like tree planting.
- Environmental Education: 75.4% see environmental education as crucial, with 81.4% supporting its integration into school curricula.

Conclusion

Achieving environmental sustainability in Ranchi requires a multifaceted approach addressing natural resource management, pollution control, sustainable agriculture, and renewable energy adoption. Effective waste management, urban planning, and community involvement are essential for mitigating environmental degradation. Policies promoting sustainable practices and technological innovations play a critical role in this endeavour. The study highlights the need for robust implementation and monitoring of sustainability initiatives to balance development with

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environmental conservation. By fostering a culture of sustainability, Ranchi can enhance its ecological health, economic stability, and social well-being, ensuring a resilient and equitable future for its residents. The insights gained from this research can guide policy-making and support similar regions facing rapid growth and environmental challenges.

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