

YOUTH VOICES FOR A SUSTAINABLE FUTURE

Editor
Dr. Monita Dhiman

VYOM HANS PUBLICATIONS

**YOUTH VOICES FOR
A SUSTAINABLE FUTURE**

Youth Voices for a Sustainable Future

Editor

Dr. Monita Dhiman

Department of Zoology,
Khalsa College for Women,
Civil Lines, Ludhiana-141002, Punjab, India.
monid.84@gmail.com

VYOM HANS PUBLICATIONS

© Editor (*Dr. Monita Dhiman*)
Date of Publications: March 05, 2025
E-ISBN (Digital Download and Online): 978-81-970890-9-1

Published By
VYOM HANS PUBLICATIONS
MSME UDYAM-PB-20-0063194
967/EH1, Industrial Area, DeraBassi,
SAS Nagar (Mohali), PIN-140507, Punjab, India.
E-Mail: sushil.kumar@vyomhansjournals.com
Website: <https://press.vyomhansjournals.com>
Mob: +91 9781711925

The authors, editors, and publisher of this book do not provide medical advice or endorse the use of any particular techniques. The content is intended solely for educational and informational purposes. Neither the authors, editors, nor the publisher shall be held responsible or liable for any consequences arising from the use or misuse of the information presented in this book.

The publisher affirms that the content of this book does not infringe upon any existing copyrights or intellectual property rights. However, if any source has been inadvertently omitted or not properly attributed, please notify the publisher in writing, and appropriate corrective action will be taken.

Youth voices for a sustainable tomorrow..

CONTENTS

Sr. No.	CHAPTER	PAGE
A1	PREFACE	ix
1	THE POWER OF YOUTH IN COMBATING CLIMATE CHANGE <i>Gurnemat Kaur</i>	1
2	SUSTAINABILITY STARTS WITH US: YOUTH-DRIVEN INNOVATIONS <i>Ridhima Jain</i>	12
3	GREEN EDUCATION: TEACHING SUSTAINABILITY IN THE CLASSROOM <i>Sita</i>	20
4	FROM LOCAL TO GLOBAL: YOUTH-LED CLIMATE MOVEMENTS <i>Anushka Pareek</i>	30
5	ECO-ENTREPRENEURSHIP: YOUNG MINDS DRIVING GREEN BUSINESS <i>Surpreet Kaur and Hitakshi Gaira</i>	38
6	SOCIAL MEDIA AND CLIMATE ADVOCACY: THE ROLE OF YOUTH INFLUENCERS <i>Tulika</i>	50
7	BIODIVERSITY AND CLIMATE: YOUTH EFFORTS IN CONSERVATION <i>Yashika</i>	59
8	URBAN SUSTAINABILITY: IDEAS FROM THE YOUTH FOR SMART CITIES <i>Tarunpreet Kaur</i>	68
9	PLASTIC POLLUTION: CREATIVE YOUTH SOLUTIONS FOR A CLEANER PLANET <i>Namya, Mehak and Gurnemat</i>	77
10	RENEWABLE ENERGY: HOW YOUNG INNOVATORS ARE CHANGING THE GAME <i>Anmol Dhunna</i>	86

11	AGRICULTURE AND CLIMATE RESILIENCE: EMPOWERING YOUTH IN FARMING <i>Surbhi Thakur</i>	94
12	WOMEN, YOUTH, AND SUSTAINABILITY: BRIDGING GENDER GAPS <i>Palak and Ramanpreet Kaur</i>	102
13	INNOVATIONS IN RECYCLING: YOUTH-CENTRIC APPROACHES TO WASTE MANAGEMENT <i>Upjipreet Kaur Brar</i>	115
14	MARINE CONSERVATION: YOUNG VOICES FOR OCEANS <i>Kirti</i>	123
15	ENVIRONMENTAL ART AND STORYTELLING: INSPIRING CHANGE THROUGH CREATIVITY <i>Tanvi Bansal</i>	132
16	CLIMATE ADAPTATION STRATEGIES: YOUTH-LED COMMUNITY INITIATIVES <i>Nandini Bali</i>	138
17	THE FUTURE WE WANT: VISIONARY IDEAS FROM THE NEXT GENERATION <i>Yuvika</i>	147

PREFACE

Climate change is a problem that we can no longer ignore. It is now an accelerating reality that is actively transforming our world today and will continue to do so in the foreseeable future. The world grapples with severe socio-economic inequalities along with the degradation and depletion of resources. In the mortuary silence, the magnificent voice of youth emerges with vigor, urgency, and hope. Youth Voices for a Sustainable Future: Tackling Climate Change and Nurturing Our Planet pay tribute to the tenacious resolve of this generation to combat climate change as well as take responsibility on a global scale.

This anthology contains the powerful contributions of graduate students, who not only dream of a better world, but who are taking steps to actively create that world. The different chapters of this book show how youths are addressing the challenges of climate change through grassroots activism, environmental entrepreneurship, digital advocacy, community-driven programs, and other forms of conservation.

What makes this volume particularly special is its origin. Each chapter has been thoughtfully contributed by student members of the Youth Club at Khalsa College for Women, Civil Lines, Ludhiana, a vibrant academic community where sustainability is not just discussed but practiced with passion and purpose. These students have drawn upon their academic understanding, lived experiences, and local contexts to craft solutions with global relevance.

We extend our heartfelt gratitude to Khalsa College for Women, Civil Lines, Ludhiana for fostering a nurturing environment that empowers youth leadership and for supporting this publication as a platform to amplify their voices. The college's commitment to environmental education and youth engagement stands as a model for institutions everywhere.

All of us benefit from sustainability in one way or the other, be it as policy makers, educators, citizens or researchers. Hence we aim to inspire every one of them through this book so that they no longer see the youth as passive recipients, but the fiercest advocates of sustainability. We hope these pages incite collective introspection, new ideals, and guide us towards an equal and greener society.

Together, let us listen, learn, and lead.

Dr. Monita Dhiman

Editor

CHAPTER-1

THE POWER OF YOUTH IN COMBATING CLIMATE CHANGE

Ms. Gurnemat Kaur

Khalsa College for Women,
Civil Lines, Ludhiana, Punjab, 141002

Email ID: gurnematk@gmail.com

ORCID ID: 0009-0000-7055-6682

Abstract

The escalating crisis of climate change demands urgent action, and the power of youth activism has emerged as a formidable force in addressing this global challenge. This paper explores the role of young people as catalysts for change, highlighting their grassroots movements, advocacy efforts, and the increasing recognition of their influence in climate policy and governance. Through examining significant youth-led initiatives such as Fridays for Future and the Global Youth Climate Strike, the paper underscores the importance of empowering youth to engage in local actions that can lead to global transformations. It also discusses the challenges faced by young activists, including tokenism in policy discussions and the need for inclusive platforms that amplify their voices. By fostering educational initiatives and enhancing youth participation in decision-making processes, society can harness the creativity and passion of the younger generation to combat climate change effectively. Ultimately, the paper advocates for a shift from mere involvement to genuine leadership, ensuring that youth perspectives are integral to shaping sustainable climate policies and fostering intergenerational equity.

Keyword: Climate change, youth activism, climate justice, empowered youth, youth advocacy

Introduction

The world as we know it is experiencing serious environmental difficulties, with climate change being one of the most critical issues. Rapid global warming, increased frequency of natural disasters, and environmental degradation

highlight the urgency of addressing this situation. These concerns have produced a new generation of youth leaders eager to solve this problem by means of advocacy and action. Youth around the world are organising at the grassroots, national, and worldwide levels to influence policy, raise awareness, and demand immediate action from corporations, governments, and international organisations. The last decade has seen an increase in youth-led activism for the environment. Movements such as Greta Thunberg's Fridays for Future, Extinction Rebellion, and the Global Youth Climate Strike have mobilised millions of people throughout the world and raised awareness about the subject of climate change. These movements urge for immediate action, not just through protests, but also by lobbying for legislative reforms that are consistent with global environmental goals like the Paris Agreement (2015) and the United Nations Sustainable Development Goals. Understanding the impact of youth on climate policy and governance becomes increasingly important as these movements grow (Terry, 2023). Young activists are not just movement students who learnt valuable lessons from their involvement, but they also turn into climate justice educators for those in their immediate vicinity, such as the general public, influential people, schoolchildren and youth, and close friends and family (Trott, 2024).

To fully grasp the significance of youth-led climate action, it is essential to understand the severity and urgency of climate change itself, its causes, consequences, and the pressing need for action.

The Science and Impact of Climate Change

The most recent assessment from the Intergovernmental Panel on Climate Change (IPCC) shows that climate change is bound to have major global consequences, including increased exposure of coastal regions to catastrophes related to nature. (Wellman et. al., 2025) Climate change refers to the change in patterns of the climate that is mostly brought about by greenhouse gas emissions. The primary cause of global warming has been greenhouse gas emissions, which trap heat in the earth's atmosphere. Human activity and natural processes are the primary sources of these emissions. While human activities are mostly associated with energy production, industrial processes, forestry, land use, and land-use change, natural systems include forest fires, earthquakes, oceans, permafrost, wetlands, mud volcanoes, and volcanoes. (Fawzy et. al., 2020) Climate change has wide-ranging environmental consequences, including rising air pollution and irritants, increasing temperatures, more intense and frequent catastrophes due to weather, disruptions to vector ecology, reduced quality and accessibility of food and water, along with deteriorating living conditions. As a result of that, human health is directly and indirectly threatened by increasing incidence of physical harm, heat illness, allergy and asthma attacks, food-and-water-borne infections, hunger, mental distress, and an overall aggravation of socioeconomic imbalances and health disparities (Ramadani et. al., 2023).

The urgency of climate change is evident and growing, and it is now ingrained in science, technology, global politics, economics, social connections, and

aesthetics. The detrimental impacts of global climate change on a worldwide scale are becoming increasingly evident, and top climate scientists have confirmed that urgent action is necessary to avoid the disastrous consequences of a global mean temperature increase of more than 1.5°C by 2050 (McGimpsey et. al., 2023).

The most recent reports on Physical Science and Impacts, Adaptation, and Vulnerability from the Intergovernmental Panel on Climate Change (IPCC) project dire scenarios for the future of humanity. The remarks made by United Nations Secretary-General António Guterres about a “code red for humanity” highlight that climate change has infiltrated every aspect of social, cultural, political, and economic life. Recent climatic events, including rising temperatures in North America and Europe, severe flooding in China and Germany, drastic desertification in Southern Africa, and wildfires in Greece, North America, Australia, and Russia, affirm that these occurrences are becoming commonplace. Instead, they signify widespread and escalating changes that will further compound human rights abuses, threaten the well-being of climate-vulnerable and frontline communities, endanger food, land, and water security, and undermine decades of progress in social, gender, and political equity. The current implementation of mitigation policies suggests we are on course for a minimum of 2.7 °C warming by the year 2100, instead of the global aim of 1.5 °C, with G20 nations, responsible for nearly 80% of global greenhouse gas (GHG) emissions, likely to miss their Nationally Determined Contributions (NDCs) (Gasparri et. al., 2022).

It is projected that between 3.3 and 3.6 billion individuals live in conditions that are highly susceptible to climate change. The vulnerability of people to climate change significantly relies on the specific challenges faced in certain regions and among particular population groups, due to persistent historical patterns of inequality associated with gender, age, ethnicity, income level, and colonialism. The IPCC indicates that “global hotspots of high human vulnerability are predominantly located in West, Central, and East Africa, South Asia, Central and South America, Small Island Developing States, and the Arctic,” in addition to areas characterized by high poverty and limited access to essential services and resources. According to UNICEF, over 1 billion children, representing half of the world's children, reside in nations facing extremely high threats from climate change, jeopardizing their survival particularly through under nutrition, air pollution, and various diseases. This severely impacts child mortality and health, with expectations of rising instances of diarrhea and pneumonia. Even with current commitments to reduce emissions, a child born in 2020 will likely encounter a two to sevenfold increase in extreme weather events, particularly heat waves, compared to those born in the 1960s, which will profoundly affect their growth and overall well-being (Rees, 2021).

Considering that the Universal Declaration of Human Rights asserts that every individual is entitled to the same rights and freedoms stated in the Declaration—irrespective of national origin, gender, age, or race and recognizing that the impacts of climate change disproportionately target the health and livelihoods

of marginalized communities who contribute the least to greenhouse gas emissions, it becomes evident that climate change undermines their ability to enjoy a life that is free, healthy, and dignified. Thus, as noted by the IPCC, climate-resilient development necessitates policies and interventions that focus on reducing exposure, vulnerability, and social inequity while concurrently addressing effective mitigation and adaptation efforts to lessen the impacts of climate change on health, well-being, and human livelihoods.

Given the devastating effects of climate change, young people have emerged as powerful voices demanding urgent action. Their movements are not just about raising awareness but about pushing for concrete policy changes to mitigate the crisis.

Youth-Led Climate Activism

Climate change is a critical worldwide issue that requires rapid response (Aboukhousa et. al., 2024). Human actions are the primary drivers of ecological fluctuations, but they also hold the power to mitigate these changes. Although climate change is a global phenomenon, its effects are deeply felt at the local level, disproportionately impacting marginalized and impoverished communities compared to their wealthier counterparts. While affluent individuals may face disruptions due to extreme weather conditions, the underprivileged often suffer the most, as their survival depends on vulnerable resources like rivers and small-scale farming (Nkrumah, 2021).

Young people's contributions are more important than ever in the complicated world of today. Students are actively employing research to have their opinions heard and promote significant change, in addition to learning about global issues. They are looking at their own towns and lifestyles and asking themselves what they as individuals can do to change things for the better. They demonstrate that their enthusiasm and dedication can propel educational and social advancement by transforming their dreams and ambitions into leadership through cooperative research (McPhail, 2024). As climate change continues to intensify, younger generations will bear the brunt of its uncertainties and hazards. So, engaging and empowering the younger generation, who will be influencing the future, is crucial to effectively deal with this issue. It is essential to empower youth to adopt local actions that can result in global change. Young people are frequently in the forefront of bringing attention to environmental issues and have a big stake in the future. Their imagination, passion, and capacity to effect significant change on a global scale may be ignited by giving them the information, resources, and chances to act locally (Rap et. al., 2024). Given that global warming aggravates all of these issues, including climate-induced migration, water scarcity, and unstable food supplies, it is therefore imperative for them to lead in sustainable advocacy. In the past, youth have been depicted in a restricted manner as a demographic that is particularly susceptible to adverse effects during disasters. Still, young people are increasingly seen as active participants in establishing policies and practices and change agents in their local communities.

One such instance is the School Strike for Climate movement, which is a global youth-led effort to put ethical demands on authorities and control global warming. Many students from schools and universities throughout the world participated in peaceful demonstrations for climate action in March 2019 that promoted intergenerational climate justice (Rap et. al., 2024). These grassroots initiatives were sparked by the ascent of Greta Thunberg, a young climate activist who demonstrated what could be accomplished in the climate change discussion by a young individual exercising her voice to challenge the established quo. Through campaigns like School Strike 4 Climate, the demonstrators created a worldwide forum to express their opinions on the objectives of climate action agendas. The youth in Australia made certain demands to the Australian government, including that new coal, oil and gas projects be stopped, that all energy be generated and exported from renewable sources by 2030, and that funds be allocated to help communities and workers who depend on fossil fuels transition to renewable energy jobs. (Cowan et. al., 2023)

Youth action is accountability to important stakeholders and lobbying for decisive action that produces many positive results. Young action promotes active citizenship by encouraging good coping mechanisms and showing agency in forming the environment one wants to live in. Furthermore, it can enable individuals to become more engaged in sociopolitical issues and enhance their leadership and community-building abilities, both of which have been connected to enhanced organisational ability and continuous engagement in group activity. Although the fight against climate change depends much on activism, education gives young people the fundamental information and abilities required for wise advocacy and sustainable action. Activism runs the danger of being reactive rather than strategic without knowledge.

Empowering Youth through Climate Education

In light of the climate crisis, empowered youth who act as change agents on a global scale are essential. To prevent creating climate anxiety for doing more harm in the long run, such initiatives should be made carefully. Sustainable behavioural change can be achieved through climate change risk education and communication, but this calls for creative socio-ecological strategies to get people to take proactive and preventative measures. (Rap et. al., 2024)

Education serves as a crucial tool for attaining sustainable development. Environmental Education, originating in the 1970s, focusses on the natural environment, associated issues, and conservation efforts. The aim is to facilitate the development of profound environmental awareness and provide practical resources for addressing specific environmental issues. Climate change education encompasses the instruction of the scientific principles, repercussions, and remedial strategies related to climate change. Its objective is to equip learners with a comprehensive understanding of global environmental issues stemming from climate change and their effects on various facets of the ecosystem. Environmental and climate education are initiatives designed to enhance public

knowledge, awareness, and understanding of the environment, its functions, and human impact.

There appears to be little discussion in educational resources about life necessities that will grow increasingly scarce as a result of climate change, such as equal accessibility to safe drinking water, or about key factors that further affect life-necessary resources, such as how socioeconomic status, gender, or bias based on ethnicity or ability manifest and are made worse by changing climates around the world. The example of fossil fuel businesses funding climate change teaching in Canadian (and global) schools shows how these corporations have become extensively ingrained and accepted in young people's daily lives. Youth have been exposed to education that, for example, address carbon footprints. While these campaigns are beneficial in raising awareness about the usage of fossil fuels, they remove businesses' duty, shifting it to consumers and, in case in point, youngsters (Sloan Morgan et. al., 2024). Promoting youth education and empowerment to prevent and respond to the negative effects of climate change is one way to address these climate impacts (Hassan et. al. 2024).

Beyond formal education, media plays a crucial role in shaping public perception of climate issues, influencing youth activism, and providing a platform for young voices. However, media coverage can be both an enabler and a barrier to youth climate action, depending on how narratives are framed.

The Power and Pitfalls of Media in Youth Climate Action

Social scientists agree that social media has a significant role in shaping students' and dropouts' perspectives on the environmental crisis. Large corporations and powerful interests have exploited these forums to push opposing viewpoints against one another, discredit scientific consensus, and highlight seasonal fluctuations. This standard may have influenced young people's perception of ecological variation as a fad promoted by environmentalists with no scientific evidence.

In March 2019, climate change protests drew significant media attention, with an emphasis on youth groups and the reactions of administration, scientists, and organisations. The media has a significant impact on both popular opinion and political behaviour. Its affects how climate change research is presented and what information gets highlighted or hidden. Mainstream media have the ability to set the agenda and portray youth climate movements in a way that marginalises and depoliticises them, even if these movements pose a danger to centralised power structures and connections. It has been demonstrated that mainstream media outlets portray young climate activists as politically invalid by emphasising their youth and lack of power, which suggests that they are unable to engage in political processes and systems. Furthermore, it has been demonstrated that the dominant media outlets frame and characterise the protests as temporary rather than thematic, which reduces them to an incident rather than critically examining the causes being pushed for and compromising the justifiable complaints of these climate change movements (Chen et al., 2023).

Protesters' complaints, reasons, and justifications for their political activity would be easier for readers to understand if they were given significant visibility in media coverage, which would give their representation in the media more depth. Consequently, encouraging young people to keep up their efforts to fulfil their responsibilities as engaged citizens not only serves to clarify the false belief that they are passive and uninterested, but it can also help to promote the protesters' agency and guarantee that their opinions are heard and given priority in the conversation about climate change (Cowan et. al., 2023).

While media coverage amplifies youth voices, its impact remains limited without structural policy changes. True influence is achieved not only through awareness but through active participation in climate governance and policy-making processes.

Youth in Climate Policy and Decision-Making

Youth participation in policy discussions is tokenistic or shallow. In most situations, only a few individuals are chosen to attend on committees dominated by adults to discuss issues affecting young people. These brief appearances often have minimal impact on policy content and outcomes. In this light, Article 6 of the 2002 New Delhi and 2012 Doha work programs urged key stakeholders to recognise and acknowledge young people as active partners in the design and implementation of climate initiatives. Youth face challenges in communicating dangers and influencing public policy, making it difficult for them to advocate for a sustainable future.

Young people can be capable, engaged citizens who are more than capable of organising their communities and who are knowledgeable about scientific studies, consensus, and expert perspectives, as demonstrated by the climate protests. Prioritising the young activists as essential participants in cooperative policy-making for climate action is important. Since youths would be the group most affected by the effects of climate change, their inclusion in the formulation of climate policies should be taken into consideration, even if they are currently under-represented in the policy-making process for climate action. Youths can contribute to ecological governance in eight areas: legal activism, advocacy, data gathering, dissemination of information, policy framing, operationalisation, monitoring, and enforcement. Rather than collaborating with youth on climate efforts, older policymakers prioritise measures for their younger counterparts. By marginalising or dismissing young people, society misses out on potential leaders who can bring new perspectives to policy debates while diminishing the younger generation's confidence and ability to articulate their views on environmental governance. After being refused access to decision-making in invited places (the legislature, council meetings), youth have attempted to reclaim their future by resisting climate injustice through fabricated spaces (Nkrumah, 2021).

International organisations (IOs) have begun to include young people in international negotiations, such as the yearly United Nations Framework Convention on Climate Change (UNFCCC) conferences, in order to help them

shape intergovernmental climate policy in response to the unique threat that climate change poses to this demographic. (Kolleck et. al., 2022)

For young activists, advancing climate justice requires an intersectional strategy. In youth-led movements, issues like intersectional environmentalism, intergenerational justice, and climate justice and equity have gained traction as calls for climate action that recognises and resolves systemic injustices. While intergenerational justice highlights the obligation to future generations, climate justice demands accountability for combating the disproportionate effects of climate change on the marginalised populations. In addition to combating racial, gender, and economic inequities, intersectional environmentalism promotes solutions that tackle environmental deterioration. Intersectional strategies have been used more frequently by youth-led advocacy organisations to elevate the voices of under-represented groups and guarantee that climate legislation is fair and inclusive. By emphasising intersectionality, these movements aim to accomplish comprehensive climate action that takes into account the various demands and experiences of all impacted groups, promoting laws that are both socially and environmentally just. (Terry, 2023)

Despite their growing involvement in climate governance, young people often find themselves sidelined in key decision-making spaces. Their inclusion is frequently symbolic rather than substantive, highlighting deeper structural barriers that must be addressed.

Barriers to Meaningful Youth Engagement in Climate Action

There is no easy path or magic formula for maintaining a youth climate movement (YCM). Challenges are unavoidable, but facing them is what turns the movement into a powerful force for change. One of the most critical challenges is youth mobility. Unlike previous generations who have permanent houses, young people regularly migrate—either to cities in quest of opportunities or back home owing to jobs or school breaks. This transitory character can make it difficult to consistently participate in climate advocacy. Academic and professional obligations present additional challenge. Exam times, work duties, and corporate pressures can all limit young activists' availability. To stay effective, a YCM must properly plan its campaigns, events, and initiatives in order to avoid clashes with academic and professional obligations. Leadership issues can also be a source of concern. To establish recognition and get taken seriously, a YCM must unite under a strong, coherent leadership. A single, recognisable voice increases credibility and keeps the movement focused and organised. Furthermore, youth activists must understand that pressing governments with strong expert and community backing can be difficult, especially if the administration regards climate campaigns as weak or disorganised. To bring about genuine change, a YCM must form wide coalitions, engage various stakeholders, and consistently push for climate legislation that hold decision-makers responsible. (Nkrumah, 2021).

Young people have also expressed their challenges navigating their place as young people at international climate negotiations, and they have criticised the

exclusive nature of these forums for limiting the chances of Indigenous activists and young people from the Global South to have a significant influence on the global agenda. These youth-identified challenges are either institutionalised, arising from 'Western, capitalist, heteropatriarchal methods for comprehending and creating approaches to climate change', or colonised practices of organisation, with reporting and movement-building centred primarily on white, Global North-based climate activists. (Sloan Morgan et. al., 2024)

Even while young people are disproportionately exposed to climate threats, they frequently face obstacles to effective participation in decision-making processes. This emphasises how crucial it is to set up mechanisms within frameworks for climate diplomacy to guarantee that young people's viewpoints help shape successful climate policies (Terry, 2023). Among the barriers youth face, 'youth-washing' stands out as a particularly deceptive challenge. While institutions publicly endorse youth engagement, many fail to translate this recognition into real influence, instead using young activists as symbolic figures for climate advocacy without giving them a seat at the decision-making table.

Youth are both marginalised and overlooked in climate justice projects. Young people are accustomed to being "youth-washed" at both local and international events in addition to being inundated with messages about climate change. Although they are praised for their participation and activism against climate injustice, young people are seldom included in high-level discussions that could bring about change. Addressing these barriers requires a shift from tokenism to meaningful inclusion, financial support, and structural reforms to integrate youth voices in climate governance.

Young people's enthusiasm, ingenuity, and resolve will be essential in propelling audacious action as the globe deals with the growing effects of climate change. Governments, organisations, and civil society now have a responsibility to make sure that young people are not just represented at the table but also have the ability to influence decisions that will impact their future. This shift from involvement to leadership will guarantee that international climate governance is fair, inclusive, and consistent with the values of intergenerational equity (Terry, 2023).

Conclusion

In conclusion, the power of youth in combating climate change is undeniable and increasingly vital as the world grapples with the escalating consequences of environmental degradation. Young activists are not only raising awareness but also driving significant policy changes and advocating for climate justice on a global scale. Their engagement in grassroots movements, such as the School Strike for Climate, exemplifies their capacity to mobilize communities and challenge established norms, demanding accountability from governments and corporations alike.

As the most affected demographic by climate change, youth possess unique insights and innovative solutions that can shape sustainable futures. However, to fully harness their potential, it is crucial to overcome existing barriers to their

participation in decision-making processes, ensuring that their voices are not merely tokenized but genuinely valued.

Empowering young people through education, resources, and platforms for advocacy will cultivate a generation of informed leaders ready to tackle climate-related challenges. The path forward necessitates a collaborative approach, where intergenerational dialogue and inclusive governance frameworks enable youth to play a pivotal role in climate action. By recognizing and supporting the agency of young activists, society can create a more equitable and sustainable world, ultimately fostering resilience against the multifaceted impacts of climate change.

References

- [1] Terry, M. (2023). The emerging role of Youth at UN Climate Summits. In *Speaking youth to power: influencing Climate Policy at the United Nations* (pp. 153-175). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-031-14298-7_6
- [2] Trott, C. D. (2024). Activism as education in and through the youth climate justice movement. *British Educational Research Journal*. <https://doi.org/10.1002/berj.4082>
- [3] Wellman, R. L., Henderson, A., Coleman, R., Hill, C., & Davey, B. T. (2025). Assessment of a youth climate empowerment program: Climate READY. *Geoscience Communication*, 8(1), 1-46. <https://doi.org/10.5194/gc-8-1-2025>
- [4] Fawzy, S., Osman, A. I., Doran, J., & Rooney, D. W. (2020). Strategies for mitigation of climate change: a review. *Environmental Chemistry Letters*, 18, 2069-2094. <https://doi.org/10.1007/s10311-020-01059-w>
- [5] Ramadani, L., Khanal, S., & Boeckmann, M. (2023). Content focus and effectiveness of climate change and human health education in schools: A scoping review. *Sustainability*, 15(13), 10373. <https://doi.org/10.3390/su151310373>
- [6] McGimpsey, I., Rousell, D., & Howard, F. (2023). A double bind: youth activism, climate change, and education. *Educational Review*, 75(1), 1–8. <https://doi.org/10.1080/00131911.2022.2119021>
- [7] Gasparri, G., Tcholakov, Y., Gepp, S., Guerreschi, A., Ayowole, D., Okwudili, É. D., Uwandu, E., Sanchez Iturregui, R., Amer, S., Beaudoin, S., & Sato, M. (2022). Integrating Youth Perspectives: Adopting a Human Rights and Public Health Approach to Climate Action. *International journal of environmental research and public health*, 19(8), 4840. <https://doi.org/10.3390/ijerph19084840>
- [8] Rees, N. (2021). The Climate Crisis Is a Child Rights Crisis: Introducing the Children's Climate Risk Index. UNICEF.
- [9] Aboukhousa, H.A. (2024). Promoting climate action through youth empowerment and environmental education: Insights from Mohamed Bin Zayed University for

- Humanities. Journal of Infrastructure, Policy and Development. <https://doi.org/10.24294/jipd.v8i11.8636>
- [10] Nkrumah, B. (2021). Eco-activism: youth and climate justice in South Africa. *Environmental Claims Journal*, 33(4), 328-350. <https://doi.org/10.1080/10406026.2020.1858599>
- [11] McPhail, S. (2024). Hope in action: The power of youth voices in leading global change. *International Journal of Youth-Led Research*, 4(1). <http://doi.org/10.56299/bcd456>
- [12] Rap, S., & Bodas, M. (2024). Innovate for Impact: Young Adults Education and Empowerment for Climate Action. *Australian Journal of Environmental Education*, 40(4), 784–794. doi:10.1017/aee.2024.46
- [13] Cowan, J. M., Dzidic, P., & Newnham, E. (2023). The Australian mainstream media's portrayal of youth climate activism and dissent. *Qualitative Sociology Review*, 19(2), 74-91. <https://doi.org/10.18778/1733-8077.19.2.04>
- [14] Sloan Morgan, O., Melchior, F., Thomas, K., & McNab-Coombs, L. (2024). Youth and climate justice: Representations of young people in action for sustainable futures. *The Geographical Journal*, 190(1), e12547. <https://doi.org/10.1111/geoj.12547>
- [15] Hassan, M., Mohsin, M., Vitasović-Kosić, I., Naseer, U., Bhat, S. A., & Dar, S. A. (2024). The effects of climate change: an overview of the ecological and economic consequences. *Šumarski list*, 148(11-12). <https://doi.org/10.31298/sl.148.11-12.5>
- [16] Chen, K., Molder, A. L., Duan, Z., Boulianne, S., Eckart, C., Mallari, P., & Yang, D. (2023). How climate movement actors and news media frame climate change and strike: Evidence from analyzing twitter and news media discourse from 2018 to 2021. *The International Journal of Press/Politics*, 28(2), 384-413. <https://doi.org/10.1177/19401612221106405>
- [17] Kolleck, N., & Schuster, J. (2022). Youth participation in global policy networks on climate change. *International Journal of Educational Research*, 114, 102002. <https://doi.org/10.1016/j.ijer.2022.102002>



HOW TO CITE

Gurnemat Kaur (2025). The Power of Youth in Combating Climate Change. Ed. by Dr. Monita Dhiman in “Youth Voices for a Sustainable Future” (pp. 01-11). Vyom Hans Publications.

DOI: <https://doi.org/10.5281/zenodo.15505768>

ISBN: 978-81-970890-9-1

CHAPTER-11

ARGICULTURE AND CLIMATE RESILIENCE: EMPOWERING YOUTH IN FARMING

Ms. Surbhi Thakur

Khalsa College for Women,
Civil Lines, Ludhiana, Punjab, 141002

Email ID: surbhithakur070305@gmail.com

ORCiD ID: 0009-0009-6453-7556

Abstract

Climate change presents substantial risks to global food security and agricultural productivity, underscoring the need for creative, resilient and transformative strategies. The study explores the role of youth in farming in promoting climate resilient agriculture. Young agricultural entrepreneurs face numerous hurdles, including inadequate access to the fertile land, capital, and market opportunities. The study focuses on empowering women and the young ones to take leadership roles through climate-resilient agriculture, as these technologies foster greater financial autonomy and decision-making capacity, ultimately bridging the gender gap. It also draws attention towards gender disparities and socioeconomic inequalities. The chapter takes a comprehensive approach, tackling the interconnected issues of climate change, agricultural productivity, and youth empowerment. The key outcomes include increased efficiency and effectiveness in agricultural production processes, strengthened resilience of agricultural systems to climate variability and extreme weather events as well as improved standard of living and well-being for young farmers and their families. These tools help the farmers to work more efficiently, reduce their environmental impact, prepare for the challenges and securing a better tomorrow for future generations.

Keywords: Climate-resilient agriculture, Youth empowerment

Introduction

The world is grappling with the daunting task of maintaining food security and sustainability in a rapidly changing climate. Climate change, an unequivocal consequence of human activities and natural processes, has emerged as a

profound and multifaceted challenge with far-reaching implications for global agriculture (Da Silva, 2023). The unpredictability of weather patterns, including prolonged droughts, erratic rainfall, and intensified storms, has engendered crop failures, yield reductions, and a heightened vulnerability to pests and diseases (Volk et al., 2023; Sahoo & Moharaj, 2022). New-generation farmers are often hindered by limited opportunities, including inadequate access to resources, market linkages, and expertise.

By 2050, the world's population is expected to reach 9.7 billion, making it essential to adopt climate-resilient agricultural strategies to ensure global food security. Nonetheless, many youth-in-agriculture policies and interventions face limited uptake or success, and the capacity of small-scale agriculture to absorb youth unemployment and underemployment remains low (Magagula et al., 2020; White, 2012). First, the barriers and assumptions are rarely based on the actual diverse and context-based aspirations, experiences, interests, and capabilities of the youth (Daum, 2019; Djurfeldt et al., 2019). Second, the policies and interventions are often built on simplistic assumptions that inadequately address intersectionality issues (Djurfeldt et al., 2019) such as between gender and intergenerational inequity (Zulu et al., 2020). Third, while digital and other technologies can mitigate market failures and enhance youth engagement in agriculture (Irungu et al., 2015; Obong et al., 2018), success is contingent on other essential conditions.

Fostering agricultural innovation among rural youth

Agriculture plays a vital role in many economies, especially in rural areas. By overcoming barriers like limited resources, skill gaps, and the appeal of urban life, rural youth have the potential to thrive in agricultural entrepreneurship (Guzman et al., 2020). By capitalizing on these opportunities, we can transform farming, energize rural communities, and build a sustainable future driven by the next generation of farmers. To tackle these challenges, promising solutions include enhancing access to essential resources like land, financing, technology, education, and markets through peer-to-peer training programs (Appiah et al., 2023). Moreover, agricultural innovation, particularly through sustainable practices, holds the key to increased productivity, enhanced crop quality, and strengthened food value chains (Muhie, 2022).

For example: In Jordan, the type of agricultural production plays a crucial role in empowering rural youth through the adoption of sustainable innovation and technology (Abu Hard et al., 2024). Research by Tarawneh and Al-Najjar (2023) underscores the importance of providing equitable loans and building capacity to encourage youth. Entrepreneurship in the agricultural sector. Additionally, Tarawneh et al., (2022) emphasize the significance of collaboration between the government and non-governmental organizations in supporting young farmers. These studies highlight the importance of teamwork and partnerships in helping young farmers thrive.

Fair training and better policies

The analysis indicates that inclusive training and policy reforms are important for enhancing agricultural entrepreneurship among youth (Bouichou et al., 2020). Although the gender distribution appears balanced, notable performance disparities in post-session knowledge tests suggest a need for targeted training that accommodates different learning styles and experiences, as observed by Van Ewijk et al., (2020). This approach aims to strengthen agricultural entrepreneurship for a sustainable tomorrow. For example :

a) Joshua Mudope's Story: Joshua Mudope, a young Ugandan farmer, revolutionized his farm and community by embracing sustainable agriculture. With training from TechnoServe, Joshua mastered climate-smart techniques, boosted his harvests, and motivated others. He also began producing his own organic fertilizer, breaking free from costly chemical.

b) Story of Yuva Rural Association: Yuva Rural Association is helping young farmers in India grow food in a sustainable way. Two young farmers, Manisha Ganshyam Indore, who started a kitchen garden and Yeshwant Namdeo Sautkar, who adopted organic farming methods have already seen great results. By teaching youth sustainable farming, we can make farming better for people and the planet.

Inclusive decision-making

Sustainable agriculture improves lives of women and youth through income and leadership. It foster a culture of peer-to-peer learning and support among youth. Traditional gender roles limit women's involvement in farm decision-making. In many rural areas, women have been limited to small-scale farming or low-paying farm work. New farming technologies can increase income by growing more crops with less work. With more financial power, women play a larger role in household and farming decisions. Collaborative decision-making brings women's perspectives to the table on farm management and investments. Inclusive decision-making benefits the whole family, leading to smarter, fairer, and more environmentally friendly choices.

Some key points on inclusive decision-making

Youth participation - Involve young farmers in decision-making processes to share their thoughts and concerns.

Equal opportunities - Ensure young men and women have the same chances to lead and decide.

Capacity building - Help young farmers develop skills and knowledge to contribute to decision-making

Collaborative approach - Foster a collaborative approach to decision-making, involving young farmers, communities, and other stakeholders.

Inclusive policies - Develop and implement policies that promote inclusive decision-making and support the participation of young farmers.

Access to resources - Provide young farmers with the tools, funding, and markets they need to participate in decision-making.

Empowerment and Accountability - Empower young farmers to take ownership of decision-making processes and to hold leaders accountable for their actions.

Restrictions and barriers

Farming must be made resilient to the escalating impacts of climate change. Women play a crucial role in ensuring food security, as they constitute a significant portion of the agricultural workforce (Agarwal, 2014). But they face many obstacles that prevent them from their full participation. There are even some barriers that hinder the ability of young farmers to adapt to climate change, innovate, and contribute to sustainable agriculture.

The foremost barriers faced by women and young farmers in climate- resilient farming are :Limited access to resources like land, money, and tools; Societal expectations and gender roles that restrict their participation.

Awareness of agro-climatic innovations

Climate change harms farming and makes it harder for rural areas to grow their own food. Some farmers consider agro-climatic practices and technologies as effective solutions. Ghana is a leading country in the adoption of these agro-climatic practices. There is great interest in adopting them. Many women and young producers believe that adopting agro-climatic practices and technologies can reduce labor intensity, boost yields, and enhance their overall well-being. Based on their knowledge, two categories of agro-climatic practices and technologies emerge: traditional and modern. These modern agricultural techniques comprise timely planting, crop rotation, conservation agriculture, and ridge cultivation. Despite the benefits, modern agro-climatic practices and technologies are not widely shared with farmers. Even the innovative agricultural solutions like Smart Valley and digital management apps are largely unknown to farmers. This is because farmers frequently face barriers in accessing agricultural advice and training from extension services. These results emphasize the importance of expanding access to existing agricultural technological innovations. It is therefore essential to develop policies that facilitate the dissemination and subsidization of these solutions to enhance farmers' productivity, with a focus on women and youth.

Conclusion

Youth empowerment in agriculture is vital for promoting climate-smart farming practices, improving food security, and driving sustainable development. This study highlights the need for further exploration into the multifaceted factors influencing women's engagement with sustainable agriculture technologies and the resulting effects on climate resilience and gender equality .By arming young farmers with the right tools, training, and expertise, we can tap into their potential to revolutionize the agricultural sector. The study stresses the

importance of acknowledging and addressing the particular difficulties faced by young farmers in the context of climate change. Through the power of technology, innovation, and entrepreneurship, we can inspire and enable young people to become leaders in sustainable agriculture, drive positive change, and contribute to a more food-secure world. Van Ewijk et al., (2020) emphasize that peer learning is an effective tool for building capacity in agricultural entrepreneurship. Peer learning effectively shares knowledge, builds trust, and fosters understanding of local contexts. It also strengthens social bonds, boosts confidence, and develops leadership skills among rural youth. Ultimately, this collaborative approach stimulates creativity and innovation in agricultural entrepreneurship by encouraging experimentation, knowledge sharing, and problem-solving.

As we explore the complexities of gendered impacts, it is clear that there is still a long way to go and many unanswered questions. A deeper understanding of technology's transformative capabilities requires continued exploration and study. The study also emphasizes the importance of identifying and addressing the specific challenges that women encounter in the agricultural sector. Sustainable farming can only succeed if we address and overcome challenges like resource scarcity, cultural traditions, and economic limitations. Our collective efforts can make climate resilience and gender equality a reality, not just something we hope for. By working together on research, policies, and action, we can unlock technology's potential to transform women's lives. Sustainable agriculture technologies offer a powerful solution for building a more equitable and resilient farming system. As we embark on this journey, we envision a future where agriculture and society flourish together, built on the principles of sustainability, equity, and prosperity.

References

- [1] Abu harb, S., Dayoub, M. and Al-Najjar, K. (2024). The impact of agricultural extension program effectiveness on sustainable farming: A survey article. *International Journal of Agricultural Technology* 20(2):477-492. <http://www.ijat-aatsea.com/>
- [2] Agarwal B. Food sovereignty, food security and democratic choice: critical contradictions, difficult conciliations. *Journal of Peasant Studies*. 2014;41(6):1247-1268. <https://doi.org/10.1080/03066150.2013.876996>
- [3] Bouichou, E.H., Abdoulaye, T., Allali, K., Bouayad, A., & Fadlaoui, A. (2020). Entrepreneurial Intention among Rural Youth in Moroccan Agricultural Cooperatives: The Future of Rural Entrepreneurship. *Sustainability*, 13(16), 9247. <https://doi.org/10.3390/su13169247>
- [4] Da Silva D. Impacts of hot climate conditions in Brazil: a comprehensive scientific study. *Endless: International Journal of Future Studies*, 2023;6(2):472-482

- [5] Daum, T., 2019. Of bulls and bulbs: aspirations, opinions and perceptions of rural adolescents and youth in Zambia. *Dev. Pract.* 29 (7), 882-897. <https://doi.org/10.1080/09614524.2019.1646209>
- [6] De Guzman, M.R.T., Kim, S., Taylor, S., & Padasas, I. (2020). Rural communities as a context for entrepreneurship: Exploring perceptions of youth and business owners. *Journal of Rural Studies*, 80, 45-52. <https://doi.org/10.1016/j.jrurstud.2020.06.036>
- [7] Djurfeldt, A.A., Kalindi, A., Lindsjö, K., Wamulume, M., 2019. Yearning to farm - youth, agricultural intensification and land in Mkushi, Zambia. *J. Rural Stud.* 71 (July), 85-93. <https://doi.org/10.1016/j.jrurstud.2019.08.010>
- [8] Irungu, K.R.G., Mbugua, D., Muia, J., 2015. Information and communication technologies (ICTs) attract youth into profitable Agriculture in Kenya. *East Afr. Agric. For. J.* 81 (1), 24-33. <https://doi.org/10.1080/00128325.2015.1040645>
- [9] Magagula, B., Chiedza, Tsvakirai, Z.Z., 2020. Youth perceptions of agriculture: influence of cognitive processes on participation in agripreneurship. *Dev. Pract.* 30 (2), 234-243. <https://doi.org/10.1080/09614524.2019.1670138>.
- [10] Muhie, S.H. (2022). Novel approaches and practices to sustainable agriculture. *Journal of Agriculture and Food Research*, 10, 100446, <https://doi.org/10.1016/j.jafr.2022.100446>
- [11] Obong, R., Mugonola, B., Phillips, D.P., 2018. Determinants of mobile phones usage in sweet potato vine business in Gulu district northern Uganda. *Afr. J. Agric. Res.* 13 (21), 1071-1079. <https://doi.org/10.5897/AJAR2017.12213>
- [12] Sahoo D. Moharaj P. Determinants of climate-smart adaptation strategies Farm-level evidence from India *Journal of Asian and African Studies.* 2024;59(3):876- 894. <https://doi.org/10.1177/00219096221123739>
- [13] Tarawneh R.A. and Al-Najjar K. (2023). Assessing the Impacts of Agricultural Loans on Agricultural Sustainability in Jordan. *IOSR Journal of Economics and Finance (IOSR-JEF)*. Vol. 14, Issue 6 Ser. PP 49-56. <https://doi.org/10.9790/5933-1406014956>
- [14] Tarawneh, R.A., Tarawneh, M.S., and Al-Najjar, K.A. (2022). Agricultural Policies among Advisory and Cooperative Indicators in Jordan. *International Journal of Research-GRANTHAALAYAH*, 10(2), 10- <https://doi.org/10.29121/granthaalayah.v10.i2.2022.4489>
- [15] Van Ewijk, E., & Ros-Tonen, M.A. (2020). The fruits of knowledge co-creation in agriculture and food-related multi-stakeholder platforms in sub-Saharan Africa-A systematic literature review. *Agricultural Systems*, 186, 102949. <https://doi.org/10.1016/j.agsy.2020.102949>
- [16] Van Ewijk, E., & Ros-Tonen, M.A. (2020). The fruits of knowledge co-creation in agriculture and food-related multi-stakeholder platforms in sub-Saharan Africa A systematic literature review. *Agricultural Systems*, 186, 102949. <https://doi.org/10.1016/j.agsy.2020.102949>

- [17] Volk GM, Carver D, Irish BM, Marek L, Frances A, Greene S, Bretting PK. Safeguarding plant genetic resources in the United States during global climate change. *Crop Science*; c2023. p. 1-23 <https://doi.org/10.1002/csc2.21003>
- [18] White, B., 2012. Agriculture and the generation problem: rural youth, employment and the future of farming. *IDS Bull.* 43 (6), 9-19. <https://doi.org/10.1111/j.1759-5436.2012.00375.x>
- [19] Yu, Y., Appiah, D., Zulu, B., & Asamoah, K. (2023). Integrating Rural Development, Education, and Management: Challenges and Strategies. *Sustainability*, 16(15), 6474, <https://doi.org/10.3390/su16156474>
- [20] Zulu, L.C., Djenontin, I.N.S., Darkwah, A., Kamoto, J., Kampanje-Phiri, J., Fischer, G., Grabowski, P., Egyir, I., 2020. Realizing Inclusive SAI: contextualizing indicators to better evaluate gender and intergenerational inequity in SAI processes and outcomes-cases from Southern and Western Africa. *Int. J. Agric. Sustain.* <https://doi.org/10.1080/14735903.2020.1737356>



HOW TO CITE

Surbhi Thakur (2025). Agriculture and Climate Resilience: Empowering Youth in Farming. Ed. by Dr. Monita Dhiman in “Youth Voices for a Sustainable Future” (pp. 94-100). Vyom Hans Publications.

DOI: <https://doi.org/10.5281/zenodo.15527803>

ISBN: 978-81-970890-9-1

CHAPTER-2

SUSTAINABILITY STARTS WITH US: YOUTH DRIVEN INNOVATIONS

Ms Ridhima Jain

Khalsa College for Women,
Civil Lines, Ludhiana, Punjab, 141002

Email ID: ridhimajain678@gmail.com

ORCiD ID: 0009-0001-3283-403X

Abstract

Sustainability has become a defining challenge of the 21st century, requiring innovative approaches to address pressing environmental and social issues. Young innovators all around are solving problems including waste management, resource conservation, and climate change by combining technology, cultural changes, and progressive ideas. This study investigates young-driven sustainability innovations, stressing case examples of young activists and entrepreneurs changing sectors and local areas. From sustainable leather substitutes to recycled plastic bricks, waste management projects, and climate activism, these projects show how young people-led activity may shape a better future. The study emphasises how important cooperation, flexibility, and original problem-solving are to building a more sustainable planet. Empowering and helping young change makers can help society speed towards world sustainability targets.

Keyword: Youth Innovators; Sustainability; Startups; Change Makers

Introduction

The term **“Sustainability”** is derived from a Latin word **“Sustinere”** means **“To hold”**. Something is sustainable if it endures, perseveres or holds up over time (Thiele, 2024). Since its introduction in the Brundtland Report in 1987, the idea of sustainable development has evolved into a paradigm character for development (Alvarado-Herrera et al., 2017; Gore, 2015) and a reference for scientific study on the environment.

The motivation to live sustainably dates back to ancient times, but is widespread due to systematic efforts few decades ago. In this relatively short time, the

pursuit of sustainability has generated lifestyle changes for countless Individuals, mission and policy changes for professional agencies, educational institutions and many more. The idea of sustainable development has grown hegemonic since the Rio de Janeiro Earth Summit and been included into national constitutions and laws of numerous nations' worldwide as well as international treaties (Ruggerio, 2021). Environmental problems, world crisis, and resource depletion define this age and need for quick response. With their unbounded creativity, imagination, courage, energy, determination, and leadership skills changing the meaning of sustainable Future, young people all across globe are rising up as a spark of change (Arnold et. al., 2009). They are not only raising awareness of their worries but also acting boldly and forcefully to realise their ideas (Shutaleva et al., 2021).

Youth driven innovations gives us a fresh outlook towards sustainability by combining advanced technologies, cultural shifts and a progressive mindset to tackle crucial problems such as Climate change, pollution, Natural calamities and resource depletion. Young innovators highlight the power of collaboration, adaptability and a vision for a better sustainable tomorrow. It also plays an important role in developing eco-friendly technologies and creating community-based actions. Sustainability requires both conservation and creativity. To be effective in our conservation, we must be adaptive. Today our Youth is demonstrating the facts that meaningful changes can be achieved at any age. It also reflects upon the deep understanding between our planet and human beings, emphasizing that the sustainability is not merely a goal but a way of living.

Youth-Driven Innovations in Sustainability

Startups play a crucial role in fostering innovation, particularly in the early stages of development. Various empirical studies highlight the strong correlation between innovation and the growth of startups (Fiorentino et al., 2021). In today's world, plastic waste has emerged as a critical environmental challenge, given its extensive presence in everyday life—from household products to automobiles and construction materials. The rapid increase in plastic production has led to significant waste generation, necessitating innovative approaches for effective waste management.

Young entrepreneurs and innovators are at the forefront of developing sustainable solutions, particularly in recycling and waste repurposing. This section explores various youth-led innovations across key sectors, including renewable energy, waste management, sustainable agriculture, and climate action.

Youth-Led Renewable Innovations

1. Gjenge Makers (Kenya)

Nzambi Matee, a Kenyan engineer and entrepreneur, founded Gjenge Makers, a startup that produces durable and cost-effective recycled plastic paving bricks. Recognized as the Young Champion of the Earth 2020 by the UN Environment Programme (UNEP), Matee developed a prototype machine capable of

transforming plastic waste into pavers for sidewalks and roads (Radosavljević et al., 2023). Her machine has a production capacity of 1,500 plastic pavers per day, demonstrating an innovative approach to reducing plastic waste.

2. Banofi (India)

Founded by Jinali Mody, Banofi is an innovative startup that transforms banana waste into a sustainable leather alternative. Her company sources banana waste directly from farmers and converts it into eco-friendly leather-like material, comprising 60% banana crop waste and 20% natural components. Compared to traditional animal-based leather, this material reduces carbon emissions by 90% and eliminates toxic waste in production (Raj et al., 2023).

Waste Management and the Circular Economy

1. Bye Bye Plastic Bags (Indonesia)

Founded by Melati and Isabel Wisjen at the ages of 12 and 10, Bye Bye Plastic Bags is a youth-led movement advocating for plastic waste reduction in Bali. Their campaign, initiated in 2013, has played a significant role in influencing government policy, promoting education, and raising public awareness about plastic pollution (Lestari et al., 2021; Rijal & Sabila, 2022).

2. Saahas Zero Waste (India)

Saahas Zero Waste, a social enterprise registered as an MSME in India, is committed to **holistic** and decentralized waste management. Their business model integrates revenue from waste recovery with service fees, ensuring maximum resource recovery and landfill diversion. The company operates a Materials Recovery Facility managing 16 tonnes of waste per day in major Indian cities like Bengaluru, Noida, and Chennai (Sambyal, 2023).

Sustainable Agriculture and Food Systems

1. ColdHubs (Nigeria)

Nnaemeka Ikegwuonu, a Nigerian entrepreneur, founded ColdHubs, a startup that provides solar-powered cold storage solutions to prevent post-harvest losses among smallholder farmers. In Nigeria, where over 40% of fresh produce is lost due to inadequate refrigeration, ColdHubs offers an affordable, off-grid solution for food preservation (Odeyemi & Ikegwuonu, 2021; Onwude et al., 2023).

2. FarmBot (USA)

Developed by a group of college students, FarmBot is an open-source robotic farming system that automates planting and irrigation using artificial intelligence. Designed for precision farming, this technology aims to address food security challenges by reducing resource wastage and increasing crop yield (Murdyantoro, et al., 2019; Dobrojević & Bacanin, 2022).

3. Tribe Grown (India)

Founded by Bhavesh Ravindra Wankhade, Tribe Grown supports tribal and marginalized farming communities by creating sustainable supply chains for

natural products like wild honey, desi ghee, and turmeric powder. The startup has trained 1,500+ farmers across Maharashtra and Madhya Pradesh, improving their incomes by 30% (Raj et al., 2023).

Climate Action and Activism

1. Fridays for Future (Sweden)

Greta Thunberg's Fridays for Future movement has mobilized millions of young people worldwide to demand urgent climate action. Since her school strike in 2018, Thunberg has emerged as a global climate leader, influencing policy decisions and raising awareness about the climate crisis (Gore, 2015).

2. Youth Advocates for Climate Action Philippines (YACAP)

Mitzi Jonelle Tan, a Filipino climate activist, is a prominent advocate for climate justice and social equity. Her activism focuses on highlighting the systemic roots of the climate crisis, emphasizing its disproportionate impact on marginalized communities in the Global South. She leads grassroots efforts to amplify voices that are often ignored in climate discourse.

“Last night I dreamt of a fossil-free world where we prioritized people and the planet over profit. The only way to achieve this is by making the right decisions today.” – Mitzi Jonelle Tan

Young innovators and activists are reshaping the global sustainability landscape through technology-driven solutions, policy advocacy, and grassroots movements. Their efforts highlight the need for collaboration, adaptability, and continuous innovation to address pressing environmental challenges. Supporting and investing in youth-led sustainability initiatives is essential for achieving a more resilient and sustainable future.

By taking small, actionable steps, individuals can contribute to meaningful change. As these youth-driven innovations demonstrate, sustainability is not just an option—it is a necessity.

How you can Contribute to Society

Sustainability and social responsibility are crucial in today's world. Contributing to society requires a structured approach that involves identifying issues, setting goals, educating oneself, and taking action. Below are key steps to make a meaningful impact.

Identify Local Issue

Observe your locality and community for identification of areas that need sustainable solutions (e.g., Waste Management, Water Conservation, or clean Energies like CNG, Biogas etc.)

Conduct Variety of Surveys or talk to locals to understand the root causes.

Set Clear Goals

Be clear about what you aim to achieve with your Project.

Use Smart Framework for Time Management of Your Schedule.

Educate Yourself

Deeply Research about Sustainable Development and topics regarding it and learn about the United Nations Sustainable Development Goals (SDGs).

Join Workshops, Webinars, or online courses to enhance your knowledge.

Build a Team

Involve like-minded peers, community members or local Organizers.

Divide roles and responsibilities based on individual Strengths.

Start Small

Begin with manageable, small-scale projects like planting trees, recycling Drives or Planning Awareness campaigns.

Use Pilot Projects to test ideas and gain experience (like in neighborhood or locality).

Create a Detailed Plan

Outline steps, timelines, required resources and potential challenges.

Develop a Budget and Explore funding options like Grants, donations, or crowd funding.

Collaborate with Stakeholders

Partner with schools, colleges, NGO's, local businesses, or government agencies to gain support and resources.

Leverage existing networks to amplify your impact.

Leverage Technology

Use Social Media to spread awareness and rally support for your project.

Utilize apps and platforms for project management, data management, data collection or fund raising.

Measure Impact

Track Progress and evaluate the effectiveness of your initiatives.

Use feedback to refine and scale your project.

Raise Awareness

Organize Community events, Workshops or campaigns to educate others about Sustainable practices.

Share your opinions, success stories, and experience through stories by creating Blogs, videos, on social media to inspire others.

Stay Persistent

Sustainable Development projects often take time to show results. Be patient, calm and adaptive.

Celebrate small victories to stay motivated and Energetic.

Join global Movements

Participate in global initiatives like Earth Day, World Cleanup Day or UN (United Nations) SDG campaigns to connect with larger Networks.

By taking small but consistent steps, individuals, especially youth, can play a significant role in promoting sustainable development. Every effort, no matter how minor, contributes to a larger positive change in society.

Conclusion

Sustainability means taking care of present needs without depleting future resources. In this concept, we have learned that sustainable way of living is a living in which we use our present resources carefully so that we can meet our future requirements (Thiele, 2024). Today's youth is continuously working for better future, better air quality, safer place, beautiful ecosystem, better life expectancy and many more. We've learned how plastic is dangerous, toxic and harmful for Nature. We've learned about Multiples of young innovators, advocates like Nzambi Matee, Melati and Isabel Wisjen, Nnaemeka Ikegwuonu, Greta Thunberg and many more. There are many more brilliant young innovators out in the world who are right now creating and discovering new things about living a sustainable life. Our little steps can make great impact, as we know unity is the best and strongest force of the World, no one can destroy united countries and united Humans. To protect our planet, to protect our future generations we need to take massive and urgent actions towards sustainability so that we can save our planet within Time or it will get too late. Age is just a number don't let it fool you! You can achieve anything at any age. Wake up Now! Take Actions with small changes, within your homes, offices, workplaces, schools, colleges, etc. Sustainability is never an option it is a necessity!

References

- [1] Thiele, L. P. (2024). Sustainability. John Wiley & Sons.
- [2] Alvarado-Herrera, A., Bigne, E., Aldas-Manzano, J., & Curras-Perez, R. (2017). A scale for measuring consumer perceptions of corporate social responsibility following the sustainable development paradigm. *Journal of Business Ethics*, 140, 243-262. <https://doi.org/10.1007/s10551-015-2654-9>
- [3] Gore, C. (2015). The post-2015 moment: Towards Sustainable Development Goals and a new global development paradigm. *Journal of International Development*, 27(6), 717-732. <https://doi.org/10.1002/jid.3109>

- [4] Ruggerio, C. A. (2021). Sustainability and sustainable development: A review of principles and definitions. *Science of the Total Environment*, 786, 147481. <https://doi.org/10.1016/j.scitotenv.2021.147481>
- [5] Arnold, H. E., Cohen, F. G., & Warner, A. (2009). Youth and environmental action: Perspectives of young environmental leaders on their formative influences. *The Journal of environmental education*, 40(3), 27-36. <https://doi.org/10.3200/JOEE.40.3.27-36>
- [6] Shutaleva, A., Martyushev, N., Nikonova, Z., Savchenko, I., Abramova, S., Lubimova, V., & Novgorodtseva, A. (2021). Environmental behavior of youth and sustainable development. *Sustainability*, 14(1), 250. <https://doi.org/10.3390/su14010250>
- [7] Fiorentino, R., Longobardi, S., & Scaletti, A. (2021). The early growth of start-ups: innovation matters. Evidence from Italy. *European Journal of Innovation Management*, 24(5), 1525-1546. <https://doi.org/10.1108/EJIM-02-2020-0057>
- [8] Radosavljević, J., Vukadinovic, A., & Đorđević, A. (2023). Recycled Plastic Construction Blocks And Bricks. *Acta Technica Corviniensis-Bulletin of Engineering*, 16(1), 97-100.
- [9] Raj, S., Atmakuri, Y., Kale, A. R., Praveen, H. J., Kumar, S., & Abraham, A. (2023). Case Studies on Agri-Startups in India: Inspiration from Mann Ki Baat, Innovations and Impact. *Journal of Agricultural Extension Management*, 24(1), 51-51.
- [10] Lestari, G. P., Fitri, T. A., & Hikmawan, M. D. (2021). The Role of Bye-Bye Plastic Bags in Realizing Bali Provincial Government Policy Regarding the Restriction of Plastic Bags in. <https://doi.org/10.37950/ijd.v3i1.60>
- [11] Rijal, N. K., & Sabila, S. (2022). From local to global: Development and transformation of bye-bye plastic bags movement. In *Social and political issues on sustainable development in the post COVID-19 crisis* (pp. 223-234). Routledge. <https://doi.org/10.1201/9781003263586-27>
- [12] Sambyal, S. S. (2023). Social Innovation for the Circular Economy: An Example of Informal Waste Recycling. In *Innovating for The Circular Economy* (pp. 53-72). CRC Press. <https://doi.org/10.1201/9781003056607-16>
- [13] Odeyemi, O. M., & Ikegwuonu, N. C. (2021). Solar-Powered Cold Storage: ColdHubs in Nigeria. In *Cold Chain Management for the Fresh Produce Industry in the Developing World* (pp. 175-182). CRC Press. <https://doi.org/10.1201/9781003056607-16>
- [14] Onwude, D., Motmans, T., Shoji, K., Evangelista, R., Gajardo, J., Odion, D., Ikegwuonu N., Adekanmbi O., Hourri S., & Defraeye, T. (2023). Bottlenecks in Nigeria's fresh food supply chain: What is the way forward?. *Trends in Food Science & Technology*, 137, 55-62. <https://doi.org/10.1016/j.tifs.2023.04.022>
- [15] Murdyantoro, B., Atmaja, D. S. E., & Rachmat, H. (2019). Application design of farmbot based on Internet of Things (IoT). *International Journal on Advanced*

Science, Engineering and Information Technology, 9(4), 1163-1170.
<https://doi.org/10.18517/ijaseit.9.4.9483>

- [16] Dobrojevic, M., & Bacanin, N. (2022). IoT as a backbone of intelligent homestead automation. *Electronics*, 11(7), 1004. <https://doi.org/10.3390/electronics11071004>



HOW TO CITE

Ridhima Jain (2025). Sustainability Starts with Us: Youth-Driven Innovation. Ed. by Dr. Monita Dhiman in “Youth Voices for a Sustainable Future” (pp. 12-19). Vyom Hans Publications.

DOI: <https://doi.org/10.5281/zenodo.15528262>

ISBN: 978-81-970890-9-1

CHAPTER-3

GREEN EDUCATION: TEACHING SUSTAINABILITY IN THE CLASSROOM

Ms Sita

Khalsa College for Women,
Civil Lines, Ludhiana, Punjab, 141002

Email ID: dmaya4068@gmail.com

ORCiD ID: 0009-0002-7039-8184

Abstract

Sustainability in education equips the youth to address global environmental challenges with the knowledge, skills, and ethical values. This also helps the youth individuals to resolve the issues like climate change, biodiversity loss, pollution, and resource depletion by fostering critical thinking, problem-solving, and interdisciplinary learning in alignment with the United Nations Sustainable Development Goals (SDGs), particularly Goal 4.7. This chapter explores key concepts, approaches, and societal benefits of green education and focusing the need of modification in the current curriculum in the education sector. Despite of various challenges such as resource scarcity, structural inertia, and inadequate teacher training many countries have implemented green education in different ways to attain the sustainable future. To overcome these barriers, technological advancements play a crucial role, while youth movements drive the practical application of sustainability initiatives. In the long run, green education promotes community resilience, fosters innovation, encourages sustainable practices, and leverages local resources to create a positive societal impact.

Keyword: Sustainable Education, Green Education, Goal 4.7

Introduction

The term “Sustainable development” was first introduced by the United Nation UN and World Environment and Development Commission (WECD) in year 1987 while emphasizing long-term human development. To recognize the role

of education in the sustainable development in 2002, the UN designated 2005-2014 as the Decade of Education for Sustainable Development, with UNESCO leading global integration efforts (Barth, 2014; Frisk & Larson, 2011). The primary objective of ESD, or green education, is to prepare students with critical thinking, ecological literacy, and the practical skills, which is a significant approach to managing severe environmental issues such as climate change, resource depletion, and pollution (Kioupi & Voulvoulis, 2020; Vimala et al., 2022). There is a general consensus that green education plays a pivotal role in disrupting the intergenerational poverty cycle, improving health outcomes, and protecting the environment to ensure that it continues to sustain present and future generations. The concept and scope of green education have grown and expanded since the Earth Summit in Brazil in 1992, during which Agenda 21 recognized Education for Sustainable Development (ESD) with the purpose of balancing economic and human wellbeing through educational practice (Grossek et al., 2019). As the education is integrated with Sustainable development goals, it promotes interdisciplinary and holistic learning of the students by emphasizing the intricate connections between human systems and the natural world. So, the inclusion of sustainability education in Goal 4.7 is crucial for equipping individuals with the skills and knowledge to face global challenges (UNESCO, 2020). Green education is based on several principles, including the cultivation of cognitive understanding, the promotion of behavioural changes, and the instillation of empathy and responsibility towards the environment (Barth et al., 2020). These principals are put into practice to establish a framework for leadership and environmental responsibility, by utilizing place-based learning, interdisciplinary curricula, and youth-led initiatives (Morgan 2023). Green Education encompasses two characteristics, environmental benefits and sustainability and works towards achieving green and being environmental friendly. This is necessary to incorporate awareness and adoption of environmental friendly practices in the student's life for the holistic development. In the teaching-learning process eco-friendly practices and culture of conservation has to be an integral part (Aithal & Rao, 2016). Nevertheless, challenges such as inadequate teacher education, opposition to traditional education reforms, and limited resources prevent the complete implementation of green education (Barth & Rieckmann, 2020). Effective global efforts and innovative teaching strategies, such as the integration of immersive technologies, are necessary to overcome these barriers (Wals et al., 2023). The main principles, strategies, global examples, and societal advantages of green education are discussed in this paper, along with considerations for its challenges and future prospects.

Principles of Green Education.

Green education is based on three fundamental principles:

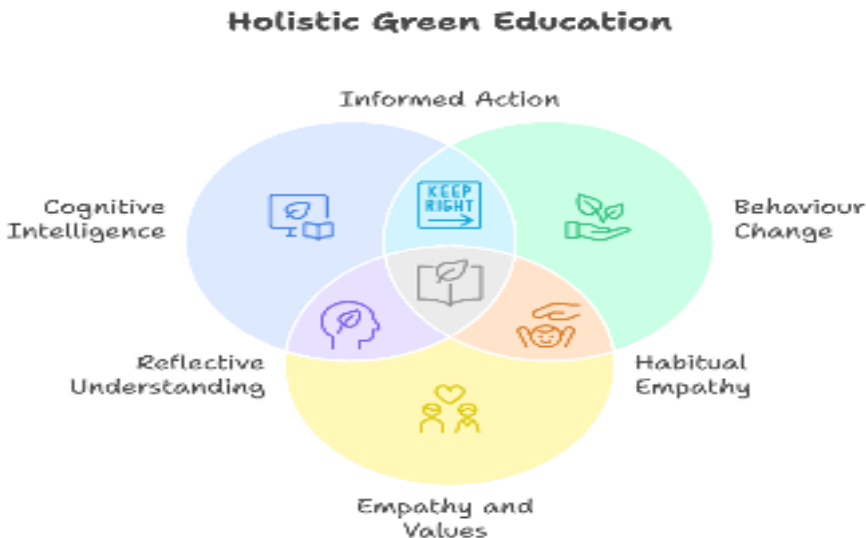
Cognitive Intelligence: Cognitive intelligence is important to understand complex ecological systems and sustainability challenges. It gives the ability to analyse and interpret any issues in present context about environmental issues

such as climate change, biodiversity loss, and resource depletion. The intricate relationships between human and ecosystems can be well recognized by developing critical thinking skills and ecological literacy in the individuals. This conceptual basis helps to make wise decisions and supports environmentally friendly solutions in sectors such environmental policy, renewable energy, and conservation (Barth et al, 2020).

Behaviour Change: To address the environmental issues it is essential to encourage sustainable behavior. It involves fostering eco-friendly habits such as proper waste disposal, water conservation, energy efficiency, and responsible consumption. These behavioural changes can be reinforced among both individuals and societal levels by community engagement, environmental education, and policy interventions. One can be encouraged to make sustainability daily life choice through habit formation, incentives, and awareness campaigns (Gifford, 2021).

Empathy and Values: Empathy and values-based education instil a strong sense of environmental responsibility among individuals. To teach about taking care for the nature and future generations helps individuals in understanding the deep connection with the environment. Reflective learning approaches, such as storytelling, experiential education, and ethical discussions, can cultivate a sense of responsibility. By making this emotional and moral engagement integral part of education fosters a long-term commitment to sustainability and also motivate individuals to act in ways that preserve ecosystems, support social justice, and contribute to the well-being of future generations (Kagawa, 2023).

By integrating cognitive intelligence, behavior change, and value-driven education, a holistic approach to sustainability can be achieved, ensuring a more conscious and responsible society.



Strategies for Implementing Green Education

Successful implementation of green education requires innovative strategies, these include place-based learning, interdisciplinary curriculum and youth lead initiatives.

Place-Based Learning

Place-based learning is an educational approach that immerses students in their local environment to foster a deeper connection with real-world sustainability issues. By engaging with their immediate surroundings, students can better understand ecological systems, resource management, and the impact of human activities on the environment. This method promotes experiential learning, where students participate in hands-on projects such as analyzing local biodiversity, studying water quality, or assessing waste management practices in their communities. Research indicates that such contextual learning enhances students' environmental literacy, critical thinking, and problem-solving abilities (Morgan, 2023). Additionally, it strengthens the link between theoretical knowledge and practical application, making sustainability concepts more tangible and actionable.



Interdisciplinary Curricula

The integration of sustainability topics across multiple disciplines, such as geography, biology, economics, and political science, fosters a holistic understanding of environmental challenges. An interdisciplinary curriculum encourages students to analyze sustainability through various perspectives, allowing for a more comprehensive grasp of the interconnectedness of ecological, social, and economic factors. For instance, studying deforestation in geography can be complemented by exploring its biological impacts on ecosystems and its economic implications for local and global markets. This multifaceted approach aligns with the growing emphasis on systems thinking in education, where learners develop the capacity to address complex

environmental issues in an integrated and solutions-oriented manner (Stevenson et al., 2017). Moreover, interdisciplinary learning helps bridge knowledge gaps between scientific research and policy-making, preparing students for careers in sustainability and environmental management.

Youth-Led Initiatives

Empowering students to take leadership roles in sustainability efforts fosters a sense of agency, responsibility, and civic engagement. Youth-led initiatives, such as school recycling programs, climate action campaigns, and community tree-planting drives, provide opportunities for students to apply their knowledge in meaningful ways. Research has shown that when young individuals are actively involved in environmental projects, they develop a stronger commitment to sustainability and are more likely to continue advocating for environmental causes into adulthood (Chawla, 2022). These initiatives also enhance teamwork, communication, and leadership skills, preparing students to become proactive agents of change. Furthermore, by engaging with their communities, students create ripple effects that encourage broader participation in sustainable practices, contributing to long-term environmental and societal benefits.

By integrating place-based learning, interdisciplinary curricula, and youth-led initiatives, education systems can cultivate a generation of environmentally conscious individuals equipped with the knowledge, skills, and motivation to address sustainability challenges effectively.

Benefits of Green Education

Green education offers numerous benefits that extend beyond the classroom, fostering a deeper understanding of sustainability and environmental responsibility. One of its primary advantages is the development of eco-literacy, which equips students with the knowledge and skills needed to recognize environmental issues and implement sustainable solutions (Sanchez-Camilo et al., 2021). By understanding concepts such as climate change, biodiversity conservation, and resource management, students become more informed and proactive in addressing ecological challenges. Additionally, green education encourages innovation by inspiring creative problem-solving in areas like renewable energy, waste reduction, and sustainable agriculture (Barth et al., 2020). Exposure to sustainability concepts at an early stage cultivates a mindset that seeks technological and policy-driven solutions to pressing environmental concerns. Furthermore, green education plays a crucial role in strengthening community resilience by fostering collective action and social responsibility (Yamini et al., 2025). When individuals work together to implement sustainable practices, such as urban greening projects, conservation efforts, and waste management initiatives, communities become more adaptable to environmental changes and socio-economic challenges. By integrating green education into curricula, educational institutions can cultivate a generation of environmentally conscious individuals who contribute meaningfully to a sustainable future.

Challenges in Green Education

Green education, despite its growing importance, faces several significant challenges that hinder its effective implementation. One major barrier is the lack of resources and funding, which limits the ability of schools and institutions to develop and sustain comprehensive sustainability programs (Stylianou, 2024). Many schools, particularly in underprivileged areas, struggle to provide the necessary materials, infrastructure, and training required to incorporate environmental education into their curricula. Additionally, the integration of green education principles into traditional curricula is often met with resistance due to rigid academic structures and competing educational priorities (Barth et al., 2020). Subjects like mathematics and language studies are traditionally prioritized over interdisciplinary sustainability education, making it difficult for schools to allocate time and resources for environmental topics. Another key challenge is the insufficient knowledge and skills among educators, as many teachers lack the necessary training to effectively teach sustainability concepts (Su et al., 2023). Without proper professional development and pedagogical support, educators may struggle to convey complex environmental issues in a meaningful and engaging manner. Addressing these challenges requires policy interventions, increased investment in sustainability education, and enhanced teacher training programs to equip educators with the skills and confidence to integrate environmental topics effectively into their teaching.

Future Directions for Green Education

Future advancements in green education are expected to be shaped by technological innovation, policy reforms, international cooperation, and enhanced pedagogical approaches. These developments aim to create more engaging, effective, and globally connected learning experiences, fostering a deeper understanding of sustainability and environmental stewardship among students.

- ***Technology Integration***

Advancements in technology, including virtual reality (VR), artificial intelligence (AI), and machine learning, are transforming the way green education is delivered and experienced. VR-based environmental simulations allow students to explore ecosystems, understand the effects of climate change, and visualize the consequences of unsustainable practices in real-time. For example, students can experience coral bleaching or deforestation from a first-person perspective, enhancing empathy and understanding of environmental issues (Sung et al., 2021). Similarly, AI-driven adaptive learning platforms can personalize sustainability education based on individual learning styles and progress. AI can also analyse large datasets on environmental change and present them in accessible formats to enhance decision-making skills. Incorporating game-based learning into green education can increase student motivation and engagement. Environmental challenges, such as managing virtual ecosystems or reducing carbon footprints in simulated environments, can help students understand the

impact of their choices. Open-access platforms and apps providing real-time environmental data, interactive content, and peer-to-peer learning opportunities can widen the reach of green education and make learning more flexible and accessible.

- ***Policy Support***

Stronger educational policies and government support are essential to embedding green education into mainstream curricula and ensuring consistent implementation across educational institutions. National and regional governments can mandate the inclusion of environmental education as a core component of school and university curricula, ensuring that sustainability principles are taught consistently across different levels of education (UNESCO, 2020). Increased financial support for green education programs, teacher training, and the development of sustainable infrastructure (e.g., eco-friendly school buildings, renewable energy systems) will enhance the capacity of educational institutions to deliver effective green education. Developing standardized frameworks for assessing students' understanding of sustainability issues will help track progress and refine teaching methods over time. Engaging policymakers, educators, environmentalists, and industry leaders in the development of green education policies ensures that educational initiatives align with broader sustainability goals and labor market needs.

- ***International Partnership***

Cross-border collaboration facilitates the exchange of best practices, research findings, and educational resources, fostering a more globally unified approach to green education. Initiatives such as UNESCO's Education for Sustainable Development (ESD) network create platforms for sharing innovative teaching strategies and developing joint educational programs. International exchange programs focusing on sustainability themes can expose students and educators to different environmental challenges and solutions, encouraging diverse perspectives and creative problem-solving (Kioupi & Voulvoulis, 2020). Collaborative research projects among universities and research institutions can explore new methodologies for teaching sustainability, assessing learning outcomes, and evaluating the long-term impact of green education. Partnering with organizations like the United Nations Environment Programme (UNEP) and the World Wildlife Fund (WWF) can provide access to expertise, funding, and educational resources.

- ***Community and Experiential Learning***

Strengthening the link between green education and local communities can create more meaningful and practical learning experiences. Encouraging students to engage in community-based environmental projects, such as tree planting, waste management, and conservation efforts, fosters a sense of responsibility and real-world problem-solving skills. Teaching students about local ecosystems, biodiversity, and environmental challenges helps them develop a personal connection to their environment, increasing motivation for sustainable action. Establishing eco-friendly schools and green campus initiatives, including

recycling programs, renewable energy installations, and sustainable landscaping, demonstrates the practical application of sustainability principles. Collaboration with local government agencies, non-profit organizations, and businesses can enhance green education programs through joint initiatives, guest lectures, and internship opportunities.

- ***Capacity Building and Teacher Training***

Empowering educators with the knowledge, skills, and resources to teach sustainability effectively is key to scaling up green education efforts. Regular workshops, training sessions, and certification programs in environmental education can equip teachers with updated knowledge and teaching strategies. Encouraging teachers from different disciplines to integrate sustainability themes into their subjects helps students understand the interconnected nature of environmental, social, and economic systems. Creating networks for educators to share experiences, challenges, and solutions can enhance the collective capacity to deliver effective green education. Developing comprehensive teaching materials, including textbooks, lesson plans, and digital content, aligned with national and international sustainability goals will support consistent delivery of green education.

Conclusion

Students with green education, can make significant contributions to addressing global environmental issues and building towards a sustainable future. The promotion of sustainability is achieved through the education and training programs that equip individuals to embrace their surroundings, foster innovation, and engage with their communities. Through the inclusion of green education in schools and universities, individuals can learn about environmental responsibility and contribute to making positive changes. In spite of this, green education must overcome challenges such as inadequate teacher training, resource limitations, and opposition to conventional curricula. Enhanced use of technology, collaboration across borders and sustainability in educational policies can contribute to its impact. Green education provides a robust foundation for developing global citizens as environmental challenges continue to intensify. The use of cognitive, behavioural, and values-based learning in this approach ensures that future generations will be well-prepared to handle challenging ecological problems. Ultimately, green education is a lifesaver for the planet and offers hope for progressively more sustainable and equal societies.

Reference

- [1] Barth, M. (2014). Implementing Sustainability in Higher Education: Learning in an Age of Transformation, January, 1–201. <https://doi.org/10.4324/9780203488355>
- [2] Frisk, E., & Larson, K. (2011). Educating for Sustainability: Competencies & Practices for Transformative Action. *Journal of Sustainability Education*, 2(March), 1–20.
- [3] Kioupi, V., & Voulvoulis, N. (2020). Education for Sustainable Development: A

- Systemic Framework for Connecting the SDGs to Educational Outcomes. *Sustainability*, 12(3), 1298. <https://doi.org/10.3390/su12176701>
- [4] Vilimala, B. K., Karniawati, I., Suhandi, A., Permanasari, A., & Khumalo, M. (2022). A Literature review of education for sustainable development (ESD) in science learning: what, why, and how. *Journal of Natural Science and Integration*, 5(1), 35. <https://doi.org/10.24014/jnsi.v5i1.15342>
- [5] United Nations Educational, Scientific and Cultural Organization (UNESCO). (2020). *Education for sustainable development: A roadmap*.
- [6] Barth, M., Godemann, J., Rieckmann, M., & Stoltenberg, U. (2020). Developing key competencies for sustainable development in higher education. *International Journal of sustainability in higher education*, 8(4), 416-430. <https://doi.org/10.1108/14676370710823582>
- [7] Yemini, M., Engel, L., & Ben Simon, A. (2025). Place-based education-a systematic review of literature. *Educational Review*, 77(2), 640-660. <https://doi.org/10.1080/00131911.2023.2177260>
- [8] Sung, A., Leong, K., & Cunningham, S. (2021). Emerging technologies in education for sustainable development. *Partnerships for the Goals*, 376-389. https://doi.org/10.1007/978-3-319-95963-4_61
- [9] Lloyd, S., & Gifford, R. (2024). Qualitative research and the future of environmental psychology. *Journal of Environmental Psychology*, 102347. <https://doi.org/10.1016/j.jenvp.2024.102347>
- [10] Kagawa, F. (2022). *Quality Education with the Planet in Mind: Towards a Climate-Responsive and Nature-Positive Framework for the Education System of Lower-Income Countries*. Global Partnership for Education.
- [11] Stevenson, R. B., Brody, M., & Dillon, J. (2017). Environmental education in schools. *Environmental Education Research*, 23(5), 691–703.
- [12] Chawla, L. (2022). *Childhood Nature Connection and Constructive Hope: Helping Young People Connect with Nature and Cope with Environmental Loss. High-Quality Outdoor Learning: Evidence-based Education Outside the Classroom for Children, Teachers and Society*, 95-122. https://doi.org/10.1007/978-3-031-04108-2_5
- [13] Sanchez-Carrillo, J. C., Cadarso, M. A., & Tobarra, M. A. (2021). Embracing higher education leadership in sustainability: A systematic review. *Journal of Cleaner Production*, 298, 126675. <https://doi.org/10.1016/j.jclepro.2021.126675>
- [14] Stylianou, P. (2024). *Sustainability Education in Formal and Non-Formal Education Materials. A Scoping Review*. <https://doi.org/10.20944/preprints202409.1506.v1>
- [15] Su, C. S., Díaz-Levicoy, D., Vásquez, C., & Hsu, C. C. (2023). Sustainable development education for training and service teachers teaching mathematics: A systematic review. *Sustainability*, 15(10), 8435. <https://doi.org/10.3390/su15108435>

- [16] Grosseck, G., Țiru, L. G., & Bran, R. A. (2019). Education for sustainable development: Evolution and perspectives: A bibliometric review of research, 1992–2018. *Sustainability*, 11(21), 6136. <https://doi.org/10.3390/su11216136>
- [17] Aithal, P. S., & Rao, P. (2016). Green education concepts & strategies in higher education model. *International Journal of Scientific Research and Modern Education (IJSRME)* ISSN (Online), 2455-563.



HOW TO CITE

Sita (2025). *Green Education: Teaching Sustainability in the Classroom*. Ed. by Dr. Monita Dhiman in “Youth Voices for a Sustainable Future” (pp. 20-29). Vyom Hans Publications.

DOI: <https://doi.org/10.5281/zenodo.15523429>

ISBN: 978-81-970890-9-1

CHAPTER-4

FROM LOCAL TO GLOBAL: YOUTH-LED CLIMATE MOVEMENTS

Ms. Anushka Pareek

Khalsa College for Women,
Civil Lines, Ludhiana, Punjab, 141002

Email ID: anushkapareek230@gmail.com

ORCiD ID: 0009-0000-1319-6338

Abstract

Youth-led initiatives for climate change have become a significant driving force in the global fight against the issue. Youth understand the need for immediate action against the climatic changes and started campaigns locally, which ultimately got worldwide recognition. Youth is considered as the bearer of the future generations and the imprint of the previous ones. Local initiatives making global waves refers to community driven efforts, grassroots movements and localized projects that have achieved widespread attention and have a significant impact beyond confined geographic areas. Youth led climate movements have experienced a significant increase in frequency over the years since 2018. These initiatives focus majorly on socio- economic, technical and cultural issues and their success may inspire similar efforts in other parts and age groups of the world. Multiple youth driven movements have been initiated globally and have achieved massive success. All these local movements demonstrate and prove how local actions when aligned with motive towards resolution of global issues can generate significant changes and influence across bordered. This document examines the rise of these movements, the strategies they employ, the impact they have made, and the challenges they continue to encounter.

Keyword: Youth, Local, Global Movements, Climatic Issues

Introduction

Climate Change and the environmental degradation could be considered as the greatest threats to humans. Children both now and in the future will bear the consequences of humanity's environmental actions, facing not only direct health effects but also numerous indirect challenges such as threats to food security and

economic stability (Stott et al., 2019). Young people across the globe have played a critical role in pushing climate change to the forefront of the global conversation, passionately advocating for urgent action. Their energy and determination are inspiring and highlight the importance of involving youth in developing solutions and envisioning a sustainable future. Local initiatives are the base to the youth-led climate movements, where young individuals started addressing environmental concerns in their communities and then these become the global events, such as the popular initiative is the Fridays for Future movement, which started by Greta Thunberg in Sweden and quickly spread to other countries (Rodela & Roumeliotis, 2024). Similarly, Generation Climate Europe (GCE) another youth-led organization also mobilized young people across the continent for climate and environmental issues (Aiello & Disez, 2024).

The rise of these movements has been driven by growing recognition of climate change as an issue that spans generations, with younger people expected to face the most severe consequences. This understanding has been further strengthened by the relentless dedication of youth activists, who have successfully carved out a significant space in the climate advocacy landscape.

Youth Led Local-Global Initiatives

Globally, youth are active and powerful agents to take the climatic action by initiating youth-led movements that connect local actions with global environmental goals. Young people fill the gap between grassroots efforts and global impact by organizing community clean-up drives and tree plantation campaigns to participating in international climate conferences and policy discussions. These youth-led movements are not only raising awareness and mobilize communities at the local level but also contributing meaningfully to achieving broader goals such as the Sustainable Development Goals (SDGs) and climate resilience. Some of these initiatives are as follows.

The Green Shakti Foundation

Founded by Indian Youth Activists, this movement emphasizes ecological restoration, afforestation and sustainable practices. The movement focuses on cleaning rivers, reducing plastic waste and promoting energy in rural and urban areas. The foundation's model has also been recognized by international environmental groups, influencing similar initiatives globally. The movement focuses on ecological conservation, sustainable waste management and community-driven approach.

Youth Climate save Movement

It is a youth-led initiative that focuses on addressing the climate crisis by advocating for sustainable food systems and plant-based solutions. It was launched in 2020 with the aim to raise awareness about the environmental impacts of animal agriculture and promotes sustainable, plant-based lifestyles as a key solution to mitigating climate change. It highlights the role of animal agriculture in greenhouse gas emissions, deforestation and biodiversity loss and also encourages a shift to plant-based diets as a way to reduce individual and

systematic environmental footprints. It is led by young activists who use social media, public speaking and grassroots organizing to amplify their message. The movement also inspires other young people to take action on climate issues through diet and lifestyle changes. The movement includes innovative and technological approaches to sustainable and plant-based food practices such as Meatless Mondays, Local food and climate drives, Youth Leadership programmes and Social media campaigns on Instagram, Facebook, Twitter and TikTok (Nasrin & Fisher, 2022).

Eco Champs India

Eco Champs India aims to empower individuals, especially the youth, to become "eco champions" by adopting environmentally responsible behaviors and leading local conservation efforts. It emphasizes the importance of small, collective actions in creating significant environmental impact. It aims at initiatives such as Clean streets, Green streets, Eco champs in schools, Waste to wonder, Green Home Initiative etc.

Sunrise Movement

The Sunrise Movement was a youth led political movement in the US Primarily focused to address the climate change through bold transformative practises and policies, The movement was initiated by a group of young activists who were concerned about the lack of political will towards curbing the climate crisis and the growing influence of fossil fuels companies in shaping the US policies (Schwartz, 2023) The movement started initially in 2017 by a group of youth activists who initially organized locally in response to the ignorance towards climate change by the US government. The group began gaining momentum in 2018 through grassroots organization and rallies focusing on actions against climate change and the Green New Deal, In November 2018, the Sunrise Movement staged a sit-in at the office of then house democratic Leader Nancy Pelosi calling on her to support the movement (Dolan, 2020). The sit-in received significant media coverage and marked a pivotal moment for the movement.

Zero Hour

Zero Hour is a youth led climate advocacy group started in 2017 in the United States. It was founded by young activists of colour, the movement emphasizes intersectionality, highlighting how climate change disproportionately affects marginalized communities. Zero hour made use of social media and local actions to create global awareness, organizing the first ever youth march in Washington D.C in 2018 and spreading the message internationally. Following the march Zero Hour continued to engage in advocacy and mobilize youth for local and national campaigns (Geoghegan, 2024). They also built an international network of young climate activists to bring attention to both climate change and social justice issues. Zero Hour has been instrumental in amplifying the voices of youth activists in climate discourse ensuring that the youth's climate concerns are provided a platform to be heard by the policy makers and the public.

Extinction Rebellion (XR)

It is a global grassroots movement that uses nonviolent direct action and civil disobedience to draw attention to the climate and ecological crisis. It was found in the United Kingdom in 2018 by activists including Roger Hallam and Gail Bradrock and has ever since grown into an international movement. It includes non-violent methods such as large-scale protests and marches, roadblocks and disruptions in public spaces, occupations of government buildings or corporate headquarters, artistic and creative demonstrations intended to generate media attention and pressure governments to take decisive action on the climate crisis. XR demands that the governments and institutions acknowledge the climate emergency and communicate its urgency transparently to the public. The movement calls for immediate and significant action to reduce greenhouse gas emissions to net zero by 2025. IT also advocates for the establishment of citizens' assemblies to guide and oversee governmental decision-making on climate and ecological policies (Pieri, 2024; Lozek Dominguez, 2024; Robertson, 2025).

Friday for Future Movement

The Fridays for Future is a global climatic action movement that was inspired by a Swedish teenager Greta Thunberg. It began in August 2018 when Greta, then 15 years old, skipped school on Fridays to protest outside her country's parliament demanding the government to take strong actions towards climate change. Greta Thunberg held up a sign that said "*Skolstrejk för klimatet*", that roughly translated to school strike for climate. Her solitary protest had gained attention and inspired millions of young people worldwide to join her in what proceeded to become the Fridays for Future Movement. The core element of the Fridays for Future Movement is that it was initiated by a student who took the responsibility of striking from school on Fridays to demand climate action. Thus, what began as a single student's protest was quick to transform into a global movement with students from across the world joining in to advocate urgent climate change action. The core demand of the movement was to demand immediate action to curb the climate change from the government. These actions included actions to reduce carbon emissions, limit global warming to 1.5°C according to the Paris agreement and take steps in a broader action range to combat the climate crisis (Huttunen & Albrecht, 2021; Wallis & Loy, 2021; Fable et al., 2022). The movement helped raise awareness globally towards the impact of the climate crisis and has pressured governments to prioritize environmental policies. It has also played a role in shifting the climate from a fringe issue to a mainstream one. This movement was significant for highlighting the significant gap between the promises and actions by the governments of various countries towards the climate crisis.

Strategies and Tactics

Youth-led climate movements have adopted multiple approaches to spread their message and push for climate-related reforms. The strategic use of social media to engage a worldwide audience could be considered as the most impactful

methods. For example, the #FridaysForFuture movement successfully used platforms like Twitter to create a global activist network that shares information, demonstrations, and raise awareness about climate crisis (Padilla-Castillo & Rodríguez-Hernández, 2022).

In addition to digital efforts, these movements have also involved in many local activisms, including organized strikes and protests. The 2018 and 2019 school climate strikes, known as #Fridays4Future, witnessed millions of students across the globe come out of classes to call for urgent climate action from global leaders (Prendergast et al., 2021). These kind events played a significant role in highlighting the climate emergency and majorly influenced public opinion and policy decisions. Another significant approach has been the pursuit of legal action. Youth-led climate litigation has become an influential means of demanding accountability from governments and corporations for their contributions to the climate crisis. These legal cases often claim that inadequate climate action infringes upon the rights of young people, and several of these lawsuits have achieved favorable outcomes in different regions (Gradoni & Mantovani, 2023).

Global Impact

Youth-led climate initiatives extends beyond local efforts to impactful global movements. These youth movements have significantly shaped the global dialogues about climate change and have also impacted international climate policies. Notably, the Fridays for Future movement has been instrumental in reframing climate conversation, highlighted urgency for immediate action and intergenerational justice (Rodela & Roumeliotis, 2024). Their effectiveness is also visible in policy making. In the United States, for instance, youth-led climate movements played a vital role in pushing forward the Inflation Reduction Act, the nation's first major climate bill, enacted in August 2022. This achievement was a significant step towards addressing climate change and largely driven by sustained efforts and advocacy from young environmentalists (Meunier, 2024).

In addition to influence laws, these movements have succeeded in raising awareness about the climate crisis in public particularly on marginalized groups, including Indigenous peoples and communities. This has broadened the focus of climate discussion to include critical issues of justice and equity (Grosse & Mark, 2020).

Challenges

Despite notable accomplishments, youth climate movements face several challenges. One major concern is the exclusion of certain demographics, especially indigenous youth and those from the Global South from leadership and decision-making roles within the movement. This underrepresentation has triggered demands for increased inclusivity and more diverse leadership (Grosse & Mark, 2020). Another one has been the depoliticization of climate change in mainstream media. While youth voices have succeeded in gaining attention, often media down their calls for basic change, allowing politicians and

corporates to draft the message without committing to genuine reform (Santos et al., 2023).

Conclusion

Youth-led climate movements have come a long way from their local roots to become a global force for change. They've brought attention to the climate emergency and played a key role in shaping climate conversations and policy decisions. However, for their impact to be enduring, these movements must continue striving for inclusivity, adaptability, and systemic reform in their quest for climate justice. Most importantly, these movements must stay committed to advocating for basic transformation. This includes to bring forward the policies that emphasize the needs of people and the planet rather than the interests of politicians and corporates.

References

- [1] Aiello, J., & Le Disez, J.-Y. (2024). Communicating intergenerational justice and climate change: a study of youth-generated environmental discourses. *Journal of World Languages*, 0(0). <https://doi.org/10.1515/jwl-2024-0007>
- [2] Dolan, P. (2020). Inclusion of Frontline Communities in the Sunrise Movement (Doctoral dissertation, Brandeis University, School of Arts and Sciences).
- [3] Fabel, M., Flückiger, M., Ludwig, M., Rainer, H., Waldinger, M., & Wichert, S. (2022). The power of youth: Political impacts of the "fridays for future" movement (No. 9742). CESifo Working Paper. <https://doi.org/10.2139/ssrn.4106055>
- [4] Ferreira da Silva, D., Carvalho, A., & Fernandes-Jesus, M. (2024). Political Imaginaries in the Climate Movement: Youth-Led Groups Constructing Plural Views of the Future. *Sociological Research Online*. <https://doi.org/10.1177/13607804241282942>
- [5] Geoghegan, P. (2024). Zero hour: The Conservatives and Labour divide over environmental targets. *TLS. Times Literary Supplement*, (6303), 8-10.
- [6] Gradoni, L., & Mantovani, M. (2023). Youth-Led Climate Change Litigation: Crossing the North-South Divide. *Verfassung Und Recht in Übersee*, 56(2), 274–298. <https://doi.org/10.5771/0506-7286-2023-2-274>
- [7] Grosse, C., & Mark, B. (2020). A colonized COP: Indigenous exclusion and youth climate justice activism at the United Nations climate change negotiations. *Journal of Human Rights and The Environment*, 11(3), 146–170. <https://doi.org/10.4337/JHRE.2020.03.07>
- [8] Huttunen, J., & Albrecht, E. (2021). The framing of environmental citizenship and youth participation in the Fridays for Future Movement in Finland. *Fennia*, 199(1). <https://doi.org/10.11143/fennia.102480>

- [9] Lozek Domínguez, P. M. (2024). Fridays for Future and Extinction Rebellion: Nurturing the Green Youth Revolution in the Digital Age.
- [10] Meunier, M. (2024). How youth-led climate movements played a role in the passage of the United States' first ever climate bill, the Inflation Reduction Act. *Revue LISA*, 22(58). <https://doi.org/10.4000/131jx>
- [11] Nasrin, S., & Fisher, D. R. (2022). Understanding collective identity in virtual spaces: a study of the youth climate movement. *American Behavioral Scientist*, 66(9), 1286-1308. <https://doi.org/10.1177/00027642211056257>
- [12] Padilla-Castillo, G., & Rodríguez-Hernández, J. (2022). International Youth Movements for Climate Change: The #FridaysForFuture Case on Twitter. *Sustainability*, 15(1), 268. <https://doi.org/10.3390/su15010268>
- [13] Pieri, Z. P. (2024). Framing the climate emergency: the role of music in extinction rebellion. *Social Movement Studies*, 1-16. <https://doi.org/10.1080/14742837.2024.2304300>
- [14] Prendergast, K., Hayward, B., Aoyagi, M., Burningham, K., Hasan, M. M., Jackson, T., Jha, V., Kuroki, L., Loukianov, A., Mattar, H., Schudel, I., Venn, S., & Yoshida, A. (2021). Youth Attitudes and Participation in Climate Protest: An International Cities Comparison. *Frontiers in Political Science*, 3. <https://doi.org/10.3389/FPOS.2021.696105>
- [15] Robertson, C. (2025). Extinction Rebellion: A Case Study of Nonviolent Climate Activism. *Peace & Change*. <https://doi.org/10.1111/pech.12733>
- [16] Rodela, R., & Roumeliotis, F. (2024). Young people as a political subject in the context of environmental governance. *Humanities and Social Sciences Communications*, 11(1), 1-9. <https://doi.org/10.1057/s41599-024-03373-y>
- [17] Santos, T. R., Üzelgün, M. A., & Carvalho, A. (2023). Young climate activists in television news: An analysis of multimodal constructions of voice, political recognition, and co-optation. *The Communication Review*. <https://doi.org/10.1080/10714421.2023.2251310>
- [18] Schwartz, H. E. (2023). *The Sunrise movement: The climate revolution generation*. Lerner Publications TM.
- [19] Stott, R., Smith, R., Williams, R., & Godlee, F. (2019). Schoolchildren's activism is a lesson for health professionals. *BMJ*, 365. <https://doi.org/10.1136/bmj.l1938>
- [20] Wallis, H., & Loy, L. S. (2021). What drives pro-environmental activism of young people? A survey study on the Fridays For Future movement. *Journal of Environmental Psychology*, 74, 101581. <https://doi.org/10.1016/j.jenvp.2021.101581>



HOW TO CITE

Anushka Pareek (2025). From Local to Global: Youth-Led Climate Movement. Ed. by Dr. Monita Dhiman in “Youth Voices for a Sustainable Future” (pp. 30-37). Vyom Hans Publications.

DOI: <https://doi.org/10.5281/zenodo.15525608>

ISBN: 978-81-970890-9-1

CHAPTER-5

ECO-ENTREPRENEURSHIP: YOUNG MINDS DRIVING GREEN BUSINESS

Ms Surpreet Kaur* and Ms Hitakshi Gaira**

Khalsa College for Women,
Civil Lines, Ludhiana, Punjab, 141002

Email ID: * surpreetchawla30@gmail.com

** hitakshigaira8@gmail.com

ORCID ID: * <https://orcid.org/0009-0009-9927-4725>

** <https://orcid.org/0009-0002-8637-1437>

Abstract

The pursuit of sustainability has emerged as a primary emphasis for contemporary entrepreneurs in light of the rapidly changing global environment. Eco-entrepreneurship seamlessly integrates environmental stewardship with commercial goals, emerging as a powerful catalyst for innovation and societal advancement. In contrast to traditional business strategies that focus just on profit, eco-entrepreneurs embrace a dual mission: they aim to tackle significant environmental challenges while establishing successful enterprises. Emerging innovators, driven by technological breakthroughs and an increasing focus on sustainable solutions, are leading the implementation of eco-friendly practices across several sectors. This chapter explores the evolution, obstacles, and prospects associated with eco-entrepreneurship, highlighting its crucial significance in transforming sustainable business practices. Eco-entrepreneurs are setting new standards in agriculture, renewable energy, and sustainable building by employing contemporary tools such as artificial intelligence and blockchain technology, as well as innovatively repurposing waste materials. Notable instances, such as the transformation of coconut shells into briquettes and the manufacture of trainers from recycled plastics, highlight the significant influence of inventive thought. By fostering innovation, resilience, and a dedication to environmental stewardship, eco-entrepreneurship paves the way for a more sustainable and equitable future. This chapter highlights the bold ingenuity of young innovators and encourages readers to explore how enterprises can serve as powerful catalysts for ecological restoration and meaningful change.

KeyWords: Sustainability, EcoEntrepreneurship, Youth, Green Business

Introduction

We live in a dynamic world where things may change within a blink of an eye. In recent years, the global business landscape has witnessed a paradigm shift towards sustainability, with an increasing number of entrepreneurs recognizing the importance of eco-friendly practices. Entrepreneurship requires innovation, creativity, opportunity, and the ability to commercialize the combination of these elements. Besides regular and social entrepreneurship, there is another type of entrepreneurship which is ecopreneurship or eco-entrepreneurship. Eco-entrepreneurship, also known as green or sustainable entrepreneurship, involves building businesses that prioritize environmental responsibility alongside financial success (Alawamleh et al., 2023). The fundamental objectives of entrepreneurship and ecopreneurship are distinct: entrepreneurs prioritise the generation of profit, whereas ecopreneurs work to reconcile profit with ecological sustainability. In contrast to conventional entrepreneurs, who prioritise financial gain, ecopreneurs employ a more comprehensive approach by incorporating environmental responsibility into their business models. They endeavour to maintain profitability while simultaneously addressing societal and environmental issues. Nevertheless, eco-entrepreneurship is accompanied by a unique set of obstacles, such as the intricacies of navigating an evolving market landscape, regulatory barriers, and limited access to capital (Gunawan, 2012).

Concepts of Eco-entrepreneurship

Green Entrepreneurship appeared for the first time in the book “The Green Entrepreneur: Business Opportunities That Can Save the Earth and Make You Money” by Gustav Berle. Eco-entrepreneurship also known as, social and environmental entrepreneurship, could play an important role in achieving a Green Economy. Green or ‘eco’ entrepreneurs are those consciously seeking business opportunities to provide, or support, profitable yet resource efficient and environmentally friendly products and services. Therefore, eco-entrepreneurship lies at the nexus of innovation, environment, and entrepreneurship (Steurer, 2013). The relation between environment, sustainability and entrepreneur has been referred by researchers using different terminology. Some definitions of green entrepreneurship described in the given table compiled by Haldar (2019).

Need of Eco-entrepreneurship

Despite global economic advancement, the escalation of economic, social, and environmental concerns has become increasingly alarming. Emerging as urgent worldwide problems are the depletion of natural resources and the negative consequences of environmental damage include drought, water scarcity, and loss of biodiversity (Agyapong, 2020). Furthermore, seriously jeopardising the stability and existence of contemporary society are climate change. Problems include poverty, hunger, growing wealth disparity, gender inequality, and unequal

access to resources and opportunity underline even more the need of a more sustainable approach to business (Rosario et al, 2022).

Table 1: Definitions of green entrepreneurship

Author	Aspect of entrepreneurship	Definitions
Dean and McMullen (2007)	Organisational characteristic	“The process of defining and exploiting economic opportunities those are present in environmentally relevant market failures”.
Kotchen (2009)	Process involved	“The practice of starting new businesses in response to an identified opportunity to earn a profit and provide (minimise) a positive (negative) environmental externality”.
Anderson and Leal (1997)	Environmental outcomes	“Entrepreneurs using business tools to preserve open space, develop wildlife habitat, save endangered species and generally improve environmental quality”.

Eco-entrepreneurship promotes business strategies that strike a mix of social, financial, and environmental effects, therefore addressing these difficulties. It entails spotting entrepreneurial prospects to generate social and environmental value, therefore promoting long-term sustainability and improving firm competitiveness and efficiency.

Characteristics of an Eco-entrepreneur

Entrepreneurship requires innovation, creativity, opportunity, and the ability to commercialize the combination of these elements. Entrepreneurs have popularized business activities by always creating something innovative and are able to use resources from their surroundings effectively. Green entrepreneurs inherent these characteristics as they identify concepts with high risk, while making a positive effect on the natural environment. They contribute towards social and environment values for which they make great efforts for sustainable development while earning profits doing business. Sustainable entrepreneurs eliminate traditional business practices, systems, and processes and replace them with superior social and environmental products and services (Ploum et al., 2018).

Pastakia (1998) categorized ecopreneurs into two categories based on their intention: social and commercial ecopreneurs. Social ecopreneurs are said to be those individuals that intended to promote eco-friendly products/ideas/technology through market and non-market routes. However, commercial ecopreneurs are those people who show their environmental concern through a conscious and consistency in adopt eco-friendly business (Schaltegger & Wagner, 2011).

Advantages of Eco-entrepreneurship

Sustainability & Innovation: Eco-entrepreneurship embodies sustainability by incorporating practices that minimize environmental impact and promote resource conservation. Through innovative approaches, eco-entrepreneurs are transforming industries by developing eco-friendly products that were once considered impossible to produce sustainably. Advances in green technology have led to the creation of alternatives that reduce waste, lower carbon emissions, and utilize renewable materials, making sustainability a tangible reality across various sectors.

Cost Savings and Regulatory Compliance: The secret to achieving these cost savings lies in recognizing and implementing green practices that prioritize energy efficiency and waste reduction. By adopting these practices like the use of renewable resources and eco-friendly biodegradable raw materials, businesses will not only contribute to environmental sustainability but will also enhance their financial sustainability, making them more resilient and competitive in the industry.

Market growth: Eco-entrepreneurship stands at the forefront of future market growth, driven by an undeniable global shift toward sustainability. As consumer awareness of environmental issues intensifies, the demand for eco-friendly products and services is surging, showcasing significant growth potential. This vital sector aligns perfectly with evolving consumer values and leverages innovative advancements in green technology, establishing itself as a key player in future economic development. The strong connection between environmental responsibility and market demand guarantees that eco-entrepreneurship will not just survive but thrive in the years ahead.

Health Benefits and Community Development: Eco-entrepreneurship is vital for improving public health and community development. By promoting sustainable practices, eco-friendly businesses reduce pollution and enhance air and water quality, leading to healthier environments and fewer diseases. Additionally, these initiatives create job opportunities and strengthen local economies, fostering community involvement in environmental conservation.

Brand Differentiation: Eco-entrepreneurship provides a unique opportunity for brands to differentiate themselves by integrating sustainability into their core business models. Unlike conventional brands, eco-friendly businesses emphasize environmental responsibility, ethical practices, and long-term ecological impact. Their dedication to creating sustainable and innovative products appeals to

environmentally conscious consumers, helping them stand out in a competitive marketplace.

Investor Interest and Government Incentives: Governments are actively offering incentives to promote eco-friendly businesses, recognizing that green entrepreneurship is essential for both economic growth and national sustainability. These incentives encourage the adoption of sustainable practices and foster innovation in eco-friendly solutions. Furthermore, investors are increasingly attracted to green ventures, seeing potential for long-term growth and profitability. Their support is driven by the understanding that eco-friendly businesses are well-positioned to flourish in a market that values sustainability and environmental responsibility.

Consumer Loyalty: As environmental awareness grows, especially among the youth, more consumers are choosing to support eco-friendly businesses that contribute to conservation. This desire allows individuals to feel they are actively protecting the planet, which fosters strong loyalty to brands that align with their values. Eco-entrepreneurs, in turn, benefit from these long-term relationships with customers who prioritize sustainability.

Education and Advocacy: Green entrepreneurs have a unique position to influence both public opinion and policy. By educating consumers and advocating for environmentally friendly policies, green entrepreneurs can help create a more conducive environment for green businesses. Thus, Green entrepreneurship is not just about the environment, but also about creating social value. Green entrepreneurs can do this by ensuring fair labour practices, creating jobs, improving communities, and ensuring their businesses positively impact society.

Challenges faced by Ecopreneurs:

High Initial cost and Lack of investors: Eco-entrepreneurs frequently encounter steep initial costs because creating sustainable products or technologies demands significant capital investment. These businesses often experience longer payback periods, which can make investors hesitant to provide funding due to the perceived higher risks and delayed returns compared to traditional, less capital-intensive ventures. Consequently, securing the necessary funding becomes a major challenge, restricting the growth potential of eco-friendly startups.

Market Awareness and Demand: Eco-entrepreneurs often struggle to raise awareness for their sustainable products. While interest in eco-friendly options is growing, many consumers don't understand their long-term benefits, leading to hesitancy in adoption. Additionally, these products are often seen as more expensive, creating barriers for potential buyers. Consequently, eco-entrepreneurs must educate the market and show that sustainability can be both affordable and impactful, making demand generation a significant challenge.

Regulatory and Legal Barriers: Navigating the intricate landscape of environmental regulations and legal requirements presents a significant challenge for eco-entrepreneurs. Complying with a variety of local, national, and international standards can be both time-consuming and costly, particularly when it comes to obtaining certifications or undergoing audits for sustainability. Additionally, regulatory environments can change unexpectedly, with shifts in environmental policies potentially impacting business operations and creating compliance risks. This unpredictability compels eco-entrepreneurs to remain adaptable, often diverting valuable resources that could otherwise be invested in innovation or business growth.

Supply Chain Challenges: For eco-entrepreneurs, establishing a sustainable supply chain is a critical challenge that requires balancing environmental goals with operational efficiency. Sourcing eco-friendly raw materials necessitates finding specialized suppliers, which are often limited and situated far from key markets, resulting in increased costs and logistical complexities. It is essential to maintain transparency and traceability throughout the supply chain to meet rigorous sustainability standards. Every step, from obtaining fair trade certifications to reducing carbon footprints, demands unwavering vigilance and innovation. This makes managing a sustainable supply chain one of the most formidable and vital aspects of running a successful green business.

Competition with Traditional Businesses: Eco-entrepreneurs face tough competition from established traditional businesses that benefit from lower operational costs and can offer products at much lower prices. This price disparity makes it challenging for eco-friendly alternatives to attract price-sensitive consumers. While sustainable businesses prioritize ethical production and environmental responsibility, they must work hard to differentiate their value and educate consumers on the long-term benefits of choosing sustainability over convenience.

Case Studies/ Success stories of young ecopreneurs

Alhaji Siraj Bah, a 22-year-old entrepreneur from Sierra Leone, is making strides in environmental innovation with his creative solution to combat deforestation. Confronted with the excessive cutting of trees for firewood and charcoal, a practice that threatens the country's forests, Bah developed a brilliant idea: converting discarded coconut shells into eco-friendly briquettes. This initiative not only addresses the deforestation problem but also provides a sustainable energy source for cooking. Bah collaborates with local vendors who sell coconut water; these vendors previously discarded the shells, often incurring costs for their disposal. By collecting these shells for free through his company, Rugsal Trading, Bah helps the vendors save money while simultaneously reducing waste. His project is estimated to save around 1,000 trees annually by lessening the dependency on wood for fuel. This approach not only fosters recycling and environmental protection but also generates economic benefits for the local community. Bah's work demonstrates how sustainable practices can lead to both ecological and economic advancements (Kurnick, 2024)

AdrianMartinus, established by Adrian and Martinus Pool in Alberta, has transformed eco-conscious craftsmanship by repurposing discarded skateboards into stylish and functional products such as furniture and jewellery. Given the worldwide popularity of skateboarding, millions of skateboards are disposed of every year, contributing to environmental pollution. AdrianMartinus collects roughly 5,000 used skateboards each year, preventing them from going to landfills and mitigating the demand for new raw materials. This youth-driven entrepreneurial initiative is not only resource-conserving and sustainable but also generates an annual revenue of \$250,000, illustrating how innovative methods can blend environmental responsibility with economic growth.

In Nairobi, Kenya, the youth-led venture Gjenge Makers, founded by Nzambi Matee, aims to address plastic waste while providing sustainable construction solutions. The company recycles various plastic types, including PET, HDPE, and PVC, into durable paving bricks that are significantly stronger than traditional concrete. On average, Gjenge Makers recycles about 20 tons of plastic each month, producing up to 1,500 bricks daily. These bricks serve as a low-cost, eco-friendly alternative for roads, pavements, and construction projects, while also creating over 100 jobs—primarily for youth and women. Gjenge Makers stands as a pioneering example of innovation and sustainability, tackling environmental issues while empowering local communities (Olila, 2017)

Thaely, launched by Ashay Bhawe, is an inventive footwear brand from India that addresses the country's plastic waste crisis, which exceeds 25,000 tons daily, making up about 8 to 10 percent of total waste. Thaely repurposes discarded plastic bags and bottles into durable, vegan sneakers, with each pair made from 10 plastic bags and 12 plastic bottles. Since its launch, the company has recycled over 50,000 plastic bags and 35,000 plastic bottles, producing approximately 1,700 sneakers in its initial batch. By July 2021, Thaely had scaled production from 50 to 300 pairs weekly as demand surged. Priced around \$100 per pair, Thaely's sneakers provide an eco-friendly alternative to conventional footwear, enhancing environmental sustainability and promoting ethical practices. The brand's commitment to sustainable innovation has attracted attention, positioning Thaely as a frontrunner in the eco-footwear market (Risbud & Waghmare, 2023)

Mo's Crib, co-founded by South African sisters Mo and Michelle Mokone, showcases youth-led eco-entrepreneurship by converting discarded PVC pipes into high-quality, handwoven home décor items. PVC, being the third most widely produced plastic globally, has a recycling rate lower than 1%, contributing significantly to pollution. By reclaiming PVC from landfills and construction sites, Mo's Crib helps alleviate plastic waste and provides job opportunities for artisans across Africa. The company has shown remarkable growth, achieving a 50% increase in sales by the end of 2022, with prospects for a 100% rise in 2023. Their expansion into international markets and partnerships with major retailers like Crate & Barrel and Target have further amplified their impact. Mo's Crib's dedication to sustainability and community upliftment establishes them as a prominent player in the eco-friendly home décor sector, demonstrating how

innovative recycling methods can lead to both economic success and environmental stewardship.

Opportunities in green entrepreneurship

- ***Renewable Energy Ventures***

The surge in global demand for clean energy has opened lucrative markets for entrepreneurs specializing in solar, wind, and bioenergy solutions. Innovative startups are capitalizing on this trend by developing cost-effective and efficient renewable energy technologies, meeting the escalating need for sustainable power sources.

- ***Sustainable Agriculture Initiatives***

With the increasing awareness of environmental impacts from traditional farming, there's a significant shift towards organic and urban agriculture. Entrepreneurs are seizing this opportunity by introducing eco-friendly farming practices and technologies that promote sustainability and meet consumer demand for green products.

- ***Eco-Friendly Product Development***

The market for sustainable consumer goods is expanding rapidly. Entrepreneurs are innovating by creating products made from recycled or biodegradable materials, catering to the environmentally conscious consumer base and setting new standards in product sustainability.

- ***Green Building and Construction***

The construction industry is undergoing a green transformation, with a growing demand for energy-efficient buildings. Entrepreneurs are leading this change by developing sustainable building materials and designs, significantly reducing the carbon footprint of new constructions.

- ***Green Technology and Innovation***

The tech industry offers vast potential for green entrepreneurship. By developing software and hardware solutions that enhance energy efficiency and reduce environmental impact, entrepreneurs are driving the green tech revolution and setting new benchmarks for sustainable innovation.

Resources for aspiring eco-entrepreneurship

India is embarking on a constructive journey where the goals of development and environmental stewardship can work hand in hand. Supporting green entrepreneurship is no longer just an optional endeavour; it has become a crucial component of our national strategy. As the third-largest start-up ecosystem in the world, India is ideally positioned to harness the innovative energy of its youthful population to drive sustainable economic growth. The challenges of climate change, resource scarcity, and environmental degradation present a

unique opportunity for us to shift towards greener practices. By championing green entrepreneurship, India can achieve meaningful economic progress while simultaneously nurturing our ecological environment. The Indian government is actively fostering this transformation through various supportive initiatives, including green bonds and priority sector lending focused on renewable energy. These initiatives underscore a strong commitment to sustainable development and provide a solid foundation for growth. For instance, the Reserve Bank of India has allocated significant resources under its Priority Sector Lending framework, resulting in a notable increase in credit for the non-conventional energy sector, which accounted for 7.9% of total power sector credit by March 2020 (Chhaochharia, 2021).

Moreover, India's ambitious goal of expanding renewable energy capacity to 175 gigawatts highlights the substantial investment potential of approximately \$200 billion, creating a wealth of opportunities for green entrepreneurs (Ghosh, 2023). The youth of India are particularly well-equipped to take advantage of this momentum. With robust government support in the form of financial incentives, tax exemptions, and a favourable regulatory landscape, young innovators can develop solutions that address pressing local and global challenges.

This nurturing ecosystem not only provides essential capital but also encourages a culture of environmental responsibility. By embracing these opportunities, young people can play a vital role in steering India towards a more sustainable future, ensuring resilience for both our economy and our environment. Together, we can create a thriving and sustainable India, where the potential of green entrepreneurship becomes a powerful force for positive change.

Given the increasing environmental challenges we face, green entrepreneurship is becoming an essential part of India's sustainable development efforts. This approach not only tackles urgent social and environmental issues but also promotes economic growth while minimizing negative ecological impacts.

As awareness of climate change grows, consumers are increasingly favoring eco-friendly products. Consequently, businesses are urged to reassess and modify their offerings to align with sustainable practices. This shift is not just essential; it also provides an opportunity for entrepreneurs to spearhead the transition to a more sustainable future.

Globally, governments are starting to understand the significance of green entrepreneurship, taking initiatives to support its development. In India, this is demonstrated through various programs like the

- Pradhan Mantri MUDRA Yojana,
- Startup India Initiative,
- National Skill Development Mission (Skill India)
- Bio E3 policy

These initiatives aim to promote innovation that benefits both the economy and the environment. By adopting green entrepreneurship, India stands to improve its economic outlook while also becoming a key player in the global pursuit of sustainability.

Now is the time for aspiring entrepreneurs to embrace this opportunity and help create a more sustainable and prosperous future for all.

Conclusion

To sum up, eco-entrepreneurship is playing a crucial role in merging economic progress with environmental sustainability. As global challenges such as climate change, resource scarcity, and pollution intensify, eco-entrepreneurs are pioneering innovative business models that prioritize both profit and ecological responsibility. By harnessing technology, sustainable materials, and circular economy principles, they demonstrate that businesses can thrive while promoting environmental conservation.

This chapter emphasizes the vital role of young innovators in advancing green entrepreneurship. Through initiatives that transform waste into valuable products and the development of eco-friendly technologies, they showcase how sustainability can be integrated into various industries. The success stories of emerging eco-entrepreneurs highlight the vast potential for sustainable businesses across fields like renewable energy, agriculture, construction, and fashion.

Despite obstacles such as high startup costs, regulatory barriers, and competition from conventional businesses, eco-entrepreneurs continue to make strides by embracing creativity, resilience, and ethical practices. Supportive government policies, rising consumer interest in sustainable products, and advancements in green technology further strengthen this movement.

As eco-entrepreneurship continues to expand, it offers a promising path toward a more sustainable and just future. Encouraging and investing in green business initiatives will be essential in driving long-term environmental and economic well-being.

Reference

- [1] Alawamleh, M., Mahadin, B., Nimer, L. A., & Marji, D. S. (2023). Ecopreneurship: a systematic review. *International Journal of Process Management and Benchmarking*, 13(2), 257-281. <https://doi.org/10.1504/IJPMB.2023.128485>
- [2] Gunawan, A. A. (2012). Ecopreneurship concept and its barriers: A literature review
- [3] Steurer, N. (2013). Eco-entrepreneurship strategies and experiences from the switch-asia programme: Scaling-up study 2013. Switch-Asia Network Facility, Germany.

- [4] Haldar, S. (2019). Green entrepreneurship in theory and practice: insights from India. *International Journal of Green Economics*, 13(2), 99-119. <https://doi.org/10.1504/IJGE.2019.103232>
- [5] Dean, T. J., & McMullen (2007). Toward a theory of sustainable entrepreneurship: Reducing environmental degradation through entrepreneurial action. *Journal of Business Venturing*, 22(1), 50-76. <https://doi.org/10.1016/j.jbusvent.2005.09.003>
- [6] Kotchen, M. J. (2009). Voluntary provision of public goods for bads: A theory of environmental offsets. *The Economic Journal*, 119(537), 883-899. <https://doi.org/10.1111/j.1468-0297.2008.02215.x>
- [7] Anderson, T. L., & Leal, D. (2001). *Free market environmentalism: revised edition*. Basingstoke: Palgrave. <https://doi.org/10.1057/9780312299736>
- [8] Agyapong, D. (2020). ECO-ENTREPRENEURSHIP. *Enterprising Africa: Transformation through Entrepreneurship*. <https://doi.org/10.4324/9780429427725-8>
- [9] Rosário, A. T., Raimundo, R. J., & Cruz, S. P. (2022). Sustainable entrepreneurship: A literature review. *Sustainability*, 14(9), 5556. <https://doi.org/10.3390/su14095556>
- [10] Ploum, L., Blok, V., Lans, T., & Omta, O. (2018). Toward a validated competence framework for sustainable entrepreneurship. *Organization & environment*, 31(2), 113-132. <https://doi.org/10.1177/1086026617697039>
- [11] Pastakia, A. (1998). Grassroots ecopreneurs: change agents for a sustainable society. *Journal of Organizational Change Management*, 11(2), 157-173. <https://doi.org/10.1108/09534819810212142>
- [12] Schaltegger, S., & Wagner, M. (2011). Sustainable entrepreneurship and sustainability innovation: categories and interactions. *Business strategy and the environment*, 20(4), 222-237. <https://doi.org/10.1002/bse.682>
- [13] Kurnick, K. (2024). Adolescence and puberty. *Children Around the World: The Future of Our Earth*, 103-120.
- [14] Olila, V. M. (2017). *The Influence of Entrepreneurial Orientation on the Development of Registered Youth-led Enterprises in Kibera Slum in Nairobi County, Kenya* (Doctoral dissertation, University of Nairobi).
- [15] Risbud, M., & Waghmare, R. B. (2023). Sustainability Through Innovation: The Case of Indian Startup Thaely. In *Handbook of Research on Solving Societal Challenges Through Sustainability-Oriented Innovation* (pp. 201-214). IGI Global. <https://doi.org/10.4018/978-1-6684-6123-5.ch011>
- [16] Chhaochharia, M. (2021). Green finance in India: progress and challenges. *Research Journal of Humanities and Social Sciences*, 12(4), 223-226. <https://doi.org/10.52711/2321-5828.2021.00039>
- [17] Ghosh, A. (2023). Can India Become a Green Superpower?: The Stakes of the World's Most Important Energy Transition. *Foreign Aff.*, 102, 144.



HOW TO CITE

Surpreet and Hitakshi (2025). Eco-Entrepreneurship: Young Minds Driving Green Business. Ed. by Dr. Monita Dhiman in “Youth Voices for a Sustainable Future” (pp. 38-49). Vyom Hans Publications.

DOI: <https://doi.org/10.5281/zenodo.15528185>

ISBN: 978-81-970890-9-1

CHAPTER-6

SOCIAL MEDIA AND CLIMATE ADVOCACY: THE ROLE OF YOUTH INFLUENCER

Ms Tulika

Khalsa College for Women,
Civil Lines, Ludhiana, Punjab, 141002

Email ID: tulikabinvalkar@gmail.com

ORCID ID: 0009-0001-2906-2323

Abstract

Among the most serious threats to ecosystems, business, and society globally is climate change. Social media platforms such as Instagram, X (formerly Twitter), YouTube, and LinkedIn have seen young influencers become influential voices of climate sustainability among the challenges. This article explores how social media has become a tool of climate activism, allowing young activists to share information, organize groups, and prompt action by virtue of awareness-generating ability. Well-established activists such as Greta Thunberg and Indian activists such as Ridhima Pandey and Licypriya Kangujam employed platforms to rally for actions such as Fridays for Future and #ClimateStrike, thus enhancing global participation in climate action.

Social Influence Theory is applied within this paper to explain how social media influences attitude and behavior towards climate action. Climate action among youth is more powerful today to some degree due to approaches such as narrative, data-based activism, collaboration, and localization. Disinformation, hate speech, and algorithmic discrimination remain challenging. The research emphasizes the need for high-quality digital literacy, fact-checking procedures, and advocating for healthy online spaces in enabling youth for climate action. Teenagers are building a greener, more sustainable future through the social media power.

Keywords: Social Media, Climate Change, Teen Influencers, Climate Activism

Introduction

Climate change has been a long-pressing challenge around the globe. We have heard it all from depletion of ozone layers and deforestation or even pollution

of water bodies from industries. It is affecting ecosystems, economies, and communities globally. It has far-reaching consequences including rising sea levels, extreme weather conditions, and the loss of biodiversity. These extreme events call for an urgent need for collective action. Amid these challenges, the voice of youth holds a critical position at the forefront calling for fresh perspectives, unyielding motivation and determination to fight for environmental sustainability.

Social media has become a front-line platform for the youth and has a transformative effect among youth activists, spreading their messages and connecting with like-minded people online to initiate change and take a step toward sustainability (Confetto et al., 2023). Online platforms like YouTube, Instagram, X (formerly Twitter), and LinkedIn provide a stage for youth activists to advocate for change and inspire action against the issue of climate change. Online campaigns like #climatestrike and online movements like Fridays for Future (FFF) showcase how online platforms can help bring millions of people together to attain the common goal of sustainable practices to safeguard our future on this planet (Li et al., 2024).

In this chapter, we will discuss the pivotal role of youth activists in attaining sustainability and advocating for climate change through the use of social media platforms to shift people's and global economies' mindsets. By viewing the global and Indian contexts, we will understand the challenges and potential future outcomes. This chapter also highlights the success and calls for more young leaders to join this quest for sustainability.

Social media as a tool for climate advocacy

Social media platforms such as Instagram, YouTube, LinkedIn, and, X (formerly Twitter) have reformed climate advocacy. They provide a global space for moving communities and raising awareness. To understand the effect of social media as a catalyst for climate advocacy we refer to the social influence theory which gives the psychological and behavioural basis as to why social media is an important tool for advocacy.

According to Kelman's (1958) social influence theory, referent others have an impact on our attitudes, beliefs, and subsequent behaviours through a variety of methods of identification, internalization, and compliance. Azher et al., (2023) asserts that the idea of a subjective norm, which expresses the degree of referent-other pressure that we believe we are subjected to while choosing whether to engage in a behaviour or not, is a representation of social influence. The theory explains how we alter our behaviour to fit in with the norms of the community that we are a part of when it comes to social media dynamics (Wang et al., 2015). As studies show, social media can modify beliefs, values, and behaviours this in turn helps in catalysing the process of climate advocacy. Viral hashtags like #climatestrike, and #fridaysforfuture have triggered global discussions and allowed live displays of events on these platforms, gathering the masses to work for the cause of climate advocacy. Youth influencers draw people's attention through visual presentations on platforms like Instagram that

help in storytelling through photos and videos while platforms like LinkedIn help in community building and sharing real-time updates (Boulianne et al., 2020; Terren & Soler-i-Marti, 2021; Belotti et al., 2022).

Youth Influencers: Force of Transformation

Youth activists use their online presence to educate, inspire, and mobilize their audience. Young influencers like Greta Thunberg have demonstrated the power of young voices through movements like 'Friday for Future'. She is known to mobilize over 10 million people across the globe through the use of online platforms. Her efforts in motivating people for collective action on climate change is now known as the "Greta Thunberg Effect" This refers to a phenomenon where her activism is responsible for a ripple effect on climate awareness and action particularly among the youth (Sabherwal et al., 2021). Her campaign 'Friday for Future' started in August 2018 when she skipped school to hold strikes in front of the Swedish parliament. Soon many people joined her campaign and started following her on Fridays for future movement. In September 2019 the campaign mobilized around 7.6 million people from around 185 countries.

In India, youth influencers like Ridhima Pandey, Aman Sharma, and Licypriya Kangujam can be seen at the forefront of climate activism. They are responsible for the mobilization of the masses at a national level through social media platforms to raise awareness and educate people on climate change. Many youths in the country have been influenced by their works and are actively supporting and participating in climate activism.

Strategies adopted by Youth Influencers

Storytelling and Personal Narratives:

Key Influencers like Ridhima Pandey also known as Greta Thunberg of Asia and others share their personal story/recollections of climate change to make the abstract concept concrete with 'feeling.' For instance, her journey as a climate activist began with her story of the Kedarnath flash floods in 2013 which encouraged her to file a petition against the National Green Tribunal of India in the year 2017 asking for stronger measures from the Indian government to protect the environment.

Data-Driven Advocacy:

Another common trend among youth influencers is posting infographics, statistics, and scientific findings as backing to their claims, increasing worth besides teaching their audiences. This makes their content more reliable and agreeable.

Collaborations:

Here youth influencers transcend global campaigns by partnering with environmental organizations, scientists, and even celebrities to widen their reach. For example, global campaigns like #FridaysForFuture partner up with organizations, such as Greenpeace, to amplify their messages.

Localization:

Indian influencers often repackage the global message into a context much closer to the local. Yet, the regional languages and culturally grounded content of the #SaveAarey, and #SaveMollem campaigns managed to touch the hearts of many local people.

As we have already discussed, Greta brought significant attention to climate change through social media platforms. let us now analyse the Greta effect and the role of social media in fostering sustainable values in the youth.

Social media plays a pivotal role in reaching the global audience and promoting climate advocacy.

X (formerly Twitter): Greta Thunberg made climate talks a major online topic by using hashtags like #FridaysForFuture to generate global trending, cohesive narratives. This illustrates how microblogging has the ability to transform localized efforts into worldwide movements

Instagram: Images from protests, infographics, and behind-the-scenes activity helped to create a sense of solidarity and community. Instagram created emotionally engaging narratives out of abstract climate data by utilizing visual storytelling.

YouTube: Promoted Thunberg's lectures, generating a lot of interest and positioning her as a key figure in the fight against climate change. The platform's long-form content produced an enduring legacy of advocacy materials and enabled in-depth investigation of climate challenges.

Strategies for engagement: The special advantages of social media enable effective lobbying and lifestyle promotion: Building a Shared Identity: A common goal is fostered by posts that emphasize the inclusive pronouns "we" and "us," which enable people to feel that they are a part of a greater movement. Value co-creation, which includes conversations, teamwork, and content sharing, increases community involvement and promotes cross-border cooperation, turning passive followers into active contributors.

Requesting Action: Getting involved in ordinary and clear campaigns like community-based initiatives, legislative lobbying, and climate strikes. Gamified challenges are often presented among activities like these to maintain interest and provoke action. Here, vast social media campaigns, like the hashtag #ActNow, are invited to reach people where they specifically can contribute to making the goals a reality and, while this is already the case, it still needs to close the gap yet existing between consciousness and the kind of influence needed.

Personal Reflection and Inclusivity: Authenticity resonates within the audience, developing trust and relatability as seen in Thunberg's advocacy compared with influencer-led green campaigns. Narratives are then able to underline the urgency of climate action through lived experience fostering empathy and immediacy.

Dynamics for support and challenges

Social media helps mobilizing support through;

Organizational Tools:

Through campaigns, petitions, and marches, activists turn internet participation into offline effect by organizing events like 'Fridays for Future'. Activism logistics are streamlined through the use of digital calendars, group conversations, and real-time updates.

Inspiration for Change:

Audiences are motivated to embrace sustainable practices by relatable advocates and influencers, which causes changes in attitudes and behaviour. The focus on realistic, daily actions makes big problems seem doable.

Visibility of issues:

By utilizing social media's worldwide reach, regular publishing keeps climate and sustainability issues in the public eye. Viral posts and trending hashtags guarantee that the conversation about climate change stays current.

Amplification of Marginalized Voices:

Social media has enabled Indigenous and frontline people to share their viewpoints, strengthening climate advocacy with a variety of narratives. These voices give depth and authenticity the climate movement by emphasizing local problems and solutions.

Social media having a dual nature also poses challenges in front of young influencers;

Hate Speech and Personal Attacks:

Advocates like as Thunberg face ageism, sexism, and ableism, which reflect larger cultural biases and necessitate strong moderation policies. These attacks can distract talks, necessitating effective counter-messaging.

Misinformation:

Conspiracy theories and scepticism undermine efforts to spread credible information, eroding trust in climate science. Fact-checking initiatives and collaborations with trustworthy organizations are critical in countering this trend.

Polarization:

Advocacy becomes a catalyst for ideological arguments, necessitating nuanced approaches to navigating controversial contexts and engaging constructively. Creating cross-partisan relationships can help alleviate these impacts.

Platform Algorithms:

Echo chambers and algorithmic biases can limit the reach of climate advocacy content, demanding intentional attempts to broaden audiences. Advocates must change their content strategy to match platform-specific algorithms and user behaviour.

The battle against climate change is crucial right now, with the youth having a vital role in determining what lies ahead. Young influencers, empowered by social media, are transforming the story of climate activism (Svensson & Wahlstrom, 2023). Their creative methods, strong voices, and steadfast resolve have not only highlighted the urgency of the climate crises on a global scale but have also motivated millions to engage in significant actions. Social media, though a potent instrument, acts as a double-edged sword. The same platforms that enhance the voices of young activists can likewise subject them to hate speech, misinformation, and division. Activists such as Greta Thunberg, Ridhima Pandey, and others have encountered personal assaults and opposition, showcasing wider societal prejudice including ageism and sexism (Coughlin & Quesada, 2024). This highlights the necessity for more robust moderation policies on digital platforms and the shared obligation of users to foster a safe, respectful environment for discussion. If these systematic challenges are not addressed, the transformative potential of youth-led climate advocacy may be compromised.

Additionally, the algorithms that control social media platforms frequently establish echo chambers that confine the influence of climate advocacy to those with similar viewpoints. To escape these, youth leaders and climate proponents need to embrace creative approaches to connect with varied audiences. Partnerships with various policymakers, business, scientists, and community leaders can aid in closing gaps and guaranteeing that climate advocacy permeates all facets of society. Likewise, initiatives designed for particular cultural and regional settings, such as India's #SaveAarey and #SaveMollem campaigns, emphasise the significance of localization in fostering deeper, more personal connections with individuals (Arnot et al., 2024).

The more urgent issue is the ongoing dissemination of misinformation and conspiracy theories related to climate change. These stories not only create uncertainty but also undermine public confidence in climate science. To address this, influencers should emphasise data-informed advocacy, making sure their campaigns are supported by trustworthy scientific evidence and delivered in comprehensible format. By combining narratives with factual data, they can render intricate issues more understandable and engaging for their audiences,

Regardless of these challenges, the accomplishments of youth influencers are significant. Initiatives such as 'Fridays for Future', started by Greta Thunberg, have rallied millions globally, and demonstrating the strength of united efforts. The "Greta" effects have encouraged numerous young individuals to emerge as leaders within their communities, utilizing social media to draw attention to environmental issues and promote solutions (Mede & Schroeder, 2024). Indian

youth influencers such as Ridhima Pandey, Aman Sharma, and Licypriya Kangujal demonstrate that climate advocacy is not limited to international leaders; it is a grassroots and national movement fuelled by individuals passionate about their environment.

Conclusion

Achieving a sustainable future requires a well-rounded and strategic approach. A key step is to prioritize digital literacy and climate education, equipping the next generation with the knowledge and skills needed to navigate the complexities of the climate crisis. Educational institutions and community organizations must integrate climate change into their curricula, fostering a generation of critical thinkers capable of developing innovative solutions.

Moreover, the global community must work together to amplify the voices of marginalized groups in the climate movement. Indigenous communities, often at the forefront of environmental stewardship, offer invaluable insights rooted in generations of sustainable practices. While social media has started to elevate these voices, more focused efforts are needed to incorporate their wisdom into mainstream climate advocacy and policymaking.

Moving forward, the passion and creativity of young influencers serve as a beacon of hope. Their efforts remind us that the fight against climate change is not only about reducing risks but also about building a more just and sustainable world. When determination, vision, and technology align, meaningful transformation becomes possible. With youth leading the charge, the vision of a greener, more equitable future is not just a distant dream, it is a tangible reality within reach.

Reference

- [1] Confetto, M. G., Covucci, C., Addeo, F., & Normando, M. (2023). Sustainability advocacy antecedents: how social media content influences sustainable behaviours among Generation Z. *Journal of Consumer Marketing*, 40(6), 758-774. <https://doi.org/10.1108/JCM-11-2021-5038>
- [2] Li, J., Chiu, D. K., Ho, K. K., & So, S. (2024). The Use of Social Media in Sustainable Green Lifestyle Adoption: Social Media Influencers and Value Co-Creation. *Sustainability*, 16(3), 1133. <https://doi.org/10.3390/su16031133>
- [3] Kelman, H. C. (1958). Compliance, identification, and internalization three processes of attitude change. *Journal of conflict resolution*, 2(1), 51-60. <https://doi.org/10.1177/002200275800200106>
- [4] Azhar, M., Nafees, S., Sujood, & Hamid, S. (2023). Understanding post-pandemic travel intention toward rural destinations by expanding the theory of planned behavior (TPB). *Future Business Journal*, 9(1), 36. <https://doi.org/10.1186/s43093-023-00215-2>

- [5] Wang, C., Lee, M. K., & Hua, Z. (2015). A theory of social media dependence: Evidence from microblog users. *Decision support systems*, 69, 40-49. <https://doi.org/10.1016/j.dss.2014.11.002>
- [6] Boulianne, S., Lalancette, M., & Ilkiw, D. (2020). "School strike 4 climate": Social media and the international youth protest on climate change. *Media and Communication*, 8(2), 208-218. <https://doi.org/10.17645/mac.v8i2.2768>
- [7] Terren, L., & Soler-i-Martí, R. (2021). "Glocal" and transversal engagement in youth social movements: a Twitter-based case study of Fridays For Future-Barcelona. *Frontiers in political science*, 3, 635822. <https://doi.org/10.3389/fpos.2021.635822>
- [8] Belotti, F., Donato, S., Bussoletti, A., & Comunello, F. (2022). Youth activism for climate on and beyond social media: Insights from FridaysForFuture-Rome. *The International Journal of Press/Politics*, 27(3), 718-737. <https://doi.org/10.1177/19401612211072776>
- [9] Sabherwal, A., Ballew, M. T., van Der Linden, S., Gustafson, A., Goldberg, M. H., Maibach, E. W. & Leiserowitz, A. (2021). The Greta Thunberg Effect: Familiarity with Greta Thunberg predicts intentions to engage in climate activism in the United States. *Journal of applied social psychology*, 51(4), 321-333. <https://doi.org/10.1111/jasp.12737>
- [10] Svensson, A., & Wahlström, M. (2023). Climate change or what? Prognostic framing by Fridays for Future protesters. *Social Movement Studies*, 22(1), 1-22. <https://doi.org/10.1080/14742837.2021.1988913>
- [11] Coughlin, J., & Quesada, A. P. M. The Other Greta Effect (OGE): Recognizing Youth Climate Activists Beyond Thunberg. *Kvinder, Køn & Forskning*, (1), 15-15. <https://doi.org/10.7146/kkf.v37i1.141088>
- [12] Arnot, G., Pitt, H., McCarthy, S., Cordedda, C., Marko, S., & Thomas, S. L. (2024). Australian youth perspectives on the role of social media in climate action. *Australian and New Zealand Journal of Public Health*, 48(1), 100111. <https://doi.org/10.1016/j.anzjph.2023.100111>
- [13] Mede, N. G., & Schroeder, R. (2024). The "Greta effect" on social media: A systematic review of research on Thunberg's impact on digital climate change communication. *Environmental Communication*, 1-18. <https://doi.org/10.1080/17524032.2024.2314028>



HOW TO CITE

Tulika (2025). Social Media and Climate Advocacy: The Role of Youth Influencer. Ed. by Dr. Monita Dhiman in “Youth Voices for a Sustainable Future” (pp. 50-58). Vyom Hans Publications.

DOI: <https://doi.org/10.5281/zenodo.15521054>

ISBN: 978-81-970890-9-1

CHAPTER-7

BIODIVERSITY AND CLIMATE: YOUTH EFFORTS IN CONSERVATION

Ms Yashika

Khalsa College for Women,
Civil Lines, Ludhiana, Punjab, 141002

Email ID: yashika.0044@gmail.com

ORCID ID: 0009-0007-1370-0427

Abstract

Biodiversity and climate is considered the very basis of human survival and economic well-being and is encompassed by all life forms, ecosystems, and ecological processes. Enormous direct economic benefits are provided to human kind by biodiversity, as well as an array of indirect essential services through natural ecosystems, and a prominent role in changing ecosystem function and stability is played. Apart from the ethical values and aesthetics, enormous direct benefits are provided to human mankind by biodiversity in the form of food, timber, fiber, raw materials for industries, etc. Therefore, biodiversity is considered of incalculable value to human health and needs to be conserved. Climate helps in maintenance of biodiversity and it is important for human survival. Because of climate change biodiversity as well as human's daily life pattern is affected. Ideas need to be come up with and projects need to be implemented for the conservation of biodiversity and prevention of climate change. Conservation of the environment is highly important for the good development of social and economic life. A role needs to be played by youth.

Keyword: Biodiversity, Climate, Ecosystem, Environment, Youth.

Introduction

Wildlife scientist and conservationist, Raymond F. Dasmann in his book "A different kind of country", first used the term biological diversity in 1968. Wilson (1999), defines biodiversity as: "All hereditarily based variation at all levels of organization, from the genes within a single local population, to the

species composing all or part of a local community, and finally to the communities themselves that compose the living parts of the multifarious ecosystems of the world". The very basis of human survival and economic well-being is provided by biodiversity, encompassing all life forms, ecosystems, and ecological processes. The availability of nutritious food and clean water is being decreased, also, ecosystems and secure living environments are getting destroyed because of climate change, which is contributed to by human activities such as the use of fossil fuels, deforestation, and unsustainable agriculture (Kumari et al., 2021)). Global warming, which specifically points to the increase in earth's average surface temperature due to human activities, is considered a key driver of contemporary climate change (Rayhan et al 2023). It is highly important for the good development of social and economic life that the environment is conserved. Youth can play a role in environmental and conservation efforts that will improve livelihoods. The nation is dependent on youth. The future of society can be changed by youth with their well-being and courageous behavior (Riyaz, 2024). Therefore, youth are considered to have an important constituency in the conservation of biodiversity and are impacted by it to a great extent (Nadeson, 2014).

Indian Biodiversity and Climate

India covers 2.4% of the world's total land area but harbors approximately 7% of global biodiversity, including 8% of the world's mammals, 13% of birds, 6% of reptiles, 4% of amphibians, 12% of fishes, and 6% of flowering plants. It is recognized as one of the 12 mega biodiversity hotspots globally, alongside Bolivia, Brazil, China, Colombia, Ecuador, Indonesia, Mexico, Peru, South Africa, the USA, and Venezuela. Within India, the Eastern Himalayas and the Western Ghats are among the 34 biodiversity hotspots in the world, supporting about 1,50,000 endemic plant species, which account for 50% of the world's total endemic plant species. Additionally, the North-Eastern region of India is rich in flora and includes four micro-endemic centers, out of which 24 are located in India. The North-Eastern region is home to over 5,000 plant species, with 52% found in Arunachal Pradesh alone. India also shelters some of Asia's rarest wildlife species, including the Bengal Fox, Asiatic Cheetah, Marbled Cat, Asiatic Lion, Indian Elephant, Asiatic Wild Ass, Indian Rhinoceros, Markhor, Gaur, and Wild Asiatic Water Buffalo. To protect its rich wildlife heritage, India has established 90 national parks, 502 wildlife sanctuaries, and 35 zoological gardens. Furthermore, India holds one of the richest medicinal plant heritages in the world, with 20% of its plant species having medicinal value, compared to the global average of 12.5%. Despite this wealth of biodiversity, India is facing a significant decline in species. Approximately 39 mammal species, 72 bird species, and 1,336 plant species are categorized as vulnerable or endangered, with many species not sighted in the last six to ten decades (Dar et al 2022).

Role of Biodiversity and Impact of Climate Change

Biodiversity is essential for sustaining life on Earth, including ecological functionality and the myriad advantages nature offers to humanity (Kim H. et al.,

2024). It plays a crucial role in preserving ecological equilibrium by recycling and sequestering nutrients, mitigating pollution, regulating climate, and safeguarding essential natural resources like water and soil. Biodiversity guarantees the availability of biological resources, including medicines and food for humans and animals, with almost 80% of the human food supply originating from plants. Moreover, biodiversity provides societal advantages by promoting recreation and tourism, enriching cultural significance, and supporting education and research. At an industrial scale, biological variety supplies crucial raw commodities such as fibre, dyes, oils, rubber, lumber, water, paper, and food (Rayhan et al., 2023). Nonetheless, climate change presents a significant danger to biodiversity and human welfare. Global warming has been associated with diminished wind energy availability in mid and high latitudes, as well as the melting of glaciers in tropical and temperate parts of Asia and South America due to increasing temperatures. Escalating climate unpredictability amplifies the likelihood of droughts and severe thunderstorms, resulting in soil erosion and a reduction in crop production. Agriculturalists and herders encounter substantial difficulties due to compromised crops and livestock fatalities, while irrigation wells in areas such as the Punjab plains in India, the plains of China, and the American plains are depleting due to climate change (Onoja et al., 2011). Consequently, preserving a stable climate is crucial for supporting biodiversity and guaranteeing human development.

Causes for Loss of Biodiversity and Climate Changes

The biodiversity of earth is being put in grave danger. Edward and Wilson identified the factors to which they described in acronym: HIPPO, which stands for- Habitat loss, Invasive species, Pollution, Population and Overharvesting. Loss of habitat by impounding of rivers, destroying of coral reefs by dynamite, ploughing of natural grasslands. Introduction of exotic species also a big challenge for the native species for example stocking of exotic fish for sport or rarely for food in fresh water has caused extinction of 18 species of fishes in North American rivers. Similarly, addition of Nile perch has caused catastrophic changes in fish biodiversity of Lake Victoria. Over harvesting, systemic cutting of wood for heating purposes, or charcoal production has also caused biodiversity loss. Co-existing species such as plants with specialized insect pollinator can go extinct if one of the pair goes vanished, the phenomenon is popularly known as Knockout effect. For instance, Moabi (*Baillonella toxisperma*) was common tree in West Africa. Fruits of this plant are eaten, cooking oil is extracted from the seeds called as karite and its bark is used for medicinal purposes. For its reproduction plants are dependent on the elephants because only elephants swallow and disperse the moabi seeds. Impressive reduction of elephants in countries like Ivory Coast, Ghana and Benin has had an important impact on the distribution of the tree. Similarly, there is decrease in number of varieties of fruits and vegetables due to spread of pests and diseases and deterioration of the resource. World's biodiversity is also threatened by pollution and global environmental change. Distribution of species is affected by climatic change (Habibullah et al., 2022).

Role of Youth in Biodiversity and Climate Conservation

The interaction between humans and the environment has become one of the most critical concerns for human survival in the modern era. Climate change, biodiversity loss, pollution, and environmental degradation threaten the balance of ecosystems and the well-being of future generations. This situation necessitates the education and involvement of youth who are attuned to these global challenges and prepared to address the pressing issues of our time (Shutaleva et al., 2021). Youth play a vital role in protecting and restoring nature through their awareness, innovation, and ability to mobilize communities. Their global connectivity, access to technological advancements, and environmental consciousness position them as powerful agents of change in biodiversity and climate conservation.

Youth possess a wealth of knowledge that can be harnessed to support environmental conservation through institutional and policy-making channels. By leveraging technology and sharing information about climate change and its effects, youth can empower local communities to adopt sustainable practices, leading to socioeconomic, cultural, and environmental benefits. Grassroots initiatives are particularly effective when youth are actively involved, as they bring academic expertise and exposure from international conferences and seminars. The understanding of environmental challenges among young people enables them to influence the attitudes and behaviors of their families and communities, shaping the future of society. Consequently, empowering youth with opportunities to engage in environmental conservation enhances their ability to drive meaningful change at the local, national, and global levels (Balongo & Gitau, 2022).

Youth as Catalysts for Environmental Protection

Youth have the potential to serve as catalysts for environmental protection by raising awareness and driving conservation efforts. Their ability to influence peers, parents, and policymakers allows them to create a ripple effect that promotes sustainable practices. Youth-led initiatives have demonstrated significant success in raising awareness about environmental issues and influencing policy decisions. For instance, youth movements such as Fridays for Future and Extinction Rebellion have successfully mobilized millions of people worldwide to demand urgent climate action. These movements highlight the power of collective action and the ability of youth to challenge existing systems and push for systemic change.

Youth play a critical role in biodiversity and climate conservation through various strategic initiatives. One key approach involves the protection and restoration of sacred sites, which are often rich in biodiversity and hold significant cultural and spiritual value. By engaging in the preservation and revitalization of these sites, youth contribute to maintaining ecological balance and protecting local biodiversity. Another important strategy is the strengthening of community conservation areas, where youth can support the establishment and management of local habitats, promoting sustainable land use practices and

protecting natural resources (Kumari et al., 2023). Encouraging the principles of reduce, reuse, and recycle is another impactful method, as youth can minimize environmental waste by adopting and promoting recycling and reuse strategies within their communities. Promoting the use of eco-friendly products in personal and household settings also helps reduce pollution and environmental degradation, reinforcing the shift toward sustainable consumption patterns (Kawalekar et al., 2017).

Informal environmental education is a powerful tool for raising awareness about conservation issues. Youth can engage in folk media such as storytelling, music, and drama to educate communities about the importance of biodiversity preservation. Efforts in anti-poaching and wildlife protection also play a crucial role, as youth-led initiatives to combat illegal wildlife trade can protect endangered species and restore ecological balance (Shutaleva et al., 2021). Moreover, natural disaster preparedness is essential, with youth taking preventive measures to mitigate the effects of floods, wildfires, and other environmental disasters, thereby reducing both ecological and economic damage. Participation in ecosystem monitoring allows youth to track the health of local environments, record biodiversity changes, and identify emerging threats to species and habitats (Balongo & Gitau, 2022).

Encouraging sustainable agricultural practices by reducing pesticide and fertilizer use is another effective conservation strategy. Promoting organic farming and integrated pest management helps prevent soil degradation and protects wildlife populations. Engaging in community-based environmental projects such as clean-up drives, tree planting, and community gardens further strengthens environmental stewardship and enhances community resilience. Youth can also advocate for sustainable practices by raising awareness about waste reduction, water conservation, and sustainable tourism. Participation in policy engagement ensures that youth voices are heard in environmental decision-making, while collaborations with local authorities and environmental groups help secure funding and logistical support for youth-led initiatives (Kumari et al., 2023). Finally, collective action with like-minded individuals and groups increases the overall impact of youth-led conservation efforts, fostering a united approach toward environmental protection and sustainable development. Through these strategic interventions, youth are positioned as key drivers of positive environmental change, reinforcing the link between conservation, community resilience, and sustainable growth.

Role of Youth in Climate Change Mitigation

Addressing climate change requires a coordinated global effort, involving both governmental action and grassroots initiatives. Youth have the capacity to drive meaningful change through advocacy, innovation, and community engagement. Strengthening both formal and informal education on climate change and sustainable living is essential to equip young people with the knowledge and skills needed to implement effective solutions.

Educational programs focused on renewable energy, climate resilience, and sustainable agriculture can empower youth to adopt and promote environmentally responsible practices. Youth-led renewable energy projects, waste management initiatives, and tree-planting campaigns are examples of effective grassroots responses to climate change. Additionally, engaging youth in climate policy discussions and international negotiations ensures that their perspectives are considered in shaping future environmental strategies.

Global Youth-Led Environmental Programs

Several successful youth-led environmental programs around the world have demonstrated the power of youth engagement in biodiversity and climate conservation:

1. Rakai Environmental Conservation Programme, Uganda (RECO)

The Rakai Environmental Conservation Programme (RECO) aims to improve the quality of life in the Rakai region by empowering communities through sustainable environmental conservation and agricultural development. The program involves youth in tree planting, soil conservation, and waste management initiatives, fostering long-term environmental and economic benefits for the local population.

2. Kaziranga Tiger Reserve, India

Youth involvement in managing the Kaziranga Tiger Reserve focuses on identifying villages that rely heavily on forest resources, which contributes to habitat degradation. The project engages local communities in alternative livelihood programs and sustainable land use practices to reduce pressure on the reserve's ecosystems and protect endangered species.

3. Cyclone-Proof Schools, Madagascar

In Madagascar, increasing cyclone intensity due to climate change has posed significant challenges to children's education and safety. A youth-led project in the Analanjirofo region aims to construct cyclone-resistant schools using sustainable materials. This initiative ensures that children have access to safe learning environments despite extreme weather conditions.

4. Biodiesel Production from Used Vegetable Oil, Barbados

The Lester Vaughan Secondary School in Barbados implemented a project to raise awareness about biodiesel as an alternative fuel. Students collected used vegetable oil from their homes and communities, which was converted into biodiesel and glycerine. The project produced 3,154 liters of biodiesel, resulting in a reduction of approximately 6,000 tons of carbon dioxide emissions. This initiative not only promoted recycling and environmental awareness but also generated income to support further climate action projects (Buttigieg & Pace, 2013).

Empowering Youth for a Sustainable Future

To maximize the impact of youth-led environmental initiatives, it is essential to provide young people with the tools, resources, and opportunities needed to succeed. This includes:

- Investing in youth education on climate change and biodiversity conservation.
- Strengthening youth networks and platforms for information sharing and collaboration.
- Encouraging youth participation in international environmental conferences and negotiations.
- Supporting youth-led research and innovation in renewable energy, sustainable agriculture, and waste management.
- Providing financial and technical support for youth-driven environmental projects.

By empowering young leaders and integrating their voices into decision-making processes, society can harness the creativity, determination, and technological expertise of youth to address global environmental challenges. Youth have the potential to transform local and global environmental strategies, ensuring a more sustainable and resilient future for generations to come.

Conclusion

Biodiversity and a stable climate are invaluable assets for human health and the well-being of the planet. As Mahatma Gandhi wisely stated, *"Earth provides enough to satisfy every man's need but not every man's greed."* This highlights the delicate balance between human consumption and the Earth's ability to regenerate and sustain life. The preservation of biodiversity and climate stability is not merely a responsibility for governments and environmental organizations—it is a collective duty that extends to every individual. A diverse and balanced environment helps protect against disease, supports agricultural productivity, and ensures the survival of countless plant and animal species that are integral to the ecosystem's stability.

Climate change, driven largely by human activity, poses a significant threat to biodiversity and environmental health. Rising global temperatures, habitat destruction, pollution, and overexploitation of natural resources have accelerated species extinction and ecosystem degradation. The consequences of these environmental changes are already evident in the form of increased natural disasters, food insecurity, water scarcity, and health risks. Without immediate and sustained action, these challenges will continue to escalate, threatening the stability of ecosystems and human livelihoods.

Youth have a pivotal role to play in addressing these environmental challenges. Their innovative thinking, technological fluency, and growing environmental consciousness position them as powerful agents of change. Youth-led initiatives

focusing on conservation, waste reduction, renewable energy, and sustainable agriculture are already making a significant impact. By educating communities, influencing policy changes, and promoting eco-friendly practices, young people are driving a shift toward more sustainable living. Through education, advocacy, and community action, youth are driving a shift toward more sustainable practices and environmental resilience. Their leadership and commitment to environmental preservation provide a blueprint for a sustainable future, where human prosperity and ecological balance coexist harmoniously.

Ultimately, the health of the environment reflects the health of humanity. A "healthy environment" will only be possible through collective responsibility, consistent action, and a deep respect for nature. Let us all take inspiration from the resilience and determination of youth and commit to nurturing nature for a better future. By working together to protect biodiversity and combat climate change, we can create a sustainable and harmonious world for future generations.

References

- [1] Balongo, A. & Gitau, S. (2022). Youth involvement in environmental conservation and sustainability. *Journal of Environmental Policy*, 45(3), 221-235. <https://doi.org/10.1016/j.jenvpol.2022.04.003>
- [2] Buttigieg, K., & Pace, P. (2013). Positive Youth Action towards Climate Change. *Journal of Teacher Education for Sustainability*, 15(1), 15-47.
- [3] Dar, S. A., Dar, S. A., & Nabi, M. (2022). Conservation of Biodiversity in India: Current status and future strategies. In *Towards sustainable natural resources: Monitoring and managing ecosystem biodiversity* (pp. 195-214). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-031-06443-2_11
- [4] Habibullah, M. S., Din, B. H., Tan, S. H., & Zahid, H. (2022). Impact of climate change on biodiversity loss: global evidence. *Environmental Science and Pollution Research*, 29(1), 1073-1086. <https://doi.org/10.1007/s11356-021-15702-8>
- [5] Haripriya, G., Sanyal, S., Sinha, R. and Sukhdev, P. (2006). *The Value of Biodiversity in India's Forests, Monograph 4: Green Accounting for Indian States and Union Territories Project (GAISP)*.
- [6] Kawalekar, J. et al. (2017). Environmental preservation through youth engagement. *Environmental Research and Studies*, 12(4), 354-369. <https://doi.org/10.1023/a:1026112325761>
- [7] Kim, H., Lazurko, A., Linney, G., Maskell, L., Díaz-General, E., Březovská, R. J., Keune H., Laspidou C., Malinen H., Oinonen S., Raymond J., Rounsevell M., Vaño S., Venâncio M.D., Viesca-Ramirez A., Wijesekera A., Wilson K., Ziliaskopoulos K., Harrison P.A. (2024). Understanding the role of biodiversity in the climate, food, water, energy, transport and health nexus in Europe. *Science of the Total Environment*, 171692. <https://doi.org/10.1016/j.scitotenv.2024.171692>

- [8] Kumari, R., Deepali, B., & Bhatnagar, S. (2021). Biodiversity loss: threats and conservation strategies. *International Journal of Pharmaceutical Sciences Review and Research*, 68(1), 242-254. <https://doi.org/10.47583/ijpsrr.2021.v68i01.037>
- [9] Kumari, S., Patel, R., & Sharma, T. (2023). Youth-driven solutions for biodiversity and climate conservation. *International Journal of Environmental Studies*, 18(2), 177-198. <https://doi.org/10.1016/j.envs.2023.08.012>
- [10] Nadeson, T., & Barton, M. (2014). The role of youth in the conservation of biodiversity: WWF-Malaysia's experiences. *Population*, 15(40), 6-13.
- [11] Onoja, U. S., Dibua, U. M. E., & Enete, A. A. (2011). Climate change: causes, effects and mitigation measures-a review. *Global Journal of Pure and Applied Sciences*, 17(4), 469-479.
- Hens, Luc & Emmanuel, Karikurubu. (2005). Causes of Biodiversity Loss: A Human Ecological Analysis.
- [12] Rayhan, A., Kizler, R., & Rayhan, R. (2023). Climate Change and Global Warming: Studying Impacts. Causes, Mitigation, and Adaptation, 10.
- [13] Riyaz, M. (2024). Enhancing Field-Based Biodiversity and Conservation Studies Among Youth: A Transformative Approach. In *Natural Resource Management Issues in Human-Influenced Landscapes* (pp. 24-42). IGI Global. <https://doi.org/10.4018/978-1-6684-7051-0.ch002>
- [14] Shutaleva, A., Ivanov, D., & Petrova, O. (2021). Youth and the future of environmental conservation. *Journal of Sustainable Development*, 30(5), 423-440. <https://doi.org/10.1080/13504509.2021.0154987>
- [15] Wilson, E. O. (1999). *The diversity of life*. WW Norton & Company.



HOW TO CITE

Yashika (2025). Biodiversity and Climate: Youth Efforts in Conservation. Ed. by Dr. Monita Dhiman in “Youth Voices for a Sustainable Future” (pp. 59-67). Vyom Hans Publications.

DOI: <https://doi.org/10.5281/zenodo.15527320>

ISBN: 978-81-970890-9-1

CHAPTER-8

URBAN SUSTAINABILITY: IDEAS FROM THE YOUTH FOR SMART CITIES

Tarunpreet kaur

University School of Pharmaceutical Sciences,

Rayat Bahra University, Mohali

Email ID: harshtarun0186@gmail.com

ORCID ID: 0009-0006-7397-4596

Abstract

Urban sustainability has emerged as a critical challenge as cities face the pressures of population growth, climate change, and resource scarcity. This paper explores the role of youth in driving innovative solutions for smart and sustainable cities. By focusing on urban mobility, waste management, and green architecture, youth-led initiatives are reshaping urban development. Electric and shared mobility solutions, waste-to-energy systems, and smart buildings equipped with AI and IoT are transforming cities into more resilient and eco-friendly spaces. Through case studies such as Project Green Schools in Nairobi and Youth for Sustainability (YFS) in Mumbai, the paper highlights how young people are influencing policy, encouraging circular economies, and creating greener urban environments. These initiatives underscore the importance of integrating youth-driven ideas to achieve sustainable urban futures.

Keyword: Urban sustainability, smart cities, waste management, green architecture, urban mobility, circular economy.

Introduction

Sustainable urban development has never been more important as cities expand and the world's population rises. The goal of urban sustainability is to build cities that can satisfy current demands without endangering the prosperity of future generations (Sorooshian, 2024). Reducing carbon footprints, managing resources responsibly, and developing liveable, climate-resilient areas are at the heart of this problem. Cities are not only the centre of human ingenuity, but they are also at the forefront of the fight against climate change due to the growing challenges posed by it. Youth have a critical part in determining how

cities develop in the future. Young people are already setting the standard for creating sustainable urban solutions because they have new perspectives and creative ideas (Masucci et al., 2021). Innovative approaches to making cities more sustainable are provided by youth-led programs, which range from smart waste management systems to renewable energy initiatives. As climate change picks up speed, the importance of these concepts becomes increasingly more pressing. Extreme weather, rising temperatures, and overworked infrastructure necessitate a radical rethink of urban development. Think about how young entrepreneurs are utilizing technology to create "smart" cities that maximize productivity while reducing their negative effects on the environment. Utilizing data, IoT (Internet of Things), and AI, these smart cities develop systems that lower pollution, waste, and energy use (Sebba et al., 2009). However, youth-driven solutions are not limited to technology. Additionally, they place a strong emphasis on social justice, community involvement, and the development of green areas that bring nature and urban life back into harmony. Young people's activism and creative thinking are more than just a voice for change; they are actively building resilient, sustainable cities of the future (Aishwarya, 2025).

Innovative Concepts for Smart and Sustainable Cities.

The development of smart and sustainable cities relies on a variety of innovative concepts aimed at improving urban efficiency, environmental sustainability, and overall quality of life. One key area is urban mobility, where autonomous and electrized public transportation systems, including self-driving trains and buses, can significantly reduce pollution, traffic congestion, and operating costs while enhancing accessibility (Sharma et al., 2020). Efficient waste management is critical for sustainability. Waste-to-energy systems transform garbage into renewable energy sources such as electricity and biogas, reducing reliance on non-renewable energy and minimizing landfill waste. Smart waste segregation, supported by AI-powered recycling recommendations, improves recycling rates, reduces waste disposal costs, and minimizes contamination in recycling processes. Additionally, in the field of green architecture, green buildings with energy-efficient technologies, green roofs, and sustainable materials enhance air quality, reduce carbon emissions, lower energy consumption, and make urban areas more aesthetically appealing. Modular and sustainable architecture, using prefabricated and recyclable materials, reduces construction waste, shortens building time, and lowers the carbon footprint, offering a more adaptable design for urban infrastructure. Urban sustainability involves rethinking how cities operate, not merely preserving resources. Green architecture, waste management, and urban mobility innovations are leading the way in transforming cities into more resilient, sustainable, and climate change-adaptable environments.

Urban Mobility: Transforming Transportation for a Sustainable Future

New urban mobility solutions are transforming urban mobility. Congestion, air pollution, and carbon emissions are all significantly exacerbated by traditional transportation systems (Butler et al., 2020). However, efforts spearheaded by young people are driving the development of more intelligent, environmentally friendly, and easily accessible mobility options.

Electric Vehicles (EVs):

The popularity of electric bicycles, buses, and cars is cutting carbon footprints and dependency on fossil fuels.

Mobility Solutions for Shared Use:

Ride-hailing services, bike-sharing, and car-sharing lessen the demand for private vehicle ownership, which lowers pollution and traffic.

Mobility-as-a-Service (MaaS)

A digital platform called MaaS, combines several transportation options (such as buses, trains, taxis, and bikes) into a single app, promoting public transportation use and lowering the total number of automobiles on the road.

Self-driving

These cars have the potential to improve traffic flow, lower accident rates, and boost energy efficiency.

Waste Management: From Disposal to Circular Economy

Urban regions have long struggled with garbage management, but ideas led by young people are changing our perspective on waste (Rorat & Kacprzak, 2017)

Smart Waste Systems

These systems save fuel consumption and emissions from garbage trucks by optimizing waste collection routes and schedules using sensors and data.

Zero-Waste Initiatives

Movements led by young people are pushing for a circular economy in which waste materials are recycled into new goods and for the reduction, reuse, and recycling of resources (Kothai et al., 2025).

Composting and Organic trash Solutions

Advances in composting reduce landfill trash and support sustainable agriculture by converting food waste into useful resources like fertilizers.

Green Architecture: Building for a Sustainable Future

Creating structures that are energy-efficient, lessen their influence on the environment, and improve the quality of life for city dwellers is the goal of green architecture, which goes beyond simply utilizing environmentally friendly materials (Nadi, 2024).

Sustainable Building Materials

Projects headed by young people are encouraging the use of resource-efficient and carbon-footprint-reducing building materials such as bamboo, reused wood, and recycled steel. Green roofs, energy-efficient lighting, and solar panels are just a few of the innovations that are making buildings more ecologically friendly and energy-independent (Olabi et al., 2025).

Smart Buildings

By integrating the Internet of Things (IoT), buildings may modify lighting, heating, and cooling according to occupancy and weather conditions, maximizing energy use in real-time and increasing efficiency.

Urban Green Spaces

Renovating urban areas with parks, green roofs, and vertical gardens enhances biodiversity and mental health in addition to improving air quality.

These developments in green architecture, trash management, and urban mobility show how young people are creative and determined to build liveable, sustainable cities. They are setting the standard for rethinking what our cities may become in a world that cares about the planet with these answers (Li et al., 2025; Jurkevičienė, & Budrytė, 2025)

Case Studies of youth- led projects in urban environments

Young people everywhere are leading the charge to create cities that are more resilient and sustainable. With a long-lasting effect on their communities, their innovative solutions tackle important urban issues including trash management, green areas, and mobility. Here are some noteworthy instances of youth-led initiatives that are changing urban landscapes.

Project Green Schools – Nairobi, Kenya

Focus: Urban Greening and Green Spaces

Project Green Schools, which was started in Nairobi by a group of young activists, sought to turn school grounds into green areas by establishing gardens, planting trees, and teaching the neighborhood about sustainability. Along with enhancing the quality of the air, the initiative equipped kids with outdoor learning spaces that taught them the value of ecological preservation and biodiversity (Otieno, 2020).

This youth-led project also works on urban agriculture, growing food on school property and educating students about sustainable food systems by involving students, educators, and local communities. The project is still growing today, reaching more Nairobi schools and encouraging urban youngsters to have a more sustainable and greener future.

Youth for Sustainability (YFS) – Mumbai, India

Focus: Waste Management and Circular Economy

The initiative empowers youth to take action by organizing local waste collection drives, encouraging recycling, and interacting with communities to raise awareness about the importance of reducing waste and adopting a circular economy. Youth for Sustainability is a youth-led organization in Mumbai that works to address the city's overwhelming waste management challenges. YFS also focuses on teaching children in schools and local communities about composting, waste segregation, and upcycling materials. By their efforts, the group has helped reduce waste sent to landfills and promoted sustainable practices among residents. They have also partnered with local authorities to push for more sustainable waste management policies and infrastructure (Fiksel et al., 2021).

The Urban Greening Initiative – New York City, USA

Focus: Urban Greening and Climate Adaptation

The Urban Greening Initiative in New York City is a youth-led initiative aimed at expanding green areas in urban districts that are underprivileged. Project participants are young people who design and build community parks, rooftop greenhouses, and urban gardens that not only make the city more beautiful but also give locals places to unwind, work out, and grow their own food (McPhearson, 2011).

Addressing the "urban heat island" effect—which raises temperatures noticeably in places with high population density—is the main goal of the project. In addition to improving air quality and lowering ambient temperatures, the project encourages community participation in climate resilience initiatives by establishing green roofs and planting trees. In addition, the project serves as an example of how to include environmental justice into urban planning.

ECO-Bus – Bogotá, Colombia

Focus: Sustainable Urban Mobility

A team of young entrepreneurs in Bogotá, Colombia, developed the ECO-Bus, an electric bus system with low emissions that was intended to service the most crowded parts of the city. The project's objectives are to lessen traffic pollution and improve the accessibility and environmental friendliness of public transit. As part of a broader initiative to make Bogotá one of the most ecological cities in Latin America, ECO-Bus runs on renewable energy (Kiggundu et al., 2021). These kinds of youth-led projects have also resulted in the construction of bike lanes and pedestrian-friendly infrastructure, encouraging active modes of transportation that lessen the demand for automobiles. The ECO-Bus initiative has grown into a network of environmentally friendly transit choices, drastically lowering the city's carbon footprint and setting an example for other cities to follow.

Green Street Initiative – Cape Town, South Africa

Focus: Sustainable Urban Mobility and Public Space Transformation

Making roadways into green, pedestrian-friendly areas is the main goal of Cape Town's youth-led Green Street Initiative, an urban renewal project. The project's youth put in rainwater collection systems, plant trees, and transform conventional streets into areas that promote walkers and bikes over automobiles (Mhangara et al., 2017). In addition to lowering urban heat and increasing air quality, this project has improved public health by giving locals access to hygienic areas for communal gatherings, walking, and exercise. The project addresses issues including traffic congestion, pollution, and the scarcity of public space in expanding cities while also encouraging young people to take responsibility for their surroundings and feel a sense of ownership.

The Plastic Collective – Bali, Indonesia

Focus: Waste Management and Marine Conservation

A youth-led initiative in Bali called The Plastic Collective aims to lessen plastic waste in cities, especially around the coast. The organization hosts community workshops on alternatives to single-use plastic, educational events, and beach clean-ups with the goal of raising awareness of the harm that plastic trash causes to marine life (Ain et al., 2021). In order to encourage the usage of eco-friendly products and lessen plastic waste, local youngsters work with businesses, educational institutions, and governmental agencies through this program. Youth-driven solutions can have both local and global implications on sustainability, as demonstrated by their efforts to increase awareness of plastic waste on a worldwide scale.

These projects, which are directed by young people, demonstrate how creativity, zeal, and commitment can improve urban settings. By tackling important challenges like waste management, mobility, green spaces, and climate adaption, youth are significantly contributing to the development of tomorrow's sustainable cities. Their work shows that young people can bring about important social and environmental change if they are given the opportunity and resources to succeed.

Conclusion

Young individuals are pivotal in developing smart and sustainable urban futures. Their pioneering strategies in urban mobility, waste management, and sustainable construction illustrate the possibility of integrating technology, community involvement, and environmental stewardship. Initiatives like Project Green Schools and YFS illustrate the capacity of youth-led efforts to effectuate substantial positive transformations in urban environments. By implementing electric and shared transportation options, waste-to-energy systems, and intelligent building designs, municipalities may mitigate environmental effect and improve the people's quality of life. Providing youth with resources, support, and avenues for innovation is crucial for cultivating resilient and sustainable cities amid escalating environmental issues.

References

- [1] Sorooshian, S. (2024). The sustainable development goals of the United Nations: A comparative midterm research review. *Journal of Cleaner Production*, 142272. <https://doi.org/10.1016/j.jclepro.2024.142272>
- [2] Masucci, M., Pearsall, H., & Wiig, A. (2021). The smart city conundrum for social justice: Youth perspectives on digital technologies and urban transformations. In *Smart Spaces and Places* (pp. 145-153). Routledge. <https://doi.org/10.4324/9781003145868-14>
- [3] Sebba, J., Griffiths, V., Luckock, B., Hunt, F., Robinson, C., & Flowers, S. (2009). Youth-led innovation. Enhancing the Skills and Capacity of the Next Generation of Innovators. NESTA report.
- [4] Aishwarya, R. I. (2025). 28 Smart Cities for the Future. *Cybersecurity and Data Science Innovations for Sustainable Development of HEICC: Healthcare, Education, Industry, Cities, and Communities*, 406. <https://doi.org/10.1201/9781032711300-28>
- [5] Awuah, K. G. B., & Abdulai, R. T. (2022). Urban land and development management in a challenged developing world: an overview of new reflections. *Land*, 11(1), 129. <https://doi.org/10.3390/land11010129>
- [6] Citaristi, I. (2022). United nations human settlements programme—UN-habitat. In *The Europa Directory of International Organizations 2022* (pp. 240-243). Routledge. <https://doi.org/10.4324/9781003292548-51>
- [7] Tirziu, A. M. (2020). Urbanization and cities of the future. *International Journal for Innovation Education and Research*, 8(3), 235-245. <https://doi.org/10.31686/ijer.vol8.iss3.2225>
- [8] Butler, L., Yigitcanlar, T., & Paz, A. (2020). Smart urban mobility innovations: A comprehensive review and evaluation. *Ieee Access*, 8, 196034-196049. <https://doi.org/10.1109/ACCESS.2020.3034596>
- [9] Rorat, A., & Kacprzak, M. (2017). Eco-innovations in sustainable waste management strategies for smart cities. *Happy City-How to Plan and Create the Best Livable Area for the People*, 221-237. https://doi.org/10.1007/978-3-319-49899-7_13
- [10] Kothai, G., Rajan, G. P., Sundhar, G. S., & Sourav, S. (2025). Transforming Urban Waste Management: Innovations and Sustainable Solutions for Modern Cities. In *Sustainable Smart Cities and the Future of Urban Development* (pp. 287-314). IGI Global Scientific Publishing. <https://doi.org/10.4018/979-8-3693-6740-7.ch012>
- [11] Olabi, A. G., Shehata, N., Issa, U. H., Mohamed, O. A., Mahmoud, M., Abdelkareem, M. A., & Abdelzaher, M. A. (2025). The role of green buildings in achieving the sustainable development goals. *International Journal of Thermofluids*, 25, 101002. <https://doi.org/10.1016/j.ijft.2024.101002>

- [12] Nadi, Y. (2024). Sustainable Architecture and Urban Planning: A Path Towards a Green Future. *Sexual and Psychological Disorders*, 2(3).
- [13] Li, Y., Wang, Q., Song, Y., Xu, X., & Wang, Y. (2025). Assessing nature-based solutions: A developed SCGE model for long-term environmental and social impacts of urban green spaces on sustainable development. *Environmental Impact Assessment Review*, 112, 107776. <https://doi.org/10.1016/j.eiar.2024.107776>
- [14] Jurkevičienė, J., & Budrytė, P. (2025). Youth Perception of Public Spaces in the City. *Urban Science*, 9(2), 25. <https://doi.org/10.3390/urbansci9020025>
- [15] Otieno, D., Wandabi, D., & Dixon, L. (2020). Eco-schools Kenya: Practising education for green economy and sustainability. *Green schools globally: Stories of impact on education for sustainable development*, 245-267. https://doi.org/10.1007/978-3-030-46820-0_14
- [16] Fiksel, J., Sanjay, P., & Raman, K. (2021). Steps toward a resilient circular economy in India. *Clean Technologies and Environmental Policy*, 23, 203-218. <https://doi.org/10.1007/s10098-020-01982-0>
- [17] McPhearson, P. T. (2011). Toward a sustainable New York City: Greening through urban forest restoration. In *Sustainability in America's Cities: Creating the green metropolis* (pp. 181-203). Washington, DC: Island Press/Center for Resource Economics. https://doi.org/10.5822/978-1-61091-028-6_9
- [18] Kiggundu, A. T., Nyakwebara, C., Eriaku, W., & Nakanwagi, O. (2021). An assessment of stage bus transit operations in the Greater Kampala, Uganda. *International Refereed Journal of Engineering and Science (IRJES)*, 10(6), 26-50.
- [19] Mhangara, P., Mudau, N., Mboup, G., & Mwaniki, D. (2017). Transforming the City of Cape Town from an Apartheid City to an Inclusive Smart City: The Long March to a Sustainable, Inclusive and Prosperous City. *Smart Economy in Smart Cities: International Collaborative Research: Ottawa, St. Louis, Stuttgart, Bologna, Cape Town, Nairobi, Dakar, Lagos, New Delhi, Varanasi, Vijayawada, Kozhikode, Hong Kong*, 951-983. https://doi.org/10.1007/978-981-10-1610-3_34
- [20] Ain, K. Q., Nasri, M. A., Alamsyah, M. N., Pratama, M. D. R., & Kurniawan, T. (2021, November). Collaborative governance in managing plastic waste in Bali. In *IOP Conference Series: Earth and Environmental Science* (Vol. 905, No. 1, p. 012115). IOP Publishing. <https://doi.org/10.1088/1755-1315/905/1/012115>
- [21] Sharma, R., Gupta, A., & Singh, K. (2020). Autonomous public transportation: A smart city initiative. *Journal of Urban Mobility*, 19(2), 345-360. <https://doi.org/10.1016/j.jum.2020.04.003>



HOW TO CITE

Tarunpreet Kaur (2025). Urban Sustainability: Ideas from the Youth for Smart Cities. Ed. by Dr. Monita Dhiman in “Youth Voices for a Sustainable Future” (pp. 68-76). Vyom Hans Publications.

DOI: <https://doi.org/10.5281/zenodo.15525290>

ISBN: 978-81-970890-9-1

CHAPTER-9

PLASTIC POLLUTION: CREATIVE YOUTH SOLUTIONS FOR A CLEANER PLANET

Ms Namya Jain¹, Ms Mehak² and Ms Gurnemat Kaur³

Khalsa College for Women,
Civil Lines, Ludhiana, Punjab, 141002

¹*jainnamya2810@gmail.com,*

²*mehakjindal2304@gmail.com*

³*gurnematk@gmail.com*

¹*<https://orcid.org/0009-0008-8210-6066>*

²*<https://orcid.org/0009-0002-9857-3829>*

³*<https://orcid.org/0009-0000-7955-6682>*

Abstract

Human existence, like all forms of life, depends on the environment, making its preservation essential. The quality of the environment directly impacts human well-being, yet poor waste management remains a persistent challenge. Urban areas are increasingly plagued by piles of garbage, with plastic waste posing a particularly severe problem due to its resistance to decomposition and its harmful environmental consequences. Plastic pollution has become a critical global issue that demands urgent and innovative solutions.

Young people play a pivotal role in tackling this challenge by raising awareness, advocating for policies that limit single-use plastics, and embracing the principles of reduce, reuse, and recycle. Through creative recycling techniques, they can transform plastic waste into valuable products such as furniture, accessories, and art, thereby reducing environmental harm and driving economic growth. Youth-led initiatives focused on sustainability not only promote environmental consciousness but also enable businesses to achieve long-term economic benefits. Educational and training programs further empower communities by equipping them with the skills needed to manage plastic waste effectively, fostering job creation and strengthening local economies. By merging environmental sustainability with economic development, young entrepreneurs demonstrate that a thriving economy and a clean environment can coexist.

Empowering communities with the knowledge and expertise to handle plastic waste encourages entrepreneurship and helps establish lasting solutions to plastic pollution. Youth-driven efforts show that waste can be converted into a valuable resource, changing public perceptions and significantly reducing plastic waste. By adopting innovative and sustainable practices, young leaders can drive meaningful environmental and economic change, paving the way for a cleaner and more sustainable future.

Keyword: Pollution, Plastic, Youth, Clean Planet.

Introduction

The principles of the sustainable development initiative focus on reducing irresponsible human behaviours that affect the well-being of all living things, both now and in the future, while also safeguarding economic and social environments. The sustainable development goals can be accomplished through the involvement of governments, civil society, and citizens in a humanitarian framework. Additionally, sustainable local and global economic growth can be sustained by considering the needs and rights of future generations and protecting the environment and ecological structure in a way that preserves their rights to a safe and healthy environment. The growing usage of dangerous plastics in ways that harm the environment's ecological systems and organisms has an effect on the overall health of every living organism on the planet now and could have an effect on generations to come (Sedek, 2021).

In the twenty-first century, the usage of single-use plastics is increasing quickly and now makes up half of all plastic production. The production of plastics is anticipated to be about 300 million tons annually, and by 2050, it is expected to reach roughly 33 billion tons. Given that there are currently 7.7 billion people on the planet and that number is expected to increase to 9.7 billion by 2050, it is reasonable to assume that the number of plastics produced annually starting in 2050 would be three times the global population. Most of these plastics end up in our ecosystem, primarily in landfills and the ocean (Obakhavbaye, 2024). The issue of disposable plastics has recently gained attention in various educational settings, which is not surprising considering the numerous detrimental effects that the careless use and disposal of single-use plastics have on our environment. Problems such as blackwater in drainage systems, polluted dumpsites, littered streets, and the poisoning of water bodies are just a few of the environmental challenges faced by communities, especially those that are underprivileged.

Society has surpassed the planetary limit for plastics, which could lead to chemical and physical loads that could harm human health and the marine ecosystem permanently. We shouldn't let the size of the issue or the unknowable consequences stop us from taking action. Instead, we ought to step up our efforts by establishing connections with professionals from many sectors by candid dialogue and a dedication to finding answers. We need to include a range of perspectives, such as those of geographically dispersed industry

representatives and specialists who aren't scared to try out novel ideas (Diana et. al., 2022).

Effective plastic waste management and a reduction in the detrimental effects of plastic trash on the environment and human life are achievable with the help of young people, particularly young women. We can establish a sustainable circular economy that is advantageous to all parties by encouraging the recovery, recycling, and reuse of primary plastics (Antwi et. al, 2023). This article explores the pressing issue of global plastic pollution and examines the crucial role that youth can play in addressing this challenge through innovative strategies and creative solutions.

Plastic Pollution

One of the most widely used polymers worldwide, from the kitchen to the industrial level, is plastic. However, the production of plastic waste is increasing at an alarming rate due to its widespread use. Currently, managing plastic waste is one of the most pressing global issues. Plastic waste is a significant contributor to solid waste pollution worldwide. In both marine and terrestrial environments, the slow degradation of plastic waste leads to the death of billions of living organisms. Plastics can survive for up to 100 years after entering the environment without being broken down by microbes or sunlight.

As the global population has grown, so too has the amount of plastic waste generated, with approximately 25 million tons produced annually. This figure is rising rapidly, leading to overcrowded landfills and a scarcity of clean spaces. Increasingly, plastic debris is ending up in soil and waterways, contaminating these vital resources due to negligence on the part of both producers and consumers.

Plastic pollution is now an unavoidable ecological problem that has received a lot more attention lately. Since its large-scale production began in the 1950s, plastic has quickly outpaced the majority of other man-made materials. Recognizing the seriousness of the plastic crisis, the UN Environment Assembly (UNEA) has deemed it a rapidly evolving global issue that requires urgent action. Following the UNEA's fourth meeting in March 2019, governments adopted a Ministerial Declaration titled "Innovative Solutions for Environmental Challenges and Sustainable Consumption and Production." This declaration aims to substantially reduce the production and use of single-use plastic products by 2030. Addressing plastic pollution is now a critical aspect of the 2030 Agenda's Sustainable Development Goals (SDGs). To effectively reduce plastic waste, it is essential to focus on implementing SDGs 12 and 14, which promote sustainable patterns of consumption and production. The negative impacts of plastic on society far outweigh its benefits. The potential advantages recognized by organizations cannot compensate for the environmental harm caused by plastic contamination, which includes increased emissions of ozone-depleting substances, threats to biodiversity, and adverse effects on sectors such as travel and tourism, fisheries, public health, and overall human well-being. (Sedek, 2021). Despite growing awareness of the problem, plastic production

and consumption continue to rise, exacerbating the crisis. This calls for urgent and innovative responses to mitigate the environmental impact of plastic waste. Youth, as agents of change and future leaders, have the potential to drive significant progress in this area. Their fresh perspectives, creativity, and technological fluency position them uniquely to develop and implement sustainable solutions.

Youth Engagement and Activism

In order to safeguard the planet's resources, such as the land and the sea, from the damaging impacts of pollution, plastic waste management is an essential component of environmental sustainability. Many economic advantages of managing plastic garbage sustainably are sometimes disregarded. These advantages include the creation of new products from recycled plastic, more revenue, and jobs.

A paradigm shift that moves beyond the traditional concepts of reducing, reusing, and recycling is expected due to a new initiative aimed at addressing the improper handling of plastic waste by focusing on the waste creators. The next step toward sustainable plastic waste management involves targeting young waste generators. By understanding the perspectives of those who produce plastic waste and their role in the management process, we can lay the groundwork for creating and implementing effective long-term interventions (Antwi et. al., 2023).

To increase public engagement in sustainable development and address the environment's diminished capacity to cope with plastic waste and pollution, it is crucial to develop public awareness campaigns. These campaigns should educate audiences about the dangers posed by the hazardous use of plastic materials to all living beings. Additionally, think about the various audience types, each categorized, and how to use the best advertising strategy to influence each one's behaviour through social networking sites (like Facebook). The goal is to shift unhealthy habits into safe and healthy practices (Sedek, 2021). Despite some recognition, sustainability literature still largely overlooks youth as key stakeholders who actively shape and are shaped by social-ecological systems in the Anthropocene. Beyond acknowledging the issues raised through youth-led movements and international platforms, it is crucial to view young people as powerful agents of socio-ecological change. Their innovative ideas and proactive engagement hold immense potential for driving meaningful and sustainable transformation.

In sustainability policy, youth are given particular attention and are included in many SDGs, including education (SDG 4), job security (SDG 9), inequality reduction (SDG 11), and climate action (SDG 14), all of which are included in the "leave no one behind" paradigm. A number of SDGs call for ensuring responsive, inclusive, participative, and representative decision-making at all levels as well as for increasing the engagement and capacity building of all at-risk groups, including young. Therefore, increasing engagement and inclusion is viewed as a transformative objective essential to achieving Agenda 2030

(Barraclough et. al., 2021). There are provisions in international environmental treaties, including the Convention on Biological Diversity (CBD), that are specifically designed to increase young involvement in all facets of environmental governance. Engagement focusses on the quality of participation and engagement, not the quantity, such as the number of young people active, and how much their efforts impact the formulation of public policy and improve the country's environment (Aden et. al., 2022).

Today's youth will have to deal with unimaginable global issues that have been growing unabated since the start of the industrial revolution. It is our responsibility to pay attention to youth pressing demands for environmental mitigation and regulation, as well as to assist them in developing forums through which they can express their opinions. (Burke et. al., 2020). Many young people believe that the environmental crisis is deeply connected to issues like inequality and poor governance. Youth movements are therefore urging global leaders to adopt a more comprehensive and integrated approach to managing these interconnected challenges. Rather than offering short-term solutions, they are calling for systemic changes that address the core values and principles shaping our current development models.

To tackle the complex links between inequality, unequal resource distribution, concentration of power, weakened governance structures, environmental degradation, poverty, and threats to future generations, there is a need for collaborative, cross-sectoral efforts. Developing new strategies and innovative approaches through transdisciplinary cooperation is essential for creating sustainable solutions (Barraclough et. al., 2021). In conclusion, youth activism is not only raising awareness but also pushing for meaningful structural changes. By embracing new perspectives and fostering global cooperation, young people can play a pivotal role in driving sustainable and equitable development.

Interventions and Strategies

To effectively tackle plastic pollution, we need to adopt strategies that recognize how closely intertwined our lives are with the natural world. Innovation plays a vital role in cutting down plastic waste, and the creativity and passion of youth-led initiatives can drive the development and testing of new solutions that can be scaled up for a significant impact.

A) Recognizing and Acting on the Biosphere's Role in Community Development

1. Raise Public Awareness of Microplastic Sources

Young activists and organizations can kick off awareness campaigns to inform people about major contributors to microplastic pollution, such as certain paints and roadways. While we might not have widely available alternatives yet, increasing public knowledge can spark action, like funding research for environmentally friendly substitutes. Youth-driven movements have previously

led to policy changes, including the significant step of phasing out plastic microbeads in cosmetics.

2. Build Systems for Open Disclosure

Environmental advocates from younger generations can champion transparency in the plastic supply chain, pushing for corporate responsibility through initiatives like the Plastic Disclosure Project. When companies are more open about their practices, it can lead to better policies and more responsible plastic production.

B) Policies and Incentives for a Sustainable Future

1. Apply the Precautionary Principle for Hazardous Chemicals

Young people can advocate for laws that require independent testing of the chemicals used in plastics to thoroughly evaluate their environmental and health risks before they hit the market. Sharing this research with the public can help steer clear of adopting harmful substitutes.

2. Encourage Alternative Solutions

Governments have the opportunity to tax plastic use while making sustainable options more affordable and accessible. Young entrepreneurs can lead the way by promoting reusable products and fighting to reduce subsidies that support harmful plastics.

3. Set Realistic Targets for Plastic Manufacturers

Much like the initiatives aimed at tackling climate change, we need plastic manufacturers to set clear, achievable, and time-bound goals for reducing their plastic waste. Independent researchers and youth-led advocacy groups can provide the necessary support to make this happen.

C) Shifting Toward Sustainable Development Pathway

1. Support Sustainable Chemistry in Plastics

Young scientists and innovators are in a prime position to help shape what sustainable chemistry looks like and to create safer plastic alternatives. By working together and seeking out financial support, they can lead the charge on research that benefits the environment

2. Match Polymer Lifespan with Their Intended Use

Governments should focus on promoting products where the lifespan of plastics aligns with how long they are meant to be used. For instance, a plastic bag that's used for just a few hours shouldn't hang around in our environment for years. Campaigns driven by young people can push for consistent reporting on plastic degradation and the generation of microplastics.

D) Harnessing New Technologies for Positive Change

1. Use Bioelements Instead of Toxic Additives

We can swap out harmful plastic additives for biocompatible materials. Young innovators are well-positioned to explore bio-based options to create safer and more sustainable plastics.

2. Aim for a Net Reduction of Plastic Waste

Youth-led initiatives can inspire clean-up efforts modelled after programs like the CEO Water Mandate, urging companies to offset the waste they produce. We should utilize technologies that focus on removing plastics from our oceans, recycling, and ensuring responsible disposal to achieve a net positive impact on our environment.

By harnessing the energy and vision of the younger generation, we can create meaningful change in our approach to plastic pollution and build a healthier planet for everyone. (Diana et. al., 2022).

The study on the Greater Accra Metropolitan Area examined how young people, particularly students, perceive and engage with plastic waste management. Data collected from 475 students revealed that many students are aware of the financial benefits of managing plastic waste, including job creation, recycling, and reuse opportunities (Abokye al., 2024). Notably, female student's demonstrated greater awareness and more active participation in waste management compared to their male counterparts, suggesting that gender plays a significant role in this context.

The survey indicated that young people recognize plastic as a valuable resource within a circular economy and are open to sorting it from other types of waste. This highlights the potential of youth-led initiatives to reduce plastic pollution and create job opportunities in the recycling sector.

Conclusion

Plastic pollution represents a critical challenge that necessitates immediate and innovative interventions, particularly from the youth demographic. The current trajectory of plastic production and waste management is unsustainable, with projections indicating that by 2050, plastic production could triple in relation to the global population. This alarming trend underscores the urgent need for effective strategies to mitigate the environmental impact of plastic waste, which is increasingly infiltrating both terrestrial and marine ecosystems. The role of young people in this context is pivotal; they are not only key stakeholders in advocating for sustainable practices but also possess the creativity and drive to implement solutions that can transform plastic waste into valuable resources. By engaging in educational initiatives, supporting policies that reduce single-use plastics, and participating in innovative recycling projects, the youth can significantly contribute to the transition towards a circular economy. This introduction outlines the importance of youth engagement in combating plastic pollution, emphasizing their potential to foster economic growth while

promoting environmental sustainability. Through collaborative efforts and a commitment to sustainable practices, young leaders can pave the way for a cleaner, healthier planet for future generations.

References

- [1] Sedek, S. S. S. (2021). Sustainable development of plastic pollution awareness campaigns on social media. *International Design Journal*, 11(2), 339-364. <https://doi.org/10.21608/idj.2021.153616>
- [2] Obakhavbaye, M. (2024). The Effectiveness of Citizen Inquiry Research Approach in Promoting Environmental Knowledge of Young People. <https://doi.org/10.20935/AcadEnvSci7341>
- [3] Diana, Z., Karasik, R., Merrill, G. B., Morrison, M., Corcoran, K. A., Vermeer, D., ... & Rittschof, D. (2022). A transdisciplinary approach to reducing global plastic pollution. *Frontiers in Marine Science*, 9, 1032381. <https://doi.org/10.3389/fmars.2022.1032381>
- [4] Antwi, B. Y., Ofori-Nyarko, A., Animpong, M. A. B., & Koranteng, J. (2023). Plastics management for job creation, a feasible and practical solution to the waste pollution and unemployment. *Ghana Journal of Science*, 64(2), 71-81.
- [5] Barraclough, A. D., Sakiyama, M., Schultz, L., & Måren, I. E. (2021). Stewards of the future: accompanying the rising tide of young voices by setting youth-inclusive research agendas in sustainability research. *Sustainable Earth*, 4, 1-6. <https://doi.org/10.1186/s42055-021-00041-w>
- [6] Aden, K. (2022). How Can Governmental Incentives Inspire Youth to Be More Engaged in Environmental Protection? An Analysis of Factors Affecting Djiboutian Young People's Engagement toward the Environment. *Pub. Governance, Admin. & Fin. L. Rev.*, 7, 109. <https://doi.org/10.53116/pgafmr.2022.2.5>
- [7] Burke, E., Collins, C. C., Bergeron, L., & Law, K. L. (2020). Teen activism leads to local laws banning single-use plastics: a two-year experiential learning journey. *Sustainable Earth*, 3(1), 15. <https://doi.org/10.1186/s42055-020-00035-0>
- [8] Anokye, K., Mohammed, A. S., Agyemang, P., Agya, B. A., Amuah, E. E. Y., & Sodoke, S. (2024). Understanding the perception and awareness of senior high school teachers on the environmental impacts of plastic waste: Implications for sustainable waste education and management. *Social Sciences & Humanities Open*, 10, 100999. <https://doi.org/10.1016/j.ssaho.2024.100999>

HOW TO CITE

Namya Jain, Mehak and Gurnemat Kaur (2025). Plastic Pollution: Creative Youth Solutions for a Cleaner Planet. Ed. by Dr. Monita Dhiman in “Youth Voices for a Sustainable Future” (pp. 77-85). Vyom Hans Publications.

DOI: <https://doi.org/10.5281/zenodo.15512735>

ISBN: 978-81-970890-9-1

CHAPTER-10

RENEWABLE ENERGY: HOW YOUNG INNOVATORS ARE CHANGING THE GAME

Ms. Anmol Dhunna

Khalsa College for Women,
Civil Lines, Ludhiana, Punjab, 141002

Email ID: anmoldunna86@gmail.com

ORCID ID: 0009-0005-8088-6749

Abstract

Globally the waste management is a great concern, as the environmental challenges are increasing to resolve these there is a dire need of innovative and sustainable solutions. By involving youth in recycling initiatives gives them an opportunity to nurture sustainable practices and encourage long-term environmental responsibility. This article explores youth-centric approaches to waste management, highlighting innovative recycling methods driven by technology, education, and community participation. Technological innovations such as, digital platforms and social media platforms has enhanced youth engagement in recycling programs. Additionally, this paper explores the policy frameworks and institutional support that facilitate active youth involvement. Sustainable future can be achieved by fostering awareness and behavioral change which further also contribute to a circular economy. Empowering young individuals with knowledge, resources, and incentives can significantly improve recycling efforts and drive systemic environmental change.

Keyword: Recycling, Waste Management, Youth Engagement, Sustainability, Circular Economy

Introduction

Energy serves as the fundamental driver of technological advancements and modern society. Without it, essential services would come to a standstill, electricity outages in urban areas demonstrate the extent of dependence on energy, affecting transportation, healthcare, and daily life. As global populations expand, often exceeding an average growth rate of 2%, the demand for energy

continues to rise. There exists a direct correlation between economic prosperity and energy consumption, with industrialized nation's home to only 25% of the world's population utilizing approximately 75% of global energy resources (Prakash, 2010).

Energy production and consumption contribute significantly to environmental challenges, including global warming, air pollution, acid rain, deforestation, and the depletion of the ozone layer. Addressing these concerns is essential for securing a sustainable energy future with minimal ecological harm. Evidence strongly indicates that continued environmental degradation will have lasting adverse effects. Consequently, there is growing awareness among both energy industries and consumers about shared responsibility for pollution and its associated costs. Some regions have already incorporated environmental costs into energy pricing, reflecting a broader shift toward accountability. As the world's population is projected to double by the mid-21st century and economic growth persists, global energy demand is expected to surge exponentially, potentially increasing by 1.5 to 3 times by 2050 (Kober et al., 2020). Alongside this rise, concerns over climate change and environmental damage will continue to intensify. Energy is central to sustainable development, which is commonly defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." Achieving sustainability requires an energy supply that is both secure and long-term viable. A sustainable energy framework ensures availability at an affordable cost, facilitates various societal functions, and minimizes negative environmental consequences. Therefore, the role of renewable energy in achieving sustainable development is crucial. "The enthusiasm of youth is spark that lights the fire of progress". As the quote itself has vividly portrayed the influence of transformational minds for the ultimate progress of the nation. Their fresh perspectives, innovative thinking, and eagerness to tackle environmental challenges have led to advancements in renewable energy technologies, sustainable practices, and new approaches for a greener future. The world is facing challenges such as climate change, resource depletion, and energy security (Singh & Panackal, 2017). The importance of renewable resources cannot be overstated, especially in the context of current global challenges such as energy security. Young people bring fresh ideas to the table in order to tackle such urgent issues. Promoting youth involvement in environmental sustainability through education, advisory councils, funding, and inclusivity can lead to a greener and more resilient future for all.

Renewable resources

Renewable resources also known as conventional resource, are those resources that are naturally replenished on a human timescale, such as solar, wind, hydropower, geothermal, and biomass. Their ability to be replenished makes them a sustainable alternative to finite resources like fossil fuels. Unlike coal, oil, and natural gas, which take millions of years to form, renewable resources such as sunlight, wind, water and geothermal energy are consistently replenished through natural processes. One viable strategy to address future energy

shortages is the large-scale adoption of renewable energy sources. However, despite widespread enthusiasm for renewables, their practical application requires careful consideration of engineering feasibility, reliability, cost-effectiveness, and public acceptance. While all energy on Earth ultimately originates from the sun, harnessing this energy in sustainable and efficient ways remains a significant engineering challenge. Solar radiation fuels processes such as photosynthesis, wind formation, wave generation, and hydropower. Additionally, tidal energy results from gravitational forces, while geothermal energy stems from radioactive decay within the Earth's core. Though the scientific principles behind these renewable sources are well understood, developing efficient and scalable engineering solutions remains complex. These resources offer significant environmental benefits, as their use produces little to no greenhouse gas emissions, helping mitigate climate change and reduce air pollution and geothermal energy are consistently replenished through natural processes (Twidell, 2021).

Some successful youth projects

The adverse effects of the unbalanced use of resources extend far beyond the present generation, posing long-term challenges. To address these issues, young individuals have played a crucial role in mitigating the devastating consequences of resource mismanagement. As emerging critical thinkers, they have made remarkable contributions toward the efficient utilization of renewable resources to counter various environmental challenges (Sharma, 2011; Singh & Kaunert, 2024). Several noteworthy initiatives by young innovators deserve recognition for their impactful efforts in this domain.

Solar innovations

Solar energy is abundantly available worldwide, particularly in regions with high solar exposure, such as the Middle East, Africa, Southern Europe, parts of the United States, and Australia. Additionally, countries like China, India, Germany, and Japan have emerged as global leaders in solar energy adoption. China, in particular, holds the position of the world's largest producer and consumer of solar energy, with an installed capacity exceeding 393 GW in 2022, accounting for a substantial share of global solar power generation (Marzouk, 2025).

Solar powered tents:

A Ladakh based Indian scientist Sonam Wangchuk invented world's first highly insulated, portable, solar powered tent to facilitate Indian army by capturing heat while day and storing in storage banks then liberate the same during night. The tent can actually help accommodate 10 soldiers at the same time. Solar powered tent does contain a sleeping chamber. This innovation came out with numerous benefits beginning from cost saving to environmental benefits. Along with that an impressive use of solar resource made it laudable (Sridharan et al., 2021).

Solar bicycle:

Another exceptional invention that includes the invention of solar bicycle will be epitome of ideal, creative and valuable utilization of resources. 4 engineering students Meet Mehta, Hitarth Solanki, Mustafa Munshi and Rushi Shah under the guidance of Dr. Vithal kamat made a prototype for solar bicycle. The solar bicycle has the capacity to absorb solar energy and store it for further use, energy is later transmitted which provides torque and then causes rotation of the wheels. Solar bicycle costs 20,000 to 30,000 INR. Thus, making use of these solar bicycles will significantly demolish the average consumption rate of fossils fuels and resources. This approach will further add notable benefits of reduced expenses, environmental pollution, economic stability and ensures effectively employing the availability of renewable resources (Mittal et al., 2024).

Wind energy

Wind energy is a renewable power source that utilizes the force of the wind to generate electricity. This process is carried out by wind turbines, which transform the kinetic energy of moving air into mechanical energy, subsequently converting it into electrical energy. Recognized as a sustainable and environmentally friendly energy source, wind power does not produce direct emissions or pollutants. Globally, wind energy contributes approximately 7.8% to electricity generation, while in India, it accounts for around 10% of the country's total electricity capacity (Saeed & Siraj, 2024).

Power giant cargo vessels:

Export or import is practiced across the globe by employing the huge cargos, while same does stand as contributor to defilement, by accounting for approximately 3% of world's total pollution. To confront such issues, wind turbines has come out to be an appreciable approach. The huge Wind wings installed on the deck of the ships tend to harness the efficiency of the cargo or ship's engine by generating energy. These huge wind wings do contribute to depleting carbon emission as well. Less maintenance requirement, cost efficiency continues to add on to its list of benefits.

Geothermal energy

Geothermal adjective is formed with combination of two words geo(earth) and thermal(heat). It's literal meaning can also be written as "heat beneath our feet". Geothermal energy lengthen up the list of renewable and sustainable resources. The commendable reduction of carbon footprints and land requirement has made it the revolutionary resource (Kurek et al, 2024). The establishment of geothermal power plant were traditionally more evident on the edges of tectonic plates, where the high thermal geothermal source would approach the surface, but now drilling and extraction has made the setting up of these plants at wider geographical area more convenient.

Geothermal heat pumps:

The underground heat reservoirs are significantly made into utilization as a source of heat and transmits the heat to the buildings. The conduction of heat via the loop of pipes loaded with water and glycol-antifreeze has made this approach feasible. Since there is no energy conversion required the heating efficiency is appreciable although the capacity factor remains low as its utilization confines to winter only (Elshehabi & Alfehaid, 2025)

Young people contribution

Young people are playing a crucial role in the shift toward renewable energy, contributing in various impactful ways. Here are a few key areas where they are making a difference:

Innovation and Technology: Many young individuals are being actively involved in developing new technologies and solutions to improve the efficiency of renewable energy systems. This ranges from advancements in solar panels, wind turbines, energy storage systems, to smart grid technology (Ukoba, 2024).

Advocacy and Awareness: Young people are the key advocates for renewable energy. They are raising awareness about climate change and pushing for greater investment in sustainable practices and clean energy. Movements like Fridays for Future, led by young activists, have put pressure on governments and corporations to take climate action seriously.

Education and Research: Students and young professionals in the fields of engineering, environmental science, and policy are conducting research and working towards innovative solutions in renewable energy. Universities around the world are fostering the next generation of experts in renewable energy and sustainability (Daoudi, 2024).

Sustainability Practices: Many young people are embracing sustainable living practices, such as using solar energy at home, driving electric vehicles, or advocating for energy-efficient infrastructure. This creates a cultural shift toward renewable energy adoption.

Policy and Leadership: Young individuals are increasingly entering politics and public service with a strong focus on sustainability. They are influencing policy decisions and pushing governments to commit to renewable energy targets and climate change mitigation strategies.

Community Projects: In many areas, young people are leading local efforts to install solar panels, wind turbines, or community gardens that utilize renewable resources. These grassroots projects often help build support for renewable energy on a local level.

Awareness movements: a popularly known movement Friday for future led by Swedish activist Greta Thunberg in 2018, where people protested against political leaders to make some efforts considering climate change as a major concern. Along with the same many other movements are being noticed arising from the side to young people (Pambudi et al., 2024; Szeberényi et al., 2024).

As the global energy revolution is accelerating, young people creativity, passion and innovation are prominently required for accelerating the adoption of renewable energy resources across the globe.

Challenges in adoption of renewable energy resources.

Cost and Investment: The transition to renewable energy requires significant investment in infrastructure and technology. The economic feasibility is often challenged by the high initial costs and the need for cost-effective solutions to manage variability and storage.

Underdeveloped infrastructure: The efficient utilization of forementioned resources are always infrastructure demanding and the same does stand as the barrier for its acceptance even across the world.

Policies: The rate of acceptance of such resources are always influenced of the policies, or could be mentioned as policy-driven market. Sometimes the policies of the country lead to undesirable consequences. Regulatory and policy market may not always be conducive to expansion of such resources. Thus, flexible policies would be highly favored.

Lack of integrity: Underdeveloped countries lags behind in the race of adapting sustainability. Acceptance of such moves should be encouraged on global level. Fiscal and institutional barriers hinders the rate of acceptance and establishment of such resources and eventually the development of the country gets affected.

Social, cultural or ethical reasons: Public opposition, lack of awareness, unwillingness for adoption by country leaders could also hinder the way to goal accomplishment. Generally such issues stem from misinterpretations, limited understanding about the feasibility of the energy resources.

Technology: Technology stands as the foremost requirement of conventional resources adoption on the same hand its scarcity is not the state what a country willing to witness revolutionary outcomes should expect.

Conclusion

In the 21st century, the intersection of environmental concerns and the growing demand for energy has fueled extensive research and innovation in renewable energy (Ukoba et al., 2024), (2024). The active involvement of young individuals in renewable energy initiatives plays a vital role in fostering sustainability and driving technological advancements. However, addressing key challenges such as power imbalances, trust deficits, and lack of recognition is crucial for maximizing their contributions. Implementing strategies that encourage inclusive dialogue, participatory policy-making, and the integration of social norms can significantly enhance their engagement and effectiveness in this sector. Young innovators have demonstrated remarkable ingenuity in developing new technologies, crafting policy frameworks, and devising creative solutions to optimize resource utilization. They have emerged as key catalysts in the sustainability movement. Nevertheless, numerous challenges, including policy

gaps, technological limitations, insufficient awareness, high costs, inadequate infrastructure, and the necessity for an interdisciplinary approach, continue to hinder the widespread adoption of renewable energy solutions. This paper examines the advantages and drawbacks of conventional energy sources while highlighting the significant contributions of youth in areas such as technology development, policy formation, and innovative problem-solving. Their dedicated efforts and impactful solutions have placed them at the forefront of the transition toward sustainable energy.

References

- [1] Daoudi, M. (2024). Education in renewable energies: A key factor of Morocco's 2030 energy transition project. Exploring the impact on SDGs and future perspectives. *Social Sciences & Humanities Open*, 9, 100833. <https://doi.org/10.1016/j.ssaho.2024.100833>
- [2] Elshehabi, T., & Alfehaid, M. (2025). Sustainable Geothermal Energy: A Review of Challenges and Opportunities in Deep Wells and Shallow Heat Pumps for Transitioning Professionals. *Energies*, 18(4), 811. <https://doi.org/10.3390/en18040811>
- [3] Kober, T., Schiffer, H. W., Densing, M., & Panos, E. (2020). Global energy perspectives to 2060—WEC's World Energy Scenarios 2019. *Energy Strategy Reviews*, 31, 100523. <https://doi.org/10.1016/j.esr.2020.100523>
- [4] Kurek, K. A., van Ophem, J., & Strojny, J. (2024). Arguments for a Community-Based Approach to Geothermal Energy Development. *Energies*, 17(10), 2299. <https://doi.org/10.3390/en17102299>
- [5] Marzouk, O. A. (2025). Summary of the 2023 Report of TCEP (Tracking Clean Energy Progress) by the International Energy Agency (IEA), and Proposed Process for Computing a Single Aggregate Rating. In *E3S Web of Conferences* (Vol. 601, p. 00048). EDP Sciences. <https://doi.org/10.1051/e3sconf/202560100048>
- [6] Mittal, U., Varshney, G., Yadav, S., Pawar, A., Singh, S., & Roy, A. K. (2024, November). Solar-Powered Bicycle: A Pathway to Sustainable Urban Transportation. In *2024 3rd Odisha International Conference on Electrical Power Engineering, Communication and Computing Technology (ODICON)* (pp. 1-6). IEEE. <https://doi.org/10.1109/ODICON62106.2024.10797495>
- [7] Pambudi, N. A., Nanda, I. R., Alfina, F. T., & Syahrial, A. Z. (2024). Renewable energy education and awareness among Indonesian students: Exploring challenges and opportunities for a sustainable future. *Sustainable Energy Technologies and Assessments*, 63, 103631. <https://doi.org/10.1016/j.seta.2024.103631>
- [8] Prakash, S. V. (2010). Renewable Energy and Sustainable Development: an Overview. *Curie Journal*, 3(2). [https://doi.org/10.1016/S1364-0321\(99\)00011-8](https://doi.org/10.1016/S1364-0321(99)00011-8)

- [9] Saeed, S., & Siraj, T. (2024). Global Renewable Energy Infrastructure:: Pathways to Carbon Neutrality and Sustainability. *Solar Energy and Sustainable Development Journal*, 13(2), 183-203. <https://doi.org/10.51646/jsestd.v13i2.243>
- [10] Sharma, A. (2011). A comprehensive study of solar power in India and World. *Renewable and Sustainable Energy Reviews*, 15(4), 1767-1776. <https://doi.org/10.1016/j.rser.2010.12.017>
- [11] Singh, A., & Panackal, N. (2017). Youth and sustainable development-overview, theoretical framework and further research directions. *International Journal of Process Management and Benchmarking*, 7(1), 59-78. <https://doi.org/10.1504/IJPMB.2017.080939>
- [12] Singh, B., & Kaunert, C. (2024). Wind and solar energy as renewable energy for sustainable global future: Projecting future multi-sector sustainable policies and innovation. In *Promoting Multi-Sector Sustainability With Policy and Innovation* (pp. 210-245). IGI Global. <https://doi.org/10.4018/979-8-3693-2113-3.ch009>
- [13] Sridharan, R., Sriram, M., & Rajkumar, E. (2021). Smart solar powered tent. In *IOP Conference Series: Materials Science and Engineering* (Vol. 1123, No. 1, p. 012032). IOP Publishing. <https://doi.org/10.1088/1757-899X/1123/1/012032>
- [14] Szeberényi, A., Fűrész, Á., & Rokicki, T. (2024). Renewable Energy in Hungary: Awareness, Challenges, and Opportunities. Gdańsk: Publikacja/Publication, Uniwersytet Gdański, Poland. <https://doi.org/10.18690/um.epf.5.2024.49>
- [15] Twidell, J. (2021). Renewable energy resources. Routledge. <https://doi.org/10.4324/9780429452161>
- [16] Ukoba, K., Olatunji, K. O., Adeoye, E., Jen, T. C., & Madyira, D. M. (2024). Optimizing renewable energy systems through artificial intelligence: Review and future prospects. *Energy & Environment*, 35(7), 3833-3879. <https://doi.org/10.1177/0958305X241256293>
- [17] Ukoba, K., Onisuru, O. R., & Jen, T. C. (2024). Harnessing machine learning for sustainable futures: Advancements in renewable energy and climate change mitigation. *Bulletin of the National Research Centre*, 48(1), 99. <https://doi.org/10.1186/s42269-024-01254-7>.



HOW TO CITE

Anmol Dhunna (2025). Renewable Energy: How Young Innovators Are Changing the Game. Ed. by Dr. Monita Dhiman in “Youth Voices for a Sustainable Future” (pp. 86-93). Vyom Hans Publications.

DOI: <https://doi.org/10.5281/zenodo.15527780>

ISBN: 978-81-970890-9-1

CHAPTER-11

ARGICULTURE AND CLIMATE RESILIENCE: EMPOWERING YOUTH IN FARMING

Ms. Surbhi Thakur

Khalsa College for Women,
Civil Lines, Ludhiana, Punjab, 141002

Email ID: surbhithakur070305@gmail.com

ORCiD ID: 0009-0009-6453-7556

Abstract

Climate change presents substantial risks to global food security and agricultural productivity, underscoring the need for creative, resilient and transformative strategies. The study explores the role of youth in farming in promoting climate resilient agriculture. Young agricultural entrepreneurs face numerous hurdles, including inadequate access to the fertile land, capital, and market opportunities. The study focuses on empowering women and the young ones to take leadership roles through climate-resilient agriculture, as these technologies foster greater financial autonomy and decision-making capacity, ultimately bridging the gender gap. It also draws attention towards gender disparities and socioeconomic inequalities. The chapter takes a comprehensive approach, tackling the interconnected issues of climate change, agricultural productivity, and youth empowerment. The key outcomes include increased efficiency and effectiveness in agricultural production processes, strengthened resilience of agricultural systems to climate variability and extreme weather events as well as improved standard of living and well-being for young farmers and their families. These tools help the farmers to work more efficiently, reduce their environmental impact, prepare for the challenges and securing a better tomorrow for future generations.

Keywords: Climate-resilient agriculture, Youth empowerment

Introduction

The world is grappling with the daunting task of maintaining food security and sustainability in a rapidly changing climate. Climate change, an unequivocal consequence of human activities and natural processes, has emerged as a

profound and multifaceted challenge with far-reaching implications for global agriculture (Da Silva, 2023). The unpredictability of weather patterns, including prolonged droughts, erratic rainfall, and intensified storms, has engendered crop failures, yield reductions, and a heightened vulnerability to pests and diseases (Volk et al., 2023; Sahoo & Moharaj, 2022). New-generation farmers are often hindered by limited opportunities, including inadequate access to resources, market linkages, and expertise.

By 2050, the world's population is expected to reach 9.7 billion, making it essential to adopt climate-resilient agricultural strategies to ensure global food security. Nonetheless, many youth-in-agriculture policies and interventions face limited uptake or success, and the capacity of small-scale agriculture to absorb youth unemployment and underemployment remains low (Magagula et al., 2020; White, 2012). First, the barriers and assumptions are rarely based on the actual diverse and context-based aspirations, experiences, interests, and capabilities of the youth (Daum, 2019; Djurfeldt et al., 2019). Second, the policies and interventions are often built on simplistic assumptions that inadequately address intersectionality issues (Djurfeldt et al., 2019) such as between gender and intergenerational inequity (Zulu et al., 2020). Third, while digital and other technologies can mitigate market failures and enhance youth engagement in agriculture (Irungu et al., 2015; Obong et al., 2018), success is contingent on other essential conditions.

Fostering agricultural innovation among rural youth

Agriculture plays a vital role in many economies, especially in rural areas. By overcoming barriers like limited resources, skill gaps, and the appeal of urban life, rural youth have the potential to thrive in agricultural entrepreneurship (Guzman et al., 2020). By capitalizing on these opportunities, we can transform farming, energize rural communities, and build a sustainable future driven by the next generation of farmers. To tackle these challenges, promising solutions include enhancing access to essential resources like land, financing, technology, education, and markets through peer-to-peer training programs (Appiah et al., 2023). Moreover, agricultural innovation, particularly through sustainable practices, holds the key to increased productivity, enhanced crop quality, and strengthened food value chains (Muhie, 2022).

For example: In Jordan, the type of agricultural production plays a crucial role in empowering rural youth through the adoption of sustainable innovation and technology (Abu Hard et al., 2024). Research by Tarawneh and Al-Najjar (2023) underscores the importance of providing equitable loans and building capacity to encourage youth. Entrepreneurship in the agricultural sector. Additionally, Tarawneh et al., (2022) emphasize the significance of collaboration between the government and non-governmental organizations in supporting young farmers. These studies highlight the importance of teamwork and partnerships in helping young farmers thrive.

Fair training and better policies

The analysis indicates that inclusive training and policy reforms are important for enhancing agricultural entrepreneurship among youth (Bouichou et al., 2020). Although the gender distribution appears balanced, notable performance disparities in post-session knowledge tests suggest a need for targeted training that accommodates different learning styles and experiences, as observed by Van Ewijk et al., (2020). This approach aims to strengthen agricultural entrepreneurship for a sustainable tomorrow. For example :

a) Joshua Mudope's Story: Joshua Mudope, a young Ugandan farmer, revolutionized his farm and community by embracing sustainable agriculture. With training from TechnoServe, Joshua mastered climate-smart techniques, boosted his harvests, and motivated others. He also began producing his own organic fertilizer, breaking free from costly chemical.

b) Story of Yuva Rural Association: Yuva Rural Association is helping young farmers in India grow food in a sustainable way. Two young farmers, Manisha Ganshyam Indore, who started a kitchen garden and Yeshwant Namdeo Sautkar, who adopted organic farming methods have already seen great results. By teaching youth sustainable farming, we can make farming better for people and the planet.

Inclusive decision-making

Sustainable agriculture improves lives of women and youth through income and leadership. It foster a culture of peer-to-peer learning and support among youth. Traditional gender roles limit women's involvement in farm decision-making. In many rural areas, women have been limited to small-scale farming or low-paying farm work. New farming technologies can increase income by growing more crops with less work. With more financial power, women play a larger role in household and farming decisions. Collaborative decision-making brings women's perspectives to the table on farm management and investments. Inclusive decision-making benefits the whole family, leading to smarter, fairer, and more environmentally friendly choices.

Some key points on inclusive decision-making

Youth participation - Involve young farmers in decision-making processes to share their thoughts and concerns.

Equal opportunities - Ensure young men and women have the same chances to lead and decide.

Capacity building - Help young farmers develop skills and knowledge to contribute to decision-making

Collaborative approach - Foster a collaborative approach to decision-making, involving young farmers, communities, and other stakeholders.

Inclusive policies - Develop and implement policies that promote inclusive decision-making and support the participation of young farmers.

Access to resources - Provide young farmers with the tools, funding, and markets they need to participate in decision-making.

Empowerment and Accountability - Empower young farmers to take ownership of decision-making processes and to hold leaders accountable for their actions.

Restrictions and barriers

Farming must be made resilient to the escalating impacts of climate change. Women play a crucial role in ensuring food security, as they constitute a significant portion of the agricultural workforce (Agarwal, 2014). But they face many obstacles that prevent them from their full participation. There are even some barriers that hinder the ability of young farmers to adapt to climate change, innovate, and contribute to sustainable agriculture.

The foremost barriers faced by women and young farmers in climate- resilient farming are :Limited access to resources like land, money, and tools; Societal expectations and gender roles that restrict their participation.

Awareness of agro-climatic innovations

Climate change harms farming and makes it harder for rural areas to grow their own food. Some farmers consider agro-climatic practices and technologies as effective solutions. Ghana is a leading country in the adoption of these agro-climatic practices. There is great interest in adopting them. Many women and young producers believe that adopting agro-climatic practices and technologies can reduce labor intensity, boost yields, and enhance their overall well-being. Based on their knowledge, two categories of agro-climatic practices and technologies emerge: traditional and modern. These modern agricultural techniques comprise timely planting, crop rotation, conservation agriculture, and ridge cultivation. Despite the benefits, modern agro-climatic practices and technologies are not widely shared with farmers. Even the innovative agricultural solutions like Smart Valley and digital management apps are largely unknown to farmers. This is because farmers frequently face barriers in accessing agricultural advice and training from extension services. These results emphasize the importance of expanding access to existing agricultural technological innovations. It is therefore essential to develop policies that facilitate the dissemination and subsidization of these solutions to enhance farmers' productivity, with a focus on women and youth.

Conclusion

Youth empowerment in agriculture is vital for promoting climate-smart farming practices, improving food security, and driving sustainable development. This study highlights the need for further exploration into the multifaceted factors influencing women's engagement with sustainable agriculture technologies and the resulting effects on climate resilience and gender equality .By arming young farmers with the right tools, training, and expertise, we can tap into their potential to revolutionize the agricultural sector. The study stresses the

importance of acknowledging and addressing the particular difficulties faced by young farmers in the context of climate change. Through the power of technology, innovation, and entrepreneurship, we can inspire and enable young people to become leaders in sustainable agriculture, drive positive change, and contribute to a more food-secure world. Van Ewijk et al., (2020) emphasize that peer learning is an effective tool for building capacity in agricultural entrepreneurship. Peer learning effectively shares knowledge, builds trust, and fosters understanding of local contexts. It also strengthens social bonds, boosts confidence, and develops leadership skills among rural youth. Ultimately, this collaborative approach stimulates creativity and innovation in agricultural entrepreneurship by encouraging experimentation, knowledge sharing, and problem-solving.

As we explore the complexities of gendered impacts, it is clear that there is still a long way to go and many unanswered questions. A deeper understanding of technology's transformative capabilities requires continued exploration and study. The study also emphasizes the importance of identifying and addressing the specific challenges that women encounter in the agricultural sector. Sustainable farming can only succeed if we address and overcome challenges like resource scarcity, cultural traditions, and economic limitations. Our collective efforts can make climate resilience and gender equality a reality, not just something we hope for. By working together on research, policies, and action, we can unlock technology's potential to transform women's lives. Sustainable agriculture technologies offer a powerful solution for building a more equitable and resilient farming system. As we embark on this journey, we envision a future where agriculture and society flourish together, built on the principles of sustainability, equity, and prosperity.

References

- [1] Abu harb, S., Dayoub, M. and Al-Najjar, K. (2024). The impact of agricultural extension program effectiveness on sustainable farming: A survey article. *International Journal of Agricultural Technology* 20(2):477-492. <http://www.ijat-aatsea.com/>
- [2] Agarwal B. Food sovereignty, food security and democratic choice: critical contradictions, difficult conciliations. *Journal of Peasant Studies*. 2014;41(6):1247-1268. <https://doi.org/10.1080/03066150.2013.876996>
- [3] Bouichou, E.H., Abdoulaye, T., Allali, K., Bouayad, A., & Fadlaoui, A. (2020). Entrepreneurial Intention among Rural Youth in Moroccan Agricultural Cooperatives: The Future of Rural Entrepreneurship. *Sustainability*, 13(16), 9247. <https://doi.org/10.3390/su13169247>
- [4] Da Silva D. Impacts of hot climate conditions in Brazil: a comprehensive scientific study. *Endless: International Journal of Future Studies*, 2023;6(2):472-482

- [5] Daum, T., 2019. Of bulls and bulbs: aspirations, opinions and perceptions of rural adolescents and youth in Zambia. *Dev. Pract.* 29 (7), 882-897. <https://doi.org/10.1080/09614524.2019.1646209>
- [6] De Guzman, M.R.T., Kim, S., Taylor, S., & Padasas, I. (2020). Rural communities as a context for entrepreneurship: Exploring perceptions of youth and business owners. *Journal of Rural Studies*, 80, 45-52. <https://doi.org/10.1016/j.jrurstud.2020.06.036>
- [7] Djurfeldt, A.A., Kalindi, A., Lindsjö, K., Wamulume, M., 2019. Yearning to farm - youth, agricultural intensification and land in Mkushi, Zambia. *J. Rural Stud.* 71 (July), 85-93. <https://doi.org/10.1016/j.jrurstud.2019.08.010>
- [8] Irungu, K.R.G., Mbugua, D., Muia, J., 2015. Information and communication technologies (ICTs) attract youth into profitable Agriculture in Kenya. *East Afr. Agric. For. J.* 81 (1), 24-33. <https://doi.org/10.1080/00128325.2015.1040645>
- [9] Magagula, B., Chiedza, Tsvakirai, Z.Z., 2020. Youth perceptions of agriculture: influence of cognitive processes on participation in agripreneurship. *Dev. Pract.* 30 (2), 234-243. <https://doi.org/10.1080/09614524.2019.1670138>.
- [10] Muhie, S.H. (2022). Novel approaches and practices to sustainable agriculture. *Journal of Agriculture and Food Research*, 10, 100446, <https://doi.org/10.1016/j.jafr.2022.100446>
- [11] Obong, R., Mugonola, B., Phillips, D.P., 2018. Determinants of mobile phones usage in sweet potato vine business in Gulu district northern Uganda. *Afr. J. Agric. Res.* 13 (21), 1071-1079. <https://doi.org/10.5897/AJAR2017.12213>
- [12] Sahoo D. Moharaj P. Determinants of climate-smart adaptation strategies Farm-level evidence from India *Journal of Asian and African Studies.* 2024;59(3):876- 894. <https://doi.org/10.1177/00219096221123739>
- [13] Tarawneh R.A. and Al-Najjar K. (2023). Assessing the Impacts of Agricultural Loans on Agricultural Sustainability in Jordan. *IOSR Journal of Economics and Finance (IOSR-JEF)*. Vol. 14, Issue 6 Ser. PP 49-56. <https://doi.org/10.9790/5933-1406014956>
- [14] Tarawneh, R.A., Tarawneh, M.S., and Al-Najjar, K.A. (2022). Agricultural Policies among Advisory and Cooperative Indicators in Jordan. *International Journal of Research-GRANTHAALAYAH*, 10(2), 10- <https://doi.org/10.29121/granthaalayah.v10.i2.2022.4489>
- [15] Van Ewijk, E., & Ros-Tonen, M.A. (2020). The fruits of knowledge co-creation in agriculture and food-related multi-stakeholder platforms in sub-Saharan Africa-A systematic literature review. *Agricultural Systems*, 186, 102949. <https://doi.org/10.1016/j.agsy.2020.102949>
- [16] Van Ewijk, E., & Ros-Tonen, M.A. (2020). The fruits of knowledge co-creation in agriculture and food-related multi-stakeholder platforms in sub-Saharan Africa A systematic literature review. *Agricultural Systems*, 186, 102949. <https://doi.org/10.1016/j.agsy.2020.102949>

- [17] Volk GM, Carver D, Irish BM, Marek L, Frances A, Greene S, Bretting PK. Safeguarding plant genetic resources in the United States during global climate change. *Crop Science*; c2023. p. 1-23 <https://doi.org/10.1002/csc2.21003>
- [18] White, B., 2012. Agriculture and the generation problem: rural youth, employment and the future of farming. *IDS Bull.* 43 (6), 9-19. <https://doi.org/10.1111/j.1759-5436.2012.00375.x>
- [19] Yu, Y., Appiah, D., Zulu, B., & Asamoah, K. (2023). Integrating Rural Development, Education, and Management: Challenges and Strategies. *Sustainability*, 16(15), 6474, <https://doi.org/10.3390/su16156474>
- [20] Zulu, L.C., Djenontin, I.N.S., Darkwah, A., Kamoto, J., Kampanje-Phiri, J., Fischer, G., Grabowski, P., Egyir, I., 2020. Realizing Inclusive SAI: contextualizing indicators to better evaluate gender and intergenerational inequity in SAI processes and outcomes-cases from Southern and Western Africa. *Int. J. Agric. Sustain.* <https://doi.org/10.1080/14735903.2020.1737356>



HOW TO CITE

Surbhi Thakur (2025). Agriculture and Climate Resilience: Empowering Youth in Farming. Ed. by Dr. Monita Dhiman in “Youth Voices for a Sustainable Future” (pp. 94-100). Vyom Hans Publications.

DOI: <https://doi.org/10.5281/zenodo.15527803>

ISBN: 978-81-970890-9-1

CHAPTER-12

WOMEN, YOUTH AND SUSTAINABILITY: BRIDGING GENDER GAPS

Ms. Palak Singh and Dr. Ramanpreet Kaur

Khalsa College for Women,
Civil Lines, Ludhiana, Punjab, 141002

*Email ID: *palakthakur1015@gmail.com*

***Ramanpreet0062@yahoo.com*

ORCiD ID: *0009-0005-6047-8633

***0000-0001-6328-3915*

Abstract

This article investigates the central contributions of women and youth to spurring sustainability by contributing to the management of natural resources, action on climate change and innovations in technology. Both groups possess immense potential for contributing to sustainability, yet both are confronted by systemic obstacles of gender inequality, restricted access to resources and exclusion from decision-making, all of which reduce their full integration into sustainability. The chapter analyzes case studies that bring out the effect of empowering youth and women, including the Rwanda Green Program, youth-initiated reforestation in Kenya and the Philippines Green School Program. It further addresses the need for education, gender-sensitive policies and technology to overcome such barriers. Through empowering women and youth through education, balanced policies and resource access, societies can unleash more innovative and sustainable solutions to environmental issues. Ultimately, gender and generation bridging is a strategic imperative for realizing effective and inclusive sustainability.

Keywords: Climate Change Action, Natural Resource Management, Empowerment, Gender-Sensitive Policies

Introduction

Sustainability is a balanced equilibrium between economic growth, environmental conservation, and social justice. As the challenges such as climate change, depletion of resources and socio-economic inequality worsen, women

and youth's roles have become more crucial (Rao et al., 2019). These two groups have potential as drivers of transformation and tend to be confronted by structural obstacles that suppress their contributions to sustainable development (Terry, 2020). Curing these obstacles is key to the creation of a more equitable and sustainable world. Women have been guardians of nature resources and have ensured conservation of the environment through indigenous knowledge and green techniques (Wamukonya & Skutsch, 2002). Ranging from the control of water resources at the village level to leading the people's movement towards conservation, as exemplified by the Chipko Movement in India, women have taken key initiatives towards preserving the world (Tsaneva, 2020). However, gender inequality in education, resources and leadership roles generally restricts their active participation in sustainability activities (Wibeck, 2014). Likewise, young people have become strong voices for climate action, leveraging their creativity and technological skills to disrupt the status quo (Sultana, 2022). Fridays for Future and youth-initiated reforestation efforts in Kenya are examples of their capacity to initiate transformative change. However, their voices are seldom represented in decision-making forums, and thus there is a disconnect between their activism and policy inputs (Simpson et al., 2021). Closing these gaps of gender and generation is not just a question of justice but also a strategic imperative. Studies have established that diverse groups come up with more creative and effective solutions to global problems. Empowering women and youth can enable societies to showcase their potential to drive the transition towards sustainability. This chapter discusses the contribution of women and youth towards sustainability and implementable strategies towards inclusivity.

Women and Natural Resource Management

Women, especially from indigenous and rural communities, take a key role in the use of natural resources sustainably. Women would also be the core managers of forests, water, agriculture, and biodiversity. Such a close identification with nature, especially in the case of communities dependent on the resource, is that women acquire extensive indigenous knowledge on sustainable use. This customary knowledge is of great importance in natural resource management so that they can be sustained in the long term. Nubler et al., 2021 opines that women have been water resource custodians for centuries and are at the heart of water collection, irrigation, and water system management. Their everyday activities of water collection, forest management, and agricultural biodiversity maintenance place them at the forefront of sustainability (Nugent & Shandra, 2009). Women also have a certain seasonality knowledge, soil fertility knowledge, and water cycle knowledge that enables them to utilize resources more effectively and react to environmental changes. Their ability to integrate traditional ecological knowledge with modern conservation strategies has a tendency to produce more sustainable and more resilient practices (Stapleton, 2019). Yet they are often excluded from realizing their maximum contribution to mainstream conservation through being

denied access to land rights, economic opportunities, and leadership by their own societies. In all but a few cases, women are excluded from formal decision-making institutions despite playing crucial roles and this lack of representation restricts the capacity for inclusive and effective environmental policy. In addition, they are prevented from benefiting from training and resources that can equip them with the capacity to more effectively manage natural resources sustainably. Empowering these women can significantly contribute to the overall goals of environmental sustainability and climate resilience (Takasaki, 2017).

Gender and Environmental Governance

Studies repeatedly bring to the forefront that women hold important roles in environmental management and sustainability initiatives but are disproportionately underrepresented in official decision-making forums. This exclusion is especially disturbing considering the critical roles women play in natural resource management and maintaining community resilience to climate change and environmental degradation. As noted by the Nubler et al, 2021, women's participation in environmental governance is not only good, it is essential to realizing successful and sustainable environmental results. Women's participation in such processes brings about more integrated, inclusive, and creative solutions (Terry, 2009). But although this has long been acknowledged to be important, women occupy an astoundingly small proportion of decision-making seats on environmental governance boards, holding a mere 17% of places on environmental governing boards (Rao et al., 2019). This stark gender imbalance is representative of a pattern of systemic exclusion and indicates an enduring gap in gender equity within environmental policy-making and management. Gender imbalances in decision-making forums render environmental policies less effective, since they deny diverse opinions and gender-responsive strategies that can make overall environmental policy sustainability stronger (Bangay, 2022). Women's underrepresentation in leadership positions not only dilutes the impact of inclusive environmental governance but also entrenches gender disparities within the sector. Additionally, this exclusion implies that critical gender-sensitive approaches, which may cater to the unique needs and contributions of women, are usually not considered in environmental management (Graham et al., 2016). Women's specialized knowledge, particularly in rural and indigenous settings, is critical to ecosystem management, biodiversity conservation, and sustainable agriculture. But without a voice at the decision-making table, these contributions go underappreciated and underleveraged (Haberland, 2015). Institutional and cultural constraints, such as deeply rooted traditional gender roles, also reinforce these inequalities. According to Jelks & Jennings, 2022, such constraints severely limit women's participation in environmental governance. These constraints are usually rooted in patriarchal systems that limit women to domestic and care-giving roles, overlooking their capacity and potential to participate equally in the public and political arenas (Lv & Deng, 2019). Women still encounter significant obstacles in much of the world, including a scarcity of educational opportunities,

gendered social norms, and weak legal systems that do not acknowledge their rights and contributions to environmental decision-making. The gap in education between men and women is specifically seen in developing nations, where educational access depends on socio-economic conditions, cultural norms, and gendered impediments (Terry, 2009). This education deficit inhibits women's participation in scientific, technical, and policy discourse on environmental issues, further enhancing their exclusion from environmental leadership. Moreover, strict social norms also stipulate that women must place family and domestic duties first, which makes their participation in environmental matters secondary or invisible (Tsaneva, 2020). Such societal expectations uphold the idea that women are incapable of leading environmental governance. In addition, most legal systems, particularly in developing countries, still overlook the rights of women, and they are not given the legal support necessary to claim their place in environmental decision-making. Even when women are involved in environmental management, they can be hindered by power imbalances, restricted access to resources, and inadequate support for their participation. The continuation of these systemic problems generally results in tokenistic inclusion, and not meaningful, substantive participation in decision-making (Norgaard & York, 2005).

Denial of environmental decision-making power to women is not a matter of gender equity it is a matter of sustainability. Women tend to be in the vanguard of addressing environmental issues, either as caretakers of water and food resources, as leaders in local conservation, or as organizers of community climate adaptation (Kluttz & Wlter, 2018). Thus, the incorporation of women in decision-making can result in more efficient environmental policies that are more responsive to the needs of communities, especially those most susceptible to environmental fluctuations (Rao et al., 2019). Although women contribute vital roles towards environmental management and sustainability initiatives, their isolation from official decision-making frameworks restricts the impact and participatory nature of these efforts (Takasaki, 2017). Breaking down institutional and cultural barriers, providing equal access to education, and enhancing legal systems to facilitate women's involvement in environmental decision-making are key measures towards gender equity and sustainability. Empowering women and involving them in environmental decision-making can lead to more equitable and effective solutions to the world's most critical environmental issues (Tsaneva, 2020).

Empowering Women for Sustainability

Empowering women in environmental leadership has been empirically associated with better and more sustainable outcomes for environmental governance. A study conducted by One Rao et al, 2019 emphasizes the value of involving women in environmental decision-making, citing that they provide new perspectives, creative ideas, and strategies prioritizing sustainability, resilience, and long-term ecological integrity. Women leadership has been demonstrated to improve decision-making in that it concentrates on community-based and inclusive approaches, which are essential when dealing with complex

environmental issues like climate change, loss of biodiversity and water scarcity (McKonen & Worku, 2011). Participation of women in environmental governance makes them integrate a more comprehensive view of the environment-one that interlinks human health with the health of nature. Women leadership tends to focus on sustainable resource use, enhanced land-use management, and the building of local communities' resilience to climate effects. According to Mc Gregor et al, 2018, women leaders are most effective at bringing environmental justice into their decision-making, making sure that marginalized groups, particularly those most exposed to environmental degradation, are part of the solution (Mina-Okori et al., 2018). This vision for sustainability and inclusion results in more just and successful results for both the planet and the individuals who rely on it. Women's contributions are especially important when it comes to issues such as biodiversity conservation, water management and climate change adaptation. These issues tend to be intricately complicated and need both local wisdom and creative approaches (Rao et al., 2019). An outstanding case of successful women's leadership is evidenced in Costa Rica, where environmental policy with gender considerations has produced more sustainable use of natural resources. The Costa Rican government has moved ahead on empowering women for participation in conservation and resource management to achieve more satisfactory results in the conservation of forests, sustainable agriculture, and resilience to climate (Simpson et al, 2021). As noted by Amorim- Mia et al, 2022, these policies not only served to protect biodiversity but also provided channels for economic empowerment of women, making sure that they receive benefits from both environmental sustainability and the economic benefits it yields. Women indigenous to a region have been at the center of environmental activism and leadership (Terry, 2009). All over the world, indigenous women have been instrumental in defending natural resources, supporting the conservation of biodiversity, and implementing community-led reforestation. Nubler et al, 2021 highlights the importance of indigenous women in initiating reforestation programs that not only fight deforestation and climate change but also support biodiversity as well as ecosystem services. Such women are endowed with in-depth familiarity of traditional environmental practices and also cultural attachment to land, a quality that their involvement brings significant benefit to sustainable environmental management (Nubler et al., 2021). They provide their contribution in ways that are valuable for sustainable environmental governance because, under their leadership, conservation activity becomes not just productive but culturally nuanced and locally situated in community tradition and value. In addition, enabling women through environmental leadership transcends ecological advantage it profoundly influences the social and economic status of women (Nugent & Shandra, 2009). Through becoming leaders in environmental efforts, women tend to achieve economic autonomy and a feeling of empowerment that boosts their social status. Women engaged in reforestation, sustainable agriculture, and water management tend to gain access to economic opportunities, markets and education, which in turn assist in subverting gender inequalities and establishing more equitable power relations

within their communities (Asadullah et al., 2021). This empowerment creates a positive feedback loop: as women gain economic independence and leadership roles, they are more able to claim their rights, advocate for additional gender equality, and promote sustainable development in their communities (Kaijser & Kronsell, 2014). These women also become role models in many instances for future generations, encouraging younger women and girls to seek leadership in environmental governance. By dismantling the barriers that have long kept women out of these spaces, they open the way to a more just, inclusive, and sustainable future (Rao et al., 2019). As the work led by indigenous women and women's movements across the globe has demonstrated, empowering women in environmental leadership roles has been a primary source of both environmental and social change. Overall, enabling women to lead in environmental issues is not simply an issue of gender equality, it is an essential component for making environmental governance sustainable, equitable, and robust. Through integrating women's voice and knowledge in decision-making, societies can complement their actions toward tackling the imperative issues of climate change, biodiversity loss, and environmental degradation (Aikman et al., 2016). The effectiveness of gender-sensitive environmental policies in countries such as Costa Rica, and the leadership of indigenous women in reforestation and conservation efforts, is a powerful reminder of the positive contribution that women can make when provided with the opportunity to lead. By empowering and enabling women's engagement in environmental decision-making, we not only promote sustainability but also create stronger, more resilient communities that are better able to meet the challenges of the future (Alston et al., 2014).

Systemic Barriers Faced by Women in Sustainability

Despite their significant contributions, women still face obstacles such as poor access to education, land ownership, and decision-making roles that restrict their participation in sustainability programs. According to Rao et al, 2019 women make up 43% of agricultural laborers globally but own less than 20% of arable land. This disparity in land ownership prevents women to a great extent from taking up eco-friendly farming systems and benefiting from the economic opportunities of the lands they till. Furthermore, restrictions on access to financial inputs, agricultural new technology, and extension services place extra burdens on their productivity and sustained performance. Women's disbarment from leadership roles in sectors like energy and environmental policy further compounds these issues. The Alston et al, 2014 revealed that women hold merely about 22% of leadership roles in the global energy sector, which is pivotal in setting the direction of climate change mitigation and sustainable development policy. Such underrepresentation excludes the integration of gender-sensitive perspectives in crucial decision-making, which otherwise can drive more inclusive and sustainable policy options. In addition to these systemic barriers, women are predominantly disproportionately impacted by climate change. Rao et al., 2019 revealed that women, particularly in developing countries, are most impacted by climate-related disasters, from floods to

droughts, due to their roles as primary caregivers and water and food providers (Terry, 2009). This also raises the significance of empowering the women's role in climate change adaptation and resilience due to their crucial information and adaptation capabilities that can be utilized in enhancing sustainability at the community level. Dissecting these impediments such as making access to education, land ownership and decision-making equal will not only ensure reducing gender imbalances but also utilize the capabilities of women towards sustainable development (Tsaneva, 2020). Enabling women to lead sectors like agriculture, renewable energy and environmental policy is central to creating inclusive, effective and resilient sustainability solutions. Investing in the leadership and capacity development of women translates into more sustainable and equitable results for people and the environment (Amorim- Maia et al., 2022).

Empowering Women through Policy and Education

Education and gender-responsive policies are necessary for empowering women in sustainability. In Rwanda, for instance, the government's commitment to gender equality has helped boost women's involvement in environmental management tremendously (Rao et al., 2019). Women's cooperatives in Rwanda have become drivers of sustainable development, leading effective reforestation initiatives that have not only checked soil erosion but also improved agricultural yields (Nubler et al., 2021). This policy about better ecological results. Education is also a critical component in empowering women to take on leadership positions in environmental sustainability (Simpson et al., 2021). Education provides women with the required skills to lead and innovate in areas such as renewable energy, sustainable agriculture, and conservation. But sustained investment in education and pro-gender policies is crucial to make these advances endure in every sector (Figueroa et al., 2020).

Youth as Sustainability Drivers

Young people are becoming key drivers of sustainability, harnessing their energy, creativity, and activism to tackle the most urgent global issues. With their profound awareness of the interconnectedness of social, environmental, and economic challenges, youth have become powerful voices within the global movement for sustainability (Rao et al., 2019). From climate activism to technological innovation, young people are remaking the future of sustainable development. They are becoming more engaged in grassroots movements, calling on governments and corporations to be accountable for their environmental impact. Their creativity and energy are most pronounced in the area of climate advocacy, where they are advocating for a future that is not only environmentally sustainable but also socially just (Figueroa et al., 2020) (Fig. 1).

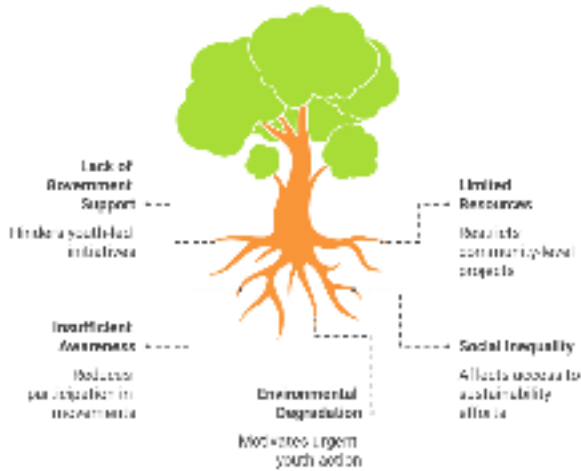


Figure 1. Youth engagement in sustainability initiatives

Youth-Led Climate Action

Movements such as Fridays for Future, spearheaded by Greta Thunberg, demonstrate the potency of youth action on climate (Terry, 2009). This international movement has witnessed millions of young individuals worldwide take part in climate protests, calling on governments and companies to take drastic measures to stem the effects of climate change (Lv & Deng, 2019). The activism shown by young people underscores their shared interest in the future of the world and their resolve to initiate policy changes at the local, national and global levels. In addition to striking, young people are also spearheading community-level efforts, such as tree-planting initiatives, water conservation measures, and organic farming practices. For instance, in Kenya, youth groups have been able to initiate tree-planting programs, which have reclaimed degraded land and offered economic benefits to surrounding communities (Amorim- Maia et al., 2022). These programs show the significant contribution of young people in bringing localized but significant environmental changes.

Case Studies and Initiatives

Cameroonian environmental activist Cécile Ndjebet was awarded the Wangari Maathai Award for her contribution to promoting women's rights to land and forests. Her efforts have demonstrated that women can drive environmental sustainability through the call for land rights and forest conservation. Rao et al., 2019 revealed that women's access to land has a direct impact on forest protection and sustainable agriculture practices. The TerraFund for AFR100 initiative, coordinated by Wanjira Mathai, Managing Director for Africa and Global Partnerships, World Resources Institute, launched \$17.8 million in support of African land restoration initiatives. According to Simpson et al., (2021), the initiative focuses on women's leadership for land restoration and climate finance as they have an important role as caretakers of the environment. India's

1970s Chipko Movement is an inspiration of women leadership in protecting the environment. Women from villages wrapped their arms around trees to guard against tree-cutting, thus safeguarding community ecosystems and living conditions. International attention was focused on the movement, illustrating that grassroots-level initiatives by women have the capacity to shape global sustainability (Asadullah et al., 2021).

The Philippines Green School Program is a model of successful incorporation of sustainability education into school curriculums. The project engages students in experiential learning activities like waste segregation, afforestation, and renewable energy initiatives, cultivating a culture of sustainability among them (Simpson et al., 2021). By so doing, the program not only educates them on environmental protection but also enables them to become leaders in their own neighborhoods. The Green School Program is a prime example of how sustainability education from an early age can train young people to be well-informed and ethical leaders able to cope with the complex environmental issues of tomorrow (McGregor et al., 2018).

Teenage Challenges in Sustainability

Young people, as potential and enthusiastic as they are, have a number of challenges to overcome to maximize their contribution to sustainability initiatives. One of the primary issues they face is underfunding of innovative projects promoting sustainability (Nubler et al, 2021). Most young innovators are unable to find funding due to risk aversion among conventional financiers, who do not always appreciate the value of youth innovation. Furthermore, youth often have limited access to decision-making platforms within conventional institutions that limit their role in shaping policies and programs at higher levels. In addition, they usually meet with opposition from deep-rooted systems that do not want to change or introduce new methods of working, stunting the advancement of aggressive, forward-looking sustainability strategies (Stapleton, 2019).

Empowering Solutions for Youth

Empowering young people to act as leaders for sustainability needs multifaceted support mechanisms that facilitate access to learning, capital, and guidance. Governments, multilateral institutions, and the business sector need to develop avenues in which young individuals can shape policy and contribute positively to decision-making (Norgaard & York, 2005). Initiatives like the UN's Youth Climate Action Network offer channels through which youth can become involved in international sustainability agendas and influence climate change solutions. By providing young innovators with the tools, networks, and access they require to excel, we can unleash their potential as drivers of change for a sustainable future (Bangay, 2022).

Closing Gender Divides in Sustainability

The gender gap in sustainability is still a pressing challenge that undermines the efficiency of international initiatives to mitigate environmental and social challenges. Women, especially in rural and disadvantaged communities, have long been left out of decision-making on natural resource management, climate policy, and environmental governance (Terry, 2009). Closing the gap is important in order to establish more inclusive and equitable solutions to meet the different needs of all communities. When women are provided with equal opportunities to contribute, sustainability initiatives tend to be more inclusive, taking into account the needs and views of entire groups instead of a privileged few (Haberland, 2015).

Gendered Impact of Climate Change

Women are disproportionately affected by climate change because they depend on natural resources and have limited access to adaptive resources (Maina- Okori et al., 2018). When there are natural disasters, like floods or droughts, women are usually more vulnerable because of their traditional roles as food and water providers and caregivers. Women, in most communities, are the ones who gather water and cut firewood, activities that are much harder during environmental crises. Aikman et al, (2016) also brings to light the fact that social norms and roles add to women's vulnerability even more, especially in developing nations, where women can be impeded in obtaining relief assistance or resources required to recover as well.

Intersectionality and How It Applies in Sustainability

The intersectionality approach is key to grasping the intricate challenges confronted by women in sustainability. Intersectionality understands that gender, race, age, socio-economic status, and others intersect to produce distinct sets of barriers for various people (Figueroa et al., 2020). Indigenous women, for instance, experience compounded struggles of cultural exclusion and economic marginalization, which makes it harder for them to engage fully in environmental governance (Takasaki, 2017). Solving these intersecting problems demands localized and inclusive solutions that consider diverse experiences and needs of various groups. By understanding these levels of inequality, we can design more specific and effective solutions to pursue sustainability.

Economic Benefits of Closing Gender Gaps

Closing gender gaps in sustainability can also generate substantial economic gains. McGregor et al, (2018) research indicates that closing gender gaps could add as much as \$12 trillion to global GDP by 2025, illustrating the vast economic potential of inclusive leadership. Women's contribution to sustainability work tends to result in more creative and efficient solutions, as they can better deal with intricate challenges through diversity (Bangay, 2022). In addition, when women are given resources and decision-making positions, they

can produce more participatory policies that serve communities, leading to greater sustainable economic growth.

Policies to Close Gender Gaps

One method of bridging gender gaps in sustainability is the use of gender-responsive policies, including women's quotas in leadership positions or incentives for women entrepreneurs. Like, in Nepal, community forest user groups have been able to enhance women's involvement in forest management, leading to improved environmental and local economic outcomes (Simpson et al., 2021). These policies not only incorporate women but enable them to spearhead sustainable practices, thereby promoting a more inclusive and efficient sustainability model.

Technology's Role in Closing Gaps

Technology is central to closing gender and generational gaps in sustainability. From mobile applications that encourage waste minimization to knowledge-sharing online platforms, technological advancements are revolutionizing the way communities respond to environmental issues (Rao et al., 2019). For instance, electronic platforms can bring women into contact with markets, increase their access to sustainable farming practices, and even monitor environmental footprints. In the neglected areas, nevertheless, closing the digital gap remains a topmost challenge, and steps should be taken to achieve fair access to technological tools via infrastructure investment as well as training initiatives (Koczberski, 1998).

Youth and Technological Solutions

Youth are increasingly using technology to address sustainability issues (Terry, 2009). Technologies such as solar water pumps and carbon tracking applications are some of the youth-driven technological innovations that are building a sustainable future. Such technologies not only ensure action on pressing environmental problems but also enable young innovators to become leaders in the fast-emerging green technology industry (Wibeck, 2014).

Conclusion

Women and youth are indispensable agents of change in the pursuit of sustainable development. Their contributions, whether through traditional knowledge, grassroots activism, or technological innovation, have demonstrated immense potential to address global challenges. However, systemic barriers, including gender inequality and limited access to resources, continue to hinder their full participation. Bridging these gaps is not only a matter of justice but also a strategic necessity to ensure effective and inclusive sustainability outcomes. Empowering women through education, equitable resource allocation, and gender-responsive policies can unlock their leadership potential in environmental conservation and resource management. Similarly, supporting youth with mentorship, funding, and platforms for decision-making can amplify their creativity and energy in driving transformative solutions. By fostering

inclusivity and leveraging the unique strengths of women and youth, societies can achieve more resilient and innovative approaches to sustainability. This collective effort, supported by global initiatives, will pave the way for a more equitable, prosperous, and sustainable future for generations to come.

References

- [1] Aikman, S., Robinson-Pant, A., McGrath, S., Jere, C. M., Cheffy, I., Themelis, S., & Rogers, A. (2016). Challenging deficit discourses in international education and development. *Compare: A Journal of Comparative and International Education*, 46(2), 314–334. <https://doi.org/10.1080/03057925.2016.1134954>
- [2] Alston, M., Whittenbury, K., Haynes, A., & Godden, N. (2014). Are climate challenges reinforcing child and forced marriage and dowry as adaptation strategies in the context of Bangladesh? *Women's Studies International Forum*, 47, 137–144. <https://doi.org/10.1016/j.wsif.2014.08.005>
- [3] Amorim-Maia, A. T., Anguelovski, I., Chu, E., & Connolly, J. (2022). Intersectional climate justice: A conceptual pathway for bridging adaptation planning, transformative action, and social equity. *Urban Climate*, 41, 101053. <https://doi.org/10.1016/j.uclim.2021.101053>
- [4] Asadullah, M. N., Islam, K. M. M., & Wahhaj, Z. (2021). Child marriage, climate vulnerability and natural disasters in coastal Bangladesh. *Journal of Biosocial Science*, 53(6), 948–967. <https://doi.org/10.1017/S0021932020000644>
- [5] Bangay, C. (2022). Education, anthropogenic environmental change, and sustainable development: A rudimentary framework and reflections on proposed causal pathways for positive change in low- and lower-middle income countries. *Development Policy Review*. <https://doi.org/10.1111/dpr.12615>
- [6] Figueroa, E., Pasten, R., Muñoz, D., & Colther, C. (2020). Not a dream wedding: The hidden nexus between climate change and child marriage. *Series Documentos de Trabajo* 508, 1–35. <https://ideas.repec.org/p/udc/wpaper/wp508.html>
- [7] Graham, J. P., Hirai, M., & Kim, S.-S. (2016). An analysis of water collection labor among women and children in 24 Sub-Saharan African countries. *PLOS ONE*, 11(6), e0155981. <https://doi.org/10.1371/journal.pone.0155981>
- [8] Haberland, N. A. (2015). The case for addressing gender and power in sexuality and HIV education: A comprehensive review of evaluation studies. *International Perspectives on Sexual and Reproductive Health*, 41(1), 31–42. <https://doi.org/10.1363/4103115>
- [9] Jelks, N. O., & Jennings, C. (2022). Equitable and just by design: Engaging youth of color in climate change education. In E. M. Walsh (Ed.), *Justice and equity in climate change education: Exploring social and ethical dimensions of environmental education* (pp. 91–107). Routledge. <https://doi.org/10.4324/9780429326011>

- [10] Kaijser, A., & Kronsell, A. (2014). Climate change through the lens of intersectionality. *Environmental Politics*, 23(3), 417–433. <https://doi.org/10.1080/09644016.2013.835203>
- [11] Kluttz, J., & Walter, P. (2018). Conceptualizing learning in the climate justice movement. *Adult Education Quarterly*, 68(2), 91–107. <https://doi.org/10.1177/0741713617751043>
- [12] Koczberski, G. (1998). Women in development: A critical analysis. *Third World Quarterly*, 19(3), 395–410. <https://doi.org/10.1080/01436599814316>
- [13] Lv, Z., & Deng, C. (2019). Does women's political empowerment matter for improving the environment? A heterogeneous dynamic panel analysis. *Sustainable Development*, 27(4), 603–612. <https://doi.org/10.1002/sd.1926>
- [14] Maina-Okori, N. M., Koushik, J. R., & Wilson, A. (2018). Reimagining intersectionality in environmental and sustainability education: A critical literature review. *The Journal of Environmental Education*, 49(4), 286–296. <https://doi.org/10.1080/00958964.2017.1364215>
- [15] McGregor, C., Scandrett, E., Christie, B., & Crowther, J. (2018). Climate justice education: From social movement learning to schooling. In T. Jafry (Ed.), *Routledge Handbook of Climate Justice* (pp. 494–508). Routledge. <https://doi.org/10.4324/9781315537689>
- [16] Mekonnen, W., & Worku, A. (2011). Determinants of low family planning use and high unmet need in Butajira District, South Central Ethiopia. *Reproductive Health*, 8(1), 37. <https://doi.org/10.1186/1742-4755-8-37>
- [17] Norgaard, K., & York, R. (2005). Gender equality and state environmentalism. *Gender & Society*, 19(4), 506–522. <https://doi.org/10.1177/0891243204273612>
- [18] Nubler, L., Austrian, K., Maluccio, J. A., & Pinchoff, J. (2021). Rainfall shocks, cognitive development and educational attainment among adolescents in a drought-prone region in Kenya. *Environment and Development Economics*, 26(5–6), 466–487. <https://doi.org/10.1017/S1355770X20000406>
- [19] Nugent, C., & Shandra, J. M. (2009). State environmental protection efforts, women's status, and world polity: A cross-national analysis. *Organization & Environment*, 22(2), 208–229. <https://doi.org/10.1177/1086026609338166>
- [20] Rao, N., Mishra, A., Prakash, A., Singh, C., Qaisrani, A., Poonacha, P., Vincent, K., & Bedelian, C. (2019). A qualitative comparative analysis of women's agency and adaptive capacity in climate change hotspots in Asia and Africa. *Nature Climate Change*, 9(12), 964–971. <https://doi.org/10.1038/s41558-019-0638-y>
- [21] Simpson, N. P., Andrews, T. M., Krönke, M., Lennard, C., Odoulami, R. C., Ouwenel, B., Steynor, A., & Trisos, C. H. (2021). Climate change literacy in Africa. *Nature Climate Change*, 11(11), 937–944. <https://doi.org/10.1038/s41558-021-01171-x>

- [22] Stapleton, S. R. (2019). A case for climate justice education: American youth connecting to intragenerational climate injustice in Bangladesh. *Environmental Education Research*, 25(5), 732–750. <https://doi.org/10.1080/13504622.2018.1472220>
- [23] Sultana, F. (2022). Critical climate justice. *The Geographical Journal*, 188(1), 118–124. <https://doi.org/10.1111/geoj.12417>
- [24] Takasaki, Y. (2017). Do natural disasters decrease the gender gap in schooling? *World Development*, 94, 75–89. <https://doi.org/10.1016/j.worlddev.2016.12.041>
- [25] Terry, G. (2009). No climate justice without gender justice: An overview of the issues. *Gender & Development*, 17(1), 5–18. <https://doi.org/10.1080/13552070802696839>
- [26] Tsaneva, M. (2020). The effect of weather variability on child marriage in Bangladesh. *Journal of International Development*, 32(8), 1346–1359. <https://doi.org/10.1002/jid.3507>
- [27] Wamukonya, N., & Skutsch, M. (2002). Gender angle to the climate change negotiations. *Energy & Environment*, 13(1), 115–124. <https://doi.org/10.1260/0958305021501119>
- [28] Wibeck, V. (2014). Enhancing learning, communication and public engagement about climate change – Some lessons from recent literature. *Environmental Education Research*, 20(3), 387–411. <https://doi.org/10.1080/13504622.2013.812720>



HOW TO CITE

Palak Singh and Ramanpreet Kaur (2025). Women, Youth, and Sustainability: Bridging Gender Gaps. Ed. by Dr. Monita Dhiman in “Youth Voices for a Sustainable Future” (pp. 101-114). Vyom Hans Publications.

DOI: <https://doi.org/10.5281/zenodo.15519838>

ISBN: 978-81-970890-9-1

CHAPTER-13

INNOVATIONS RECYCLING: YOUTH-CENTRIC APPROACHES TO WASTE MANAGEMENT IN INDIA

Ms. Upjipreet Kaur Brar

Khalsa College for Women,
Civil Lines, Ludhiana, Punjab, 141002

Email ID: upjipreetkaurbrar@gmail.com

ORCID ID: 0009-0008-1778-6560

Abstract

The global waste crisis remains a critical challenge that demands innovative and sustainable solutions. Young individuals have emerged as key contributors in tackling this issue, bringing fresh perspectives and enthusiasm to waste management initiatives. This chapter explores the significant role of youth in recycling and waste management through various innovative projects. By examining youth-led efforts such as school recycling programs and waste-to-wealth initiatives, it highlights how education, technology, and community-driven approaches are being leveraged to address waste-related concerns.

Educational institutions, including schools and universities, play a pivotal role in raising awareness about effective waste management. However, young people often encounter challenges such as inadequate resources and limited institutional support, which hinder their active participation in these initiatives. This chapter underscores the importance of equipping youth with the necessary tools and opportunities to overcome these obstacles. Furthermore, technology has become a crucial enabler in advancing waste management solutions. Innovations like smart waste bins and creative recycling methods demonstrate how young individuals are harnessing technological advancements to enhance waste management systems. Ultimately, empowering youth in this domain is essential for driving long-term progress, as their innovative ideas and dedication to sustainability have the potential to create lasting and meaningful change.

Keywords: Innovations, Recycling, Waste-Management

Introduction

The continuous rise in municipal solid waste generation, along with its environmental and economic repercussions, presents a major challenge to sustainable development (Khan et al., 2022). Rapid population growth and increasing global gross domestic product (GDP) contribute significantly to the surge in waste production, posing a serious threat to sustainability (Ho et al., 2021; Tayeh et al., 2021). According to the World Bank, global waste generation is expected to escalate from 2.01 billion tonnes in 2016 to 3.40 billion tonnes by 2050, reflecting a 70% increase (Kaza et al., 2018). The growing volume and complexity of waste highlight the urgent need for effective waste management strategies, particularly recycling (Daniel et al., 2012).

Inefficient waste management systems are closely linked to environmental and public health concerns (Lin et al., 2022). While alternative waste management solutions exist, many nations still rely on open dumping (Shrestha et al., 2023; Silva et al., 2021) and landfilling (Paes et al., 2020; Lebon et al., 2020; Zaikova et al., 2022; Zhang et al., 2023) which exacerbate pollution and resource depletion. The shortcomings of traditional waste disposal methods, primarily landfilling, have become increasingly apparent (Winterstetler et al., 2021). In 2016, only 13.5% of global waste was recycled, and 5.5% was composted, whereas a staggering 40% of waste was improperly handled (Kaza et al., 2018).

Advancements in material production and consumption have led to a dramatic rise in waste volume, necessitating a shift towards sustainable solutions such as recycling. Expanding recycling infrastructure and promoting circular economy practices can mitigate the environmental burden of waste while recovering valuable resources, reducing landfill dependence, and fostering long-term sustainability (Amobonye et al., 2021). Among the various stakeholders, youth have emerged as key contributors to the field of waste management. Their involvement brings fresh perspectives and novel approaches to tackling this pressing issue. Educational institutions play a pivotal role in cultivating environmental consciousness among young people by integrating waste management topics into their curricula (Djirong et al., 2024). This early exposure to environmental issues empowers students to take proactive roles in managing waste in their communities.

Research communities have explored both citizen and community engagement as essential strategies for enhancing living conditions through technology. In the context of waste management, youth play a crucial role in fostering collective action and leveraging technology for sustainable solutions. Studies highlight that community-driven initiatives, where individuals share responsibility and monitor environmental conditions using accessible technology, have proven effective (Dushkova & Ivlieva, 2024). Efforts to address environmental challenges, such as air quality monitoring and pollution control (Kumari et al., 2025), have successfully integrated community participation, often in collaboration with local governance bodies. However, low-resource regions face obstacles such as weak governance, limited funding, and inadequate planning for technology

deployment. In these areas, youth-driven waste management initiatives adopt a bottom-up approach, where young individuals actively engage in collaborative development efforts, utilizing technology to bridge gaps and connect communities.

By incorporating youth into waste management strategies, their innovative mindset, technological adaptability, and commitment to sustainability contribute significantly to addressing waste-related challenges while fostering long-term environmental stewardship. This chapter delves into various youth-driven initiatives, examines the barriers they face, and explores the innovative solutions they propose. By analyzing case studies and the role of technology, it offers a comprehensive view of the significant contributions of young people to waste management.

Youth Participation in Waste Management Education

The growing environmental crisis has amplified the global call for sustainable waste management, highlighting the critical need for youth engagement in educational and action-based initiatives (Subri et al., 2025). Improper disposal of waste not only pollutes vital resources like soil and water but also contributes significantly to greenhouse gas emissions, accelerating climate change. While governmental and organizational efforts aim to tackle this issue, their impact remains limited without the active involvement of young people at the community level. As future leaders and current changemakers, youth are central to driving local action, especially given that waste management solutions require grassroots participation (Camilleri, 2021).

Despite rising awareness among youth about environmental issues, a gap often exists between their knowledge and consistent involvement in practices such as recycling. This highlights the need for targeted educational initiatives that go beyond awareness to build practical skills in sustainable waste management. By integrating education with hands-on participation, young individuals can be empowered to take ownership of their role in addressing waste challenges, leading community efforts, and fostering long-term environmental responsibility (Kasavan et al., 2021).

Overcoming Barriers to Youth Engagement

Although young people have immense potential to contribute to waste management, they often face obstacles that limit their full participation. These include restricted access to necessary resources, minimal backing from local authorities, and a lack of proper training and information. Overcoming these challenges is vital to enabling youth to make a meaningful impact in waste management efforts (Whiteman et al., 2025). For instance, in Hyderabad, a youth-led group initially struggled to launch a city-wide recycling campaign due to resource constraints. However, through strategic partnerships with local businesses and government bodies, they were able to gather the support and tools needed. This collaboration ultimately led to the successful rollout of a recycling initiative that made a noticeable dent in the city's waste output.

Innovative Youth Led Waste-to-Wealth Projects

The idea of turning waste into wealth is increasingly being embraced by young innovators, who are spearheading initiatives that repurpose waste into valuable products. These efforts not only help minimize waste but also generate economic opportunities. Youth-driven waste-to-wealth projects highlight the ingenuity and entrepreneurial mindset of the younger generation in tackling waste management issues (Dhar et al., 2021). Youth around the world are demonstrating remarkable ingenuity in addressing waste management challenges through innovative waste-to-wealth initiatives. These projects not only reduce the environmental burden of waste but also generate economic and social value by transforming discarded materials into useful products. The following case studies from India highlight how young individuals and student groups have creatively repurposed waste materials into sustainable solutions:

- In Chennai, engineering students developed a method to convert plastic waste into durable bricks, which are now being used to construct affordable housing. This innovation simultaneously addresses the twin issues of plastic pollution and housing shortages, receiving widespread recognition and support from stakeholders.
- In Kochi, Kerala, a student collective from a hospitality college launched an initiative to collect used cooking oil from restaurants and convert it into eco-friendly soaps and dishwashing liquids. This project not only prevents harmful waste oil from contaminating waterways but also provides low-cost hygiene products to underprivileged communities.
- A youth NGO in Bengaluru collaborated with a recycling startup to repurpose used juice and milk cartons (tetra packs) into school benches and desks. These non-biodegradable cartons were compressed into sturdy sheets, contributing to educational infrastructure for government schools while promoting recycling awareness among students and families.
- In Ahmedabad, Gujarat, young designers founded a social enterprise that recycles scrap vehicle tyres into stylish and durable footwear. Their venture, SoleCycle, diverts rubber waste from landfills and employs local artisans, blending sustainability with social entrepreneurship.
- A student initiative in Ludhiana known as ReLeaf collects discarded newspapers from classrooms and hostels to create eco-friendly pens and seed pencils. These biodegradable stationery items are embedded with seeds such as basil and marigold, encouraging users to plant them after use and fostering a culture of sustainability.
- Architecture students in Hyderabad have innovatively used foam and sponge waste collected from mattress factories to create modular furniture. These lightweight, colorful lounge seating options have been

installed in youth cafes and co-working hubs, showcasing how design can intersect with recycling to create practical, aesthetic solutions.

These diverse and impactful projects exemplify how youth can play a pivotal role in reimagining waste not as a burden but as a resource. Through such initiatives, they contribute to environmental conservation, community development, and the circular economy, underscoring the importance of empowering young people in sustainable waste management strategies. Youth in India are increasingly emerging as pivotal agents of change in the waste management sector through innovative and sustainable practices. According to the India Youth for Climate Network, youth-led social enterprises have successfully recycled over 10,000 tonnes of waste, demonstrating the scale and effectiveness of their contributions to environmental conservation (Kumar, 2023). Supporting this momentum, more than 500 youth startups focused on waste management have been registered under the Atal Innovation Mission (NITI Aayog, 2023), highlighting the growing entrepreneurial spirit among young innovators. Furthermore, a report by UNDP India (2022) reveals that approximately 47% of youth-led environmental initiatives in urban areas are centered on upcycling, composting, and the adoption of sustainable alternatives (Kumar, 2023). These figures underscore the proactive role of young people in promoting circular economy practices and addressing the escalating waste crisis through creative, community-driven solutions.

Strategic Waste Management Practices in Universities

Universities have become hubs for innovative waste management practices, with students playing a crucial role in these initiatives. By implementing strategic waste management practices, universities can serve as models for sustainable waste management and inspire broader community engagement. At a university in Bangalore, students launched a composting program to manage cafeteria waste. The compost produced is used in campus gardens, reducing the need for chemical fertilizers and enhancing soil health. This initiative has significantly reduced the university's waste footprint and serves as an example of effective waste management practices (Sawalkar et al., 2023).

Conclusion

Youth involvement in waste management is crucial for finding creative and lasting solutions to the growing waste problem. This chapter shows that young people are already making a difference through innovative projects, such as recycling programs and waste-to-wealth initiatives. Education, creativity, and community collaboration help young people drive positive change in waste management.

However, young people face challenges, including limited access to resources and support. To fully unlock their potential, it is essential to provide them with the right tools, training, and opportunities. Support from governments, schools, and businesses is key to helping youth overcome these barriers. Examples like the school recycling program in Pune and the e-waste collection drive in

Bangalore highlight how youth-led projects can have a significant impact when given the right resources. These initiatives show that youth have the power to create solutions that help reduce waste and promote recycling. In conclusion, supporting and empowering youth is vital for building a sustainable future. By providing resources and opportunities, we can help young people lead the way in waste management, turning their innovative ideas into real solutions.

References

- [1] Amobonye, A., Bhagwat, P., Singh, S., & Pillai, S. (2021). Plastic biodegradation: Frontline microbes and their enzymes. *Science of the Total Environment*, 759, 143536. <https://doi.org/10.1016/j.scitotenv.2020.143536>
- [2] Camilleri, M. A. (2021). Sustainable production and consumption of food. *Mise-en-place circular economy policies and waste management practices in tourism cities. Sustainability*, 13(17), 9986. <https://doi.org/10.3390/su13179986>
- [3] Daniel, H., & Perinaz, B. T. *What a waste: a global review of solid waste management*, 2012.
- [4] Dhar, S., Singh, R., Shrivastava, M., & Sangwan, S. (2021). *Waste to Wealth: Innovative Ideas and Technological Initiatives*. In *Innovations in Agriculture for a Self-Reliant India* (pp. 581-593). CRC Press. <https://doi.org/10.1201/9781003245384-33>
- [5] Djirong, A., Jayadi, K., Abduh, A., Mutolib, A., Mustofa, R. F., & Rahmat, A. (2024). Assessment of student awareness and application of eco-friendly curriculum and technologies in Indonesian higher education for supporting sustainable development goals (SDGs): A case study on environmental challenges. *Indonesian Journal of Science and Technology*, 9(3), 657-678. <https://doi.org/10.17509/ijost.v9i3.74385>
- [6] Dushkova, D., & Ivlieva, O. (2024). Empowering communities to act for a change: A review of the community empowerment programs towards sustainability and resilience. *Sustainability*, 16(19), 8700. <https://doi.org/10.3390/su16198700>
- [7] Goris, L. M., Harish, M. T., & Bhavani, R. R. (2017, July). A system design for solid waste management: A case study of an implementation in Kerala. In *2017 IEEE Region 10 Symposium (TENSYP)* (pp. 1-5). IEEE. <https://doi.org/10.1109/TENCONSpring.2017.8070106>
- [8] Ho, H. J., Iizuka, A., & Shibata, E. (2021). Chemical recycling and use of various types of concrete waste: A review. *Journal of Cleaner Production*, 284, 124785. <https://doi.org/10.1016/j.jclepro.2020.124785>
- [9] Kasavan, S., Yusoff, S., Ali, N. I. M., & Masarudin, N. A. (2021). Reducing food waste at school canteens: The behaviour of school communities. *Geografia*, 17(2). <https://doi.org/10.17576/geo-2021-1702-05>
- [10] Kaza, S., Yao, L., Bhada-Tata, P., & Van Woerden, F. (2018). *What a waste 2.0: a global snapshot of solid waste management to 2050*. World Bank Publications. <https://doi.org/10.1596/978-1-4648-1329-0>

- [11] Khan, S., Anjum, R., Raza, S. T., Bazai, N. A., & Ihtisham, M. (2022). Technologies for municipal solid waste management: Current status, challenges, and future perspectives. *Chemosphere*, 288, 132403. <https://doi.org/10.1016/j.chemosphere.2021.132403>
- [12] Kumar, A. (2023). Promoting youth involvement in environmental sustainability for a sustainable Future. *Edumania-An International Multidisciplinary Journal*, 1(03), 261-278. <https://doi.org/10.59231/edumania/9012>
- [13] Kumari, S., Choudhury, A., Karki, P., Simon, M., Chowdhry, J., Nandra, A., & Garg, M. C. (2025). Next-Generation Air Quality Management: Unveiling Advanced Techniques for Monitoring and Controlling Pollution. *Aerosol Science and Engineering*, 1-22. <https://doi.org/10.1007/s41810-024-00281-1>
- [14] Lebon, E., Madushele, N., & Adelard, L. (2020). Municipal solid wastes characterisation and waste management strategy evaluation in insular context: A case study in Reunion Island. *Waste and Biomass Valorization*, 11, 6443-6453. <https://doi.org/10.1007/s12649-019-00860-1>
- [15] Lin, Z., Ooi, J. K., & Woon, K. S. (2022). An integrated life cycle multi-objective optimization model for health-environment-economic nexus in food waste management sector. *Science of The Total Environment*, 816, 151541. <https://doi.org/10.1016/j.scitotenv.2021.151541>
- [16] Machin-Mastromatteo, J. D. (2023). Community-driven and social initiatives. *Information Development*, 39(3), 393-401. <https://doi.org/10.1177/02666669231197243>
- [17] NITI Aayog. (2023). Annual Report. Annual Report | NITI Aayog. (n.d.). <https://www.niti.gov.in/Annual-Report>. <https://www.niti.gov.in/annual-report>
- [18] Paes, M. X., de Medeiros, G. A., Mancini, S. D., Bortoleto, A. P., de Oliveira, J. A. P., & Kulay, L. A. (2020). Municipal solid waste management: Integrated analysis of environmental and economic indicators based on life cycle assessment. *Journal of cleaner production*, 254, 119848. <https://doi.org/10.1016/j.jclepro.2019.119848>
- [19] Sawalkar, R. S., Undale, S., Muluk, S., Mude, G., Saxena, V. D., & Pasumarti, S. (2023). Strategic waste management practices for environmental sustainability—a case of Indian university. *Management of Environmental Quality: An International Journal*, <https://doi.org/10.1108/MEQ-07-2022-0201>
- [20] Shrestha, P. P., Ghimire, A., Dangi, M. B., & Urynowicz, M. A. (2023). Development of a Municipal Solid Waste Management Life Cycle Assessment Tool for Banepa Municipality, Nepal. *Sustainability*, 15(13), 9954. <https://doi.org/10.3390/su15139954>
- [21] Silva, V., Contreras, F., & Bortoleto, A. P. (2021). Life-cycle assessment of municipal solid waste management options: A case study of refuse derived fuel production in the city of Brasilia, Brazil. *Journal of Cleaner Production*, 279, 123696. <https://doi.org/10.1016/j.jclepro.2020.123696>

- [22] Subri, U. S., Ghani, N. M., Rus, R. C., & Affandi, H. M. (2025). Waste no more: Empowering communities through education and participation in sustainable waste management. *Multidisciplinary Reviews*, 8(7), 2025204-2025204. <https://doi.org/10.31893/multirev.2025204>
- [23] Tayeh, B. A., Alyousef, R., Alabduljabbar, H., & Alaskar, A. (2021). Recycling of rice husk waste for a sustainable concrete: a critical review. *Journal of Cleaner Production*, 312, 127734. <https://doi.org/10.1016/j.jclepro.2021.127734>
- [24] United Nations. (2022). The Sustainable Development Goals Report. <https://unstats.un.org/sdgs/report/2022/The-Sustainable-Development-Goals-Report-2022.pdf>
- [25] Whiteman, A. D., Hennessy, N., & Wilson, D. C. (2025). Rethinking waste and resource management for underserved communities. *Oxford Development Studies*, 1-17. <https://doi.org/10.1080/13600818.2025.2473957>
- [26] Winterstetter, A., Heuss-Assbichler, S., Stegemann, J., Kral, U., Wäger, P., Osmani, M., & Rechberger, H. (2021). The role of anthropogenic resource classification in supporting the transition to a circular economy. *Journal of Cleaner Production*, 297, 126753. <https://doi.org/10.1016/j.jclepro.2021.126753>
- [27] Zaikova, A., Vinitskaia, N., Deviatkin, I., Havukainen, J., & Horttanainen, M. (2022). Life cycle assessment of existing and alternative options for municipal solid waste management in Saint Petersburg and the Leningrad region, Russia. *Recycling*, 7(2), 19. <https://doi.org/10.3390/recycling7020019>
- [28] Zhang, J., Qin, Q., Li, G., Tseng, C. H., & Fang, G. (2023). Assessing the impact of waste separation on system transition and environmental performance through a city-scale life cycle assessment. *Ecological Economics*, 211, 107886. <https://doi.org/10.1016/j.ecolecon.2023.107886>



HOW TO CITE

Upjipreet Kaur Brar (2025). Innovations in Recycling: Youth Centric Approaches to Waste Management. Ed. by Dr. Monita Dhiman in “Youth Voices for a Sustainable Future” (pp. 115-122). Vyom Hans Publications.

DOI: <https://doi.org/10.5281/zenodo.15524984>

ISBN: 978-81-970890-9-1

CHAPTER-14

MARINE CONSERVATION: YOUNG VOICES FOR OCEANS

Ms. Kirti

Khalsa College for Women,
Civil Lines, Ludhiana, Punjab, 141002

Email ID: kirtigupta.5104@gmail.com

ORCID ID: 0009-0001-8700-3321

Abstract

The health of the world's oceans is under increasing threat due to pollution, overfishing, climate change, and habitat destruction. Young individuals are stepping up as ocean advocates, leading marine conservation efforts through education, activism, technological innovations, and community-based projects. This chapter explores the role of youth in protecting marine ecosystems, highlighting their contributions to policy advocacy, sustainable practices, and scientific research. By examining case studies of youth-led marine conservation initiatives, this chapter showcases how young changemakers are creating a wave of impact for a sustainable ocean future.

Keywords: Marine conservation, youth activism, ocean sustainability, plastic pollution, climate change, marine biodiversity

Introduction

The marine environment includes a diverse range of ecosystems, each with its own unique features. These range from vibrant coral reefs and expansive kelp forests, to coastal areas like mangroves, seagrass beds, and salt marshes. Beyond the shore, the ocean floor is marked by vast deep-sea plains, deep trenches, and towering seamounts and ridges. Hydrothermal vents further contribute to the complexity of these ecosystems, supporting life forms that thrive in extreme conditions. Above, the water column stretches deep into the ocean, housing a variety of species adapted to survive at different depths (Hixon et al; 2001, Vikas & Dwarakish, 2015).

Oceans cover more than 70% of the Earth's surface and are fundamental to regulating climate, supporting biodiversity, and sustaining human life. They absorb approximately 40% of anthropogenic CO₂ emissions, mitigating climate

change impacts (Costanza et al; 1999). Additionally, oceans provide resources such as food, renewable energy, and minerals while supporting global economies through fisheries, transportation, and tourism.

Marine biodiversity is essential not only for the direct benefits it offers to humans but also for the critical roles it plays in maintaining ecosystem health (Neeman et al; 2013). The ocean is essential for supporting and sustaining life, but unfortunately, human activities have caused severe harm to marine ecosystems. Overfishing, habitat destruction and pollution have a long history of damaging these delicate environments. And now, the added pressure of climate change is further impacting the vital functions and roles that oceans play in our world (Osterblom et al; 2023).

Despite their vastness, oceans are not immune to human-induced pressures. Rising sea temperatures, plastic waste accumulation, and destructive fishing practices threaten marine biodiversity. Protecting marine habitats is crucial for the health of both the environment and coastal communities. Monitoring marine biodiversity and taking steps to prevent further damage to these ecosystems is necessary (Ison et al., 2024). Protecting marine habitats is crucial for the health of both the environment and coastal communities. Monitoring marine biodiversity and taking steps to prevent further damage to these ecosystems is necessary (Chatterjee et al; 2017). Addressing these challenges requires a collective effort, and young individuals have emerged as key players in ocean conservation, using their creativity, digital platforms, and scientific knowledge to drive impactful initiatives worldwide.

Challenges Facing our Oceans

Our oceans are vast and teeming with life, playing a critical role in regulating the Earth's climate and supporting biodiversity. However, human activities have placed immense pressure on marine ecosystems, leading to widespread environmental issues. Several major challenges currently affecting our oceans have been recognized like overfishing, ocean acidification, rising sea temperatures, loss of biodiversity, illegal and unregulated maritime activities, ocean pollution and degradation due to plastics, chemical run offs, oil spills and many more (Costanza et al., 1998). Out of these most pressing challenges facing our oceans include overfishing, plastic pollution, ocean acidification, and climate change.

Overfishing

Unsustainable fishing practices have led to the depletion of fish stocks, disrupting food chains and marine ecosystems. The collapse of certain fish populations has profound ecological and economic consequences. Overfishing occurs when fish are caught at a faster rate than they can reproduce, leading to a severe depletion of fish populations. Industrial-scale fishing, driven by global seafood demand, has pushed many species to the brink of collapse, disrupting marine food chains and ecosystems. The removal of key species, such as sharks and tuna, can cause imbalances, allowing smaller fish populations to grow

unchecked, which in turn depletes their prey and disrupts food webs. Additionally, destructive fishing methods like bottom trawling and longline fishing result in significant bycatch, accidentally capturing non-target species such as dolphins, sea turtles, and seabirds, while also damaging fragile marine habitats like coral reefs and seabeds (Sanjay et al., 2024). Beyond environmental consequences, overfishing threatens the livelihoods of millions, particularly in coastal communities that depend on fishing for sustenance and economic stability. The collapse of fish stocks can lead to food insecurity and financial hardships for those reliant on the fishing industry. To address this crisis, sustainable fishing practices, stricter regulations, and the enforcement of marine protected areas are essential to ensure the long-term health of marine ecosystems and the communities that depend on them.

Plastic Pollution

The abundance of plastic waste in the ocean has become a major concern for marine life. Approximately 8 million tons of plastic enters the ocean annually, resulting in over 690 encounters with various marine species reported thus far (Carbery et al., 2018). The negative impacts of plastics have been well-documented, including entanglement and physical harm to the movement, breathing, and digestion of marine animals. Additionally, due to their slow degradation, plastics can serve as floating surfaces for various organisms, leading to long-distance transportation of non-native species and posing a potential threat to local biodiversity (Avio et al., 2015).

As of late, there has been a significant surge in scientific curiosity surrounding microplastics (Avio et al., 2015). Microplastics, which have no agreed upper size limit, are generally considered to be plastics that have been either created or broken down by the environment into particles smaller than 5 mm in diameter. Microplastics have garnered widespread attention due to their negative and toxic impact on the environment. The toxicity of MPs depends greatly on their size - the smaller the particle, the deeper it can penetrate into an organism and release toxic chemicals in acidic gut conditions (Carbery et al., 2018). This pollution poses severe threats to marine life, as animals like sea turtles, whales, and seabirds often mistake plastic debris for food, leading to internal injuries, blockages, and starvation. Lost or discarded fishing nets, known as "ghost nets," continue to entangle and kill marine species long after they are abandoned. Additionally, microplastics have infiltrated the marine food chain, absorbing harmful pollutants that are consumed by plankton, fish, and ultimately humans, raising significant health concerns. Plastic waste also disrupts marine ecosystems, affecting habitats from coral reefs to deep-sea environments. Floating plastic debris can block sunlight, hindering photosynthesis in marine plants and phytoplankton, which are crucial for oxygen production (Ayassamy, 2025). Addressing plastic pollution requires global efforts, including reducing plastic production, improving waste management, and promoting biodegradable alternatives to protect marine life and preserve ocean health.

Ocean Acidification

The rising levels of carbon dioxide (CO₂) in the atmosphere are not only driving climate change but also increasing ocean acidity, as the oceans absorb about 30% of human-generated CO₂. Approximately 25% of the released CO₂ is absorbed by the oceans, where it reacts with seawater to create carbonic acid. This causes a decrease in pH levels, an increase in acidification, and changes in carbonate chemistry. This whole phenomenon is called ocean acidification. Ocean acidification has been shown to have harmful effects on various marine life forms (Falkenberg et al., 2020). Coral reefs, which rely on carbonate ions to build their calcium carbonate skeletons, become weakened in acidic waters, making them more vulnerable to erosion, storms, and disease, threatening the 25% of marine species that depend on them. Acidification has simplified the ocean ecosystem resulting in lower abundance, complexity and habitat of organisms. Loss of certain associated organisms and changes in interactions between those species. It also has an impact on the acid-base levels of marine creatures and can also change how they perceive and interpret sensory input (McCormick et al., 2013). To mitigate ocean acidification, reducing CO₂ emissions through renewable energy, carbon capture technologies, and sustainable land-use practices is essential for preserving marine biodiversity and ocean health.

Climate Change

Climate change is profoundly altering oceanic conditions, resulting in rising sea temperatures, extreme weather events, and melting ice caps, all of which have severe consequences for marine biodiversity and human societies. Warmer ocean temperatures are triggering more frequent and intense marine heatwaves, leading to coral bleaching, where corals expel their symbiotic algae, losing their color and ability to survive. Additionally, warmer waters fuel stronger hurricanes, cyclones, and typhoons, which not only threaten coastal communities but also accelerate coastal erosion and damage vital marine ecosystems like coral reefs, mangroves, and seagrass beds. The rapid melting of polar ice caps is contributing to rising sea levels, endangering island nations and coastal cities while also disrupting ocean currents and marine migration routes. Climate change is also driving shifts in species distribution, as fish move to cooler waters, affecting traditional fisheries and food security. Furthermore, critical marine habitats such as seagrass meadows and mangroves, which act as carbon sinks, are at risk of destruction (Talukder et al., 2022). Addressing climate change demands urgent action to reduce greenhouse gas emissions, protect marine ecosystems, and implement climate adaptation strategies to safeguard coastal communities.

In recent years, the depletion of numerous global fisheries has been linked to a combination of factors including excessive fishing practices, pollution, destruction of habitats, ocean acidification, increasing sea surface temperatures, and disruptions in food webs caused by the loss of species. These physical,

chemical, and biological changes in the oceans have all contributed to the decline in fish populations (Fleming et al., 2019).

Youth actions for Marine Conservation

The world's population consists of over a third being young individuals, who will ultimately grow up to become our future leaders in fields such as science, education, environmental protection, and governmental policy-making etc. They are the ones to bear the repercussions of change in climate patterns, depletion of resources or any sort of environmental degradation. Thus, it becomes important for the society to motivate, encourage and empower its youth in coming forward and willingly and enthusiastically participate in decision making processes aimed at conservation efforts (Wootton et al., 2024).

Amongst youth, environmental activism often starts at home or with close companions. After gaining knowledge about any environmental concerns in their schools, they may initiate conversations between their friends or family members. Besides this informal action they may also formally come to take part in activities such as joining school protests, assuming positions within communities or organizations and even pursuing and securing public offices at a growing rate. Studies show that adults generally have a favorable view of the involvement of young people in formal political arenas. Additionally, research suggests that youth can generally influence their family's opinions on such topics through intergenerational learning (Hartley et al., 2021).

In 2018, the Scottish Government declared it the 'Year of Young People' with the goal of promoting youth participation and giving them a voice in public services and decisions that impact their lives. As part of this initiative, the Sea Scotland 2018 conference aimed to gather insights and perspectives from young people about the marine environment. This was done with the help of an online survey and the results were presented by the Vice-Chair of SYP at the conference.

The Scottish Youth Parliament operates within Scotland to offer unbiased representation for the country's young citizens between the ages of 11 to 26. SYP provides a national platform, led by youth, for open discussion and advocacy on topics voted as most important by young people in Scotland each year. This allows SYP to actively engage with the Scottish Parliament on predetermined issues. However, their ability to address additional pressing matters may be restricted due to voluntary nature of all SYP members (Devenport et al., 2021).

Gathering in Sydney, Australia for the 2014 IUCN World Parks Congress were an unprecedented number of young conservationists under the age of 35, many with a strong dedication to marine preservation. This event placed great importance on empowering emerging leaders and fostering a connection between youth and nature through Stream 8: Inspiring a New Generation. As part of this effort, young leaders served as co-leaders, session chairs, workshop facilitators, and plenary keynote speakers. The focus was on international efforts to preserve our oceans being led by passionate young individuals who were

members of IUCN Task Force on Intergenerational Partnership on Sustainability (IPS), IUCN World Commission on Protected Areas Young Professionals (WCPA YP) group, and the newly formed IUCN WCPA Marine Young Professionals Task Force (Task Force). These young leaders were dedicated volunteers who strived to make a positive impact on global marine conservation. At the Congress, two main platforms supported the WCPA Marine's presence under the Cross-Cutting Marine theme: the Oceans + Pavilion and the VIP Oceans Reception. The Pavilion hosted most of the marine events, and young marine leaders volunteered their time to assist in managing it both before and during the Congress. They also played a key role in organizing the Oceans Reception, which provided opportunities for networking and knowledge exchange between young and senior leaders. Additionally, the Oceans + Pavilion highlighted some of the most innovative solutions for marine conservation from around the world (Bianco et al., 2016).

The Youth Ocean Conservation Summit (YOCD) is an event designed to empower young people by giving them the tools and knowledge to become active ocean advocates. Held annually at Mote Marine Laboratory in Sarasota, FL, with additional satellite locations across the country. It's a space where participants can dive into pressing environmental issues and learn how to tackle them in their communities. One of the features is the opportunity to develop action plans, allowing attendees to create perceptible steps for their own conservation projects. They are also paired with experienced mentors who provide guidance throughout the process, helping them navigate challenges and grow their skills. It brings together like-minded youth, fostering a sense of unity and shared purpose. After the events, the participants stay connected through an online network, ensuring continued collaboration and support. Funding opportunities are available to bring their projects to life, and peer driven model encourages a ripple effect, inspiring even more youth-led initiatives (Russell et al., 2019).

The Blue Med Initiative established in 2014 is a collaborative effort aimed at promoting sustainable growth and blue jobs in the Mediterranean region. Established to address the need for a coordinated approach to maritime activities, it emphasizes a trans-disciplinary and inclusive strategy involving scientists, policymakers, and citizens. A key feature of the initiative is the Young Ambassadors' Program, which empowers youth, particularly from non-EU Mediterranean countries, to advocate for sustainable practices and engage in marine governance. Through this program, Blue Med addresses critical environmental issues like marine litter, while fostering international cooperation for the responsible management of marine resources, ensuring the Mediterranean's sustainability for future generations (Cappelletto et al., 2021).

Starting in 2021, the United Nations (UN) launched a ten-year initiative called the UN Decade of Ocean Science for Sustainable Development (hereafter referred to as the "UN Ocean Decade"). The main objective of this decade is to promote ocean science for the greater good of humanity. By connecting people and the ocean, the UN Ocean Decade aims to strengthen capacity building in

areas and among groups that have limited influence. It also strives to increase societal awareness and involvement while striving for diversity in addressing oceanic issues across generations, genders and geographical regions. This includes empowering young individuals since they are, and will continue to be, heavily affected by current threats to our planet (Kelly et al., 2022).

Conclusion

In conclusion, the future of marine and coastal conservation will rely on a comprehensive approach that combines scientific research with practical, community-centred strategies. A better understanding of the intricate relationships within marine ecosystems is essential for developing more effective conservation plans. Additionally, addressing the socio-economic factors that influence human behaviours and their impact on these ecosystems will play a crucial role in aligning conservation goals with local needs. The development of adaptive management strategies, which can evolve with changing environmental conditions, is also vital for ensuring long-term ecosystem health. Innovation in technology, restoration techniques, and policy frameworks will be critical to mitigating human impacts. Finally, fostering collaboration and interdisciplinary research will help create holistic conservation strategies that are both sustainable and resilient. By focusing on these key areas, we can significantly enhance our ability to protect and preserve marine and coastal ecosystems for future generations.

References

- [1] Hixon, M., Boersma, P., Hunter, M. L., Micheli, F., & Norse, E. (2001). Oceans at risk - Research priorities in marine conservation biology. 125–154.
- [2] Vikas, M., & Dwarakish, G. S. (2015). Coastal pollution: a review. *Aquatic procedia*, 4, 381-388. <https://doi.org/10.1016/j.aqpro.2015.02.051>
- [3] Neeman, N., Servis, J. A., & Naro-Maciel, E. (2013). Conservation issues: Oceanic ecosystems (pp. 193–201). <https://doi.org/10.1016/B978-0-12-809665-9.09198-9>
- [4] Costanza, R. (1999). The ecological, economic, and social importance of the oceans. *Ecological economics*, 31(2), 199-213. [https://doi.org/10.1016/S0921-8009\(99\)00079-8](https://doi.org/10.1016/S0921-8009(99)00079-8)
- [5] Österblom, H., Wabnitz, C. C., Tladi, D., Allison, E. H., Arnaud-Haond, S., Bebbington, J., ... & Selim, S. A. (2023). Towards ocean equity. In *The Blue Compendium: From Knowledge to Action for a Sustainable Ocean Economy* (pp. 485-521). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-031-16277-0_13
- [6] Ison, S., Cvitanovic, C., Pecl, G., Hobday, A. J., & van Putten, I. (2024). Participatory research in complex marine conservation settings: A review of recent trends and lessons for the future. *Ocean & Coastal Management*, 253, 107053. <https://doi.org/10.1016/j.ocecoaman.2024.107053>

- [7] Chatterjee, S. (2017). An Analysis of Threats to Marine Biodiversity and Aquatic Ecosystems. Social Science Research Network. <https://doi.org/10.2139/ssrn.2964468>
- [8] Costanza, R., Andrade, F., Antunes, P., den Belt, M. V., Boersma, D., Boesch, D. F., & Young, M. (1998). Principles for sustainable governance of the oceans. *Science*, 281(5374), 198-199. <https://doi.org/10.1126/science.281.5374.198>
- [9] Sanjay, G., Chezhian, A., & Sureshkumar, P. (2024). A SHORT REVIEW ON THE MENACE OF OVERFISHING. *Journal of Experimental Zoology India*, 27(1). <https://doi.org/10.51470/JEZ.2024.27.1.55>
- [10] Carbery, M., O'Connor, W., & Palanisami, T. (2018). Trophic transfer of microplastics and mixed contaminants in the marine food web and implications for human health. *Environment international*, 115, 400-409. <https://doi.org/10.1016/j.envint.2018.03.007>
- [11] Avio, C. G., Gorbi, S., Milan, M., Benedetti, M., Fattorini, D., d'Errico, G., & Regoli, F. (2015). Pollutants bioavailability and toxicological risk from microplastics to marine mussels. *Environmental pollution*, 198, 211-222. <https://doi.org/10.1016/j.envpol.2014.12.021>
- [12] Ayassamy, P. (2025). Ocean plastic pollution: a human and biodiversity loop. *Environmental Geochemistry and Health*, 47(4), 1-17. <https://doi.org/10.1007/s10653-025-02373-4>
- [13] Falkenberg, L. J., Bellerby, R. G., Connell, S. D., Fleming, L. E., Maycock, B., Russell, B. D., ... & Dupont, S. (2020). Ocean acidification and human health. *International Journal of Environmental Research and Public Health*, 17(12), 4563. <https://doi.org/10.3390/ijerph17124563>
- [14] McCormick, M. I., Watson, S. A., & Munday, P. L. (2013). Ocean acidification reverses competition for space as habitats degrade. *Scientific Reports*, 3(1), 3280. <https://doi.org/10.1038/srep03280>
- [15] Talukder, B., Ganguli, N., Matthew, R., Hipel, K. W., & Orbinski, J. (2022). Climate change-accelerated ocean biodiversity loss & associated planetary health impacts. *The Journal of Climate Change and Health*, 6, 100114. <https://doi.org/10.1016/j.joclim.2022.100114>
- [16] Fleming, L. E., Maycock, B., White, M. P., & Depledge, M. H. (2019). Fostering human health through ocean sustainability in the 21st century. *People and Nature*, 1(3), 276-283. <https://doi.org/10.1002/pan3.10038>
- [17] Wootton, N., Nursey-Bray, M., Holland, S., & Gillanders, B. M. (2024). Better understanding ocean awareness: Insights from young people. *Marine Policy*, 164, 106159. <https://doi.org/10.1016/j.marpol.2024.106159>
- [18] Hartley, J. M., Higgins, K. M., Peterson, M. N., Stevenson, K. T., & Jackson, M. W. (2021). Perspective from a youth environmental activist: Why adults will listen to youth in politics. *Frontiers in Political Science*, 3, 636583. <https://doi.org/10.3389/fpos.2021.636583>

- [19] Devenport, E., Brooker, E., Brooker, A., & Leakey, C. (2021). Insights and recommendations for involving young people in decision making for the marine environment. *Marine Policy*, 124, 104312. <https://doi.org/10.1016/j.marpol.2020.104312>
- [20] Bianco, M., Koss, R., & Zischka, K. (2016). Empowering emerging leaders in marine conservation: the growing swell of inspiration. *Aquatic Conservation-Marine and Freshwater Ecosystems*, 26, 225–236. <https://doi.org/10.1002/aqc.2650>
- [21] Russell, S. (2019). Empowering Young Ocean Conservationists (pp. 437–446). Springer, Cham. https://doi.org/10.1007/978-3-319-90778-9_24
- [22] Cappelletto, M., Giuffredi, R., Kastanidi, E., Vassilopoulou, V., & L'Astorina, A. (2021). Grounding Ocean Ethics While Sharing Knowledge and Promoting Environmental Responsibility: Empowering Young Ambassadors as Agents of Change. *Frontiers in Marine Science*, 8. <https://doi.org/10.3389/fmars.2021.717789>
- [23] Kelly, R., Elsler, L. G., Polejack, A., van der Linden, S., Tönnesson, K., Schoedinger, S. E., & Wisz, M. S. (2022). Empowering young people with climate and ocean science: Five strategies for adults to consider. *One Earth*, 5(8), 861-874. <https://doi.org/10.1016/j.oneear.2022.07.007>



HOW TO CITE

Kirti (2025). *Marine Conservation: Young Voices for Oceans*. Ed. by Dr. Monita Dhiman in “Youth Voices for a Sustainable Future” (pp. 123-131). Vyom Hans Publications.

DOI: <https://doi.org/10.5281/zenodo.15534778>

ISBN: 978-81-970890-9-1

CHAPTER-15

ENVIRONMENTAL ART AND STORYTELLING: INSPIRING CHANGE THROUGH CREATIVITY

Ms. Tanvi Bansal

Khalsa College for Women,
Civil Lines, Ludhiana, Punjab, 141002

Email ID: tanvibansal1131@gmail.com

<https://orcid.org/0009-0003-6352-1356>

Abstract

In the face of escalating environmental challenges, the intersection of environmental art and storytelling emerges as a vital catalyst for inspiring change. This paper explores how these intertwined disciplines foster a deeper emotional connection to nature while raising awareness about ecological issues. Environmental art, characterized by its use of natural materials and themes of sustainability, serves as a powerful medium to provoke thought and reflection on humanity's relationship with the earth. Simultaneously, storytelling transforms complex scientific concepts into relatable narratives, promoting environmental advocacy and individual responsibility. By examining prominent examples of environmental art and storytelling, this study illustrates their collective potential to engage communities, challenge conventional wisdom, and cultivate a culture of sustainability. Ultimately, the integration of these creative practices not only encourages personal action but also contributes to the emergence of a new environmental ethic rooted in empathy and shared responsibility for the planet's future.

Key Words: Environmental Art, Storytelling, Creativity, Sustainability, Conservation, Human-Nature Connection, Eco Art, Environmental Issues, Awareness, Activism, Climate Change, Visual Storytelling

Introduction

Humanity has disrupted the planet's natural balance over the past 150 years by living beyond our means. We have destroyed vast areas of forests, burned immense quantities of fossil fuels, and released significant amounts of methane,

leading to an unprecedented environmental crisis. Scientists agree that global temperatures will continue to rise for decades, making urgent action essential.

Addressing the catastrophic consequences of human activity requires a multifaceted strategy that involves the efforts of scientists, engineers, policymakers, and artists. Approaching climate change from various angles is crucial not only for ecological stability but also for achieving sustainable development in social and economic aspects. Interdisciplinary collaboration enables professionals from diverse fields to share insights and better understand the interconnected nature of the challenges we face. In this era of environmental uncertainty, effective communication across disciplines is more important than ever. Visual art, often regarded as a universal language, has a unique ability to inspire individuals from all walks of life to adopt sustainable practices. However, the arts are frequently overlooked when it comes to disseminating scientific knowledge. While the scientific community may not always recognize the role of art, it has proven to be a powerful tool for shaping public opinion, conveying complex ideas, and challenging dominant narratives.

Art can transform public and architectural spaces—such as parks, memorials, and meeting areas—into platforms for engagement and reflection. Installations that bring people together, much like those at war monuments, create intimate emotional experiences and foster open dialogue. When artists are given the opportunity to reach broader audiences, their work can inspire activism and build momentum for collective action.

Research on environmental art often explores its intersections with design, ethics, and education. Studies have shown that "green art" can serve as an effective educational tool, promoting systems thinking and transdisciplinary learning. Integrating environmental art into academic curricula encourages students to think more holistically and creatively about ecological issues as they grow.

Historically, art and science have often been viewed as separate domains; however, there is a growing consensus on the value of collaboration between the two. When addressing a global issue as complex as climate change, multidisciplinary approaches can generate a richer array of ideas and solutions, blending perspectives from science, humanities, and creative practices. In an age of environmental degradation, society must begin to think differently and embrace more imaginative approaches to problem-solving. Only then can we create the innovation needed to tackle the challenges still threatening our world. (Jean, 2019)

Relationship between Art and Climate Change

Humans and the natural world are no longer connected. We argue that various factors—including political relationships, sociocultural norms, institutional structures, and ideological orientations, contribute to this disconnection by either encouraging or fostering a disregard for humanity's place within nature. This divide has a significant impact on the climate crisis.

To address environmental change, important measures have been taken to help people reconnect with their surroundings (Beery et al., 2023). Art serves as one of the most effective means of fostering an emotional bond between individuals and the natural world. It has the unique ability to uplift and inspire us. Consider the awe inspired by a breathtaking landscape, the joy brought on by a vibrant painting, or the tranquility evoked by a soothing piece of music. Through moments of grace and transcendence, art transports us to new emotional realms and enhances our well-being. Moreover, art often stimulates critical thinking and deep reflection, promoting both intellectual and emotional engagement. It can challenge our assumptions, confront our biases, and encourage us to explore alternative perspectives, leading to personal and emotional growth (Pitout, 2024).

Art also enables us to engage with climate change issues in an engaging and calming manner. While the subject can be stressful and anxiety-inducing, expressing ourselves through art alleviates these negative emotions while also emphasizing the importance of the issue at hand. Numerous studies have shown that viewing art can enhance our mood, reduce stress and anxiety levels, and increase our overall sense of well-being and satisfaction.

Eco-Art

Eco art is a relatively new concept for many, having emerged in the 1960s alongside the rise of environmental groups. Today, it is nearly impossible to find artwork in museums or galleries that has not been influenced by environmentalism due to its significant growth over the past 60 years. Across the globe, sustainability is becoming a powerful muse, inspiring artists to use their talents to highlight pressing environmental challenges. The Greek words "eco" and "art" translate to "home" and "to prepare" or "fit together," respectively.

The term "eco art" refers to both environmental and ecological art. While these two forms of art are similar, there are subtle differences that set them apart. Despite sharing the same goal of using artistic expression to address ecological issues, they differ in methodology, focus, and intent. Eco art is created by artists who are concerned about the current climate crisis and various environmental issues. Eco artists usually do not work alone; they often collaborate with experts from fields such as biology, ecology, geology, zoology, botany, and activism. The aim of eco art is to work in harmony with the environment, often resulting in pieces made from eco-friendly materials or artworks that enhance the surroundings in which they are displayed. Additionally, eco art is designed to convey a powerful message. After all, isn't one of the goals of art creation to leave a mark on the world? Art should evoke thoughts and emotions in the audience while also being aesthetically pleasing. Environmental art raises numerous questions, ranging from aesthetics to ethics.

In general, environmental art covers a broader spectrum and often highlights the connection between art and nature without necessarily promoting sustainable behaviors. Artists in this genre may engage with the environment, use natural materials, or create large installations that encourage reflection on our relationship with the natural world (Pitout, 2024).

On the other hand, eco art is a more focused subset of environmental art that emphasizes sustainable practices and advocacy. Eco artists typically address specific ecological issues to raise awareness, inspire action, or propose concrete solutions to environmental challenges. Their works often incorporate recycled materials, renewable energy, or community collaborations to promote sustainable living.

In conclusion, eco art actively seeks to confront and address environmental issues through creative means, while environmental art involves a more comprehensive exploration of the artistic relationship with nature. Nonetheless, both play a vital role in enhancing our understanding of how humans impact the environment. In the art world, both forms are included within the eco art genre, despite their distinctions. By inspiring with beauty and conveying important messages about ecological challenges, eco art serves as a crucial medium for re-establishing the human connection to the environment.

Narratives and Storytelling

The issue of climate change is extremely complex and encompasses both short-term and long-term political, economic, and humanitarian dimensions, along with intricate climatological data. It reveals the rationale and shortcomings of our society. To effectively prioritize the fight against climate change, climate activists must leverage storytelling to inspire and influence people's behavior. As a significant environmental concern, climate change exemplifies what are known as "super-wicked problems." These problems have high stakes, contradictory information, multiple engaged interests, and uncertainty about their implications. Climate change stands out as one of the most critical policy issues facing our society today, as it affects a resource that we all share. However, it seems to be the first ecological emergency where public concern is lower than that of scientists. Many people perceive "global warming" as a minor issue, similar to "violence on television" or "growing trade deficits." The effects of climate change are challenging to grasp, and there are many intricate and contentious approaches to addressing these issues. Public support for climate measures is significantly influenced by perceptions of risks, which are shaped by cultural factors (Arnold, 2018). Narratives can be particularly effective when they align with the audience's values. Metaphors and analogies play a crucial role in facilitating this alignment and enhancing engagement with a broader audience. They serve as mental shortcuts for understanding complex information. Narratives are especially adept at reshaping deeply held beliefs and judgments, as most people interpret the world through stories rather than numbers and facts. By utilizing narratives, individuals can better comprehend and remember difficult and abstract scientific concepts.

Scientists are trained to be impartial, process information logically, and base their conclusions on empirical data. However, during their training, they are not typically taught communication techniques or how public opinion is formed about scientific issues. Narratives have the potential to bridge the gap between non-expert audiences and scientists. Since most individuals view the world

through tales rather than purely quantitative data, stories are particularly effective in altering ingrained beliefs. They can simplify complex scientific ideas, making them easier for people to recall and understand.

For an effective narrative, participants need a way to connect with the story. This could be through narrative self-reference or identification with a character. Metaphors and analogies foster this connection by encouraging self-reflection and engagement. Not everyone can visualize how a tree's root systems interact. For instance, many people today might envision a router using network wires to connect several computers. To capture interest and draw people into the narrative, the communicator should leave information gaps for the audience to fill in. When individuals see the story as their own, they may be more inclined to accept it as truth (Rabelista Nijhof, 2023).

Community Engagement and Education through Creative Practices

One essential component of a sustainable environment is community, which plays a significant role in its development. Therefore, active and engaged communities are crucial (Petronienė et al., 2022).

The transition to sustainability requires two key changes: (1) reforming both individual and communal thought and behavior patterns, and (2) creating suitable organizational structures, plans, and facilities to support this change. The arts can significantly contribute to both areas. Public art, in particular, has the power to inspire new perspectives on a community and influence the behavior of its members. Beyond enhancing the aesthetics of urban spaces, public art allows authorities to demonstrate their commitment to addressing social and environmental issues (Robidoux et al., 2018).

Song (2014) explored the potential of ecological art, especially public art, in American elementary and post-secondary educational institutions. She argues that "ecological art can be implemented and inspired in ways that engage students, have both immediate and collateral ecological implications, and ultimately encourage reflection, conversation, and behavioral changes in viewers" (Robidoux et al., 2018).

Conclusion

In conclusion, the integration of environmental art and storytelling represents a transformative approach to addressing the pressing ecological challenges of our time. By fostering a deeper emotional connection between individuals and the natural world, these creative practices serve as powerful tools for raising awareness and inspiring action. Environmental art, with its emphasis on sustainability and the use of natural materials, provokes critical reflection on humanity's relationship with the earth, while storytelling translates complex scientific concepts into relatable narratives that resonate with diverse audiences. Together, they not only challenge conventional perspectives but also cultivate a culture of sustainability rooted in empathy and collective responsibility. As we navigate the complexities of climate change, the collaborative efforts of artists,

scientists, and communities become increasingly vital, paving the way for innovative solutions and a renewed commitment to preserving our planet for future generations. This research underscores the necessity of interdisciplinary collaboration and the vital role of creative expression in fostering a more sustainable and interconnected world.

References

- [1] Arnold, A. (2018). *Climate change and storytelling: Narratives and cultural meaning in environmental communication*. Springer.
- [2] Beery, T., Stahl Olafsson, A., Gentin, S., Maurer, M., Stålhammar, S., Albert, C., & M. Raymond, C. (2023). Disconnection from nature: Expanding our understanding of human–nature relations. *People and Nature*, 5(2), 470-488. <https://doi.org/10.1002/pan3.10451>
- [3] Jean, H. (2019). *Connecting art and science: an artist's perspective on environmental sustainability*.
- [4] Petronienė, S., & Juzelėnienė, S. (2022). Community Engagement via Mural Art to Foster a Sustainable Urban Environment. *Sustainability*, 14(16), 10063. <https://doi.org/10.3390/su141610063>
- [5] Pitout, M. (2024). *Eco art helps us connect with our environment and develop an understanding of the climate crisis* (Doctoral dissertation, Institute of Art, Design+ Technology).
- [6] Rabelista Nijhof, A. (2023). Narrative transportation, identification, and storytelling in environmental (science) communication: Immersing audiences in a story. *ScienceOpen Preprints*. 10.14293/PR2199.000068.v1
- [7] Robidoux, M., & Kovacs, J. F. (2018). Public art as a tool for environmental outreach: Insights on the challenges of implementation. *The Journal of Arts Management, Law, and Society*, 48(3), 159-169. <https://doi.org/10.1080/10632921.2018.1450315>
- [8] Song, Y. I. K. (2014). A new vision for public art and functional landscape design. *International Journal of Art & Design Education*, 33(2), 242-257. <https://doi.org/10.1111/j.1476-8070.2014.12003.x>



HOW TO CITE

Tanvi Bansal (2025). *Environmental Art and Storytelling Inspiring Change through Creativity*. Ed. by Dr. Monita Dhiman in “Youth Voices for a Sustainable Future” (pp. 132-137). Vyom Hans Publications.

DOI: <https://doi.org/10.5281/zenodo.15525290>

ISBN: 978-81-970890-9-1

CHAPTER-16

CLIMATE ADAPTATION STRATEGIES: YOUTH-LED COMMUNITY INITIATIVES

Ms. Nandini Bali

Khalsa College for Women,
Civil Lines, Ludhiana, Punjab, 141002

Email ID: nandinibali434@gmail.com

ORCID ID: 0009-0004-8557-0666

Abstract

The change in climate poses major threats to ecosystems and human societies, disproportionately affecting vulnerable communities. To combat the effect of climate change, youth can be a crucial agent of change by implying innovative adaptation strategies. This chapter explores the role of young individuals in climate adaptation through community-driven initiatives, education, technological interventions, and policy advocacy. By analyzing successful youth-led projects, this chapter highlights the importance of empowering young people in shaping climate-resilient societies.

Keywords: Climate adaptation, youth initiatives, community resilience, climate change, sustainable development

Introduction

Climate change has become one of the most pressing global challenges, affecting both natural ecosystems and human communities. The global climate is changing at an alarming rate and requires immediate attention (Bolan et al., 2024). It has a huge impact on the ecosystem disrupting all the realms of life. Thousands of plant and animal species went extinct due to habitat loss and climate change. Due to an increase in global temperature, glaciers are melting. Permafrost thawing is one of the major concerns of environmentalists as greenhouse gases are released into the atmosphere leading to further climatic disruption (Miner et al., 2022). The soil becomes loose and soil erosions, landslides become very common. Also certain ancient viruses and microorganisms release into the atmosphere causing spread of many diseases, further enhancing the problem. Recent data indicate a continued and alarming

rise in global surface temperatures and greenhouse gas concentrations. As per data from World Meteorological Organization in 2024, Earth's average surface temperature was approximately 1.55°C above the 1850–1900 average, marking it as the warmest year on record. The decade from 2015 to 2024 has been the hottest on record, with each successive year contributing to the escalating trend. NOAA global monitoring laboratory noticed that the greenhouse gas concentrations have also reached unprecedented levels, with atmospheric CO_2 levels hitting 419.3 ppm in 2023, marking a 50% increase from pre-industrial levels. Methane concentrations saw an annual increase of 9.9 ± 0.6 ppb in 2023, while nitrous oxide levels rose from 336.59 ppb in 2023 to 337.71 ppb in 2024. These trends highlight the accelerating impact of human activities on the climate system, emphasizing the urgent need for immediate and comprehensive mitigation strategies (Lee et al., 2023; Forster et al., 2024). Its consequence ranging from rising temperatures and melting glaciers to extreme weather events are particularly severe for marginalized populations. The effects of climate change vary for different sectors of society, affecting the vulnerable groups like women, children, people with disabilities, economically underprivileged, and elderly the most (Soler-i-Marti et al., 2024). Addressing these issues requires innovative and inclusive solutions, with youth playing a crucial role in spearheading community-driven climate adaptation strategies. This chapter examines the efforts of young people in mitigating climate impacts through grassroots initiatives, technological solutions, and advocacy.

The Role of Youth in Climate Adaptation

Youth have a stake in climate change decisions, as they'll inherit a warmer planet. Involving them in the conversation ensures their voices are heard and allows them to influence climate responses (Rooney-Varga et al. 2014). The lifestyle choices and actions of today's youth can substantially impact greenhouse gas emissions (GGE) by 2050, making their decisions crucial for a sustainable future (Pickering et al. 2022, Ngcamu, 2023)). As future leaders, today's youth will make crucial decisions about transitioning to a low-carbon economy, addressing the environmental and societal impacts of climate change. Many children and youth are anxious about climate change, highlighting the need to educate and empower them with the knowledge to address their concerns and respond effectively (Soler-i-Marti et al., 2024). Youth worldwide are demanding climate action, expressing frustration at governments' inaction. Events like the 2019 UNICEF-sponsored "Youth for Climate Action" Summit and Greta Thunberg's school strike movement have mobilized millions of young people to publicly call for urgent climate action.

Young individuals are playing a crucial role in climate adaptation efforts, actively engaging in various initiatives to mitigate the impacts of climate change (Baldwin et al., 2023). Their contributions span from raising awareness to implementing practical solutions that promote sustainability and resilience. Below are some key ways in which youth are making a difference, along with relevant examples:

Raising Awareness about Climate Change and Its Consequences

One of the most significant contributions of young individuals is their role in spreading awareness about climate change and its long-term consequences. Through social media campaigns, educational programs, and grassroots initiatives, youth are ensuring that climate literacy reaches a broad audience. For example, Greta Thunberg's Fridays for Future movement has mobilized millions of young people globally to demand urgent climate action from policymakers. In India, the Let Me Breathe initiative provides a platform for youth to share personal stories and concerns about climate issues, ensuring that their voices are heard by decision-makers.

Leading Afforestation and Conservation Projects

Young environmentalists are at the forefront of afforestation and conservation efforts, recognizing the importance of trees and biodiversity in climate adaptation. Many youth-led organizations focus on tree planting, restoring degraded lands, and protecting endangered species. One notable initiative is Felix Finkbeiner's "Plant-for-the-Planet", which has helped plant over 14 billion trees worldwide (Finkbeiner, 2013). In Kenya, the Green Generation Initiative, founded by Elizabeth Wathuti, has planted thousands of trees to combat deforestation and promote environmental education in schools (Aboorva & Mani, 2024). In India, the SayTrees Foundation engages young volunteers to plant and maintain urban forests in cities facing deforestation (Renkl, 2018).

Promoting Climate-Resilient Agricultural Practices

Agriculture is one of the sectors most affected by climate change, and youth are driving innovation in climate-resilient farming techniques. By advocating for sustainable agriculture, organic farming, and water-efficient practices, they are helping communities adapt to changing climatic conditions. For example, in Bangladesh, youth-led floating farms provide a climate-resilient alternative for food production in flood-prone areas. In Africa, young agripreneurs are using hydroponics and vertical farming to conserve water and maximize yields in regions suffering from prolonged droughts. Indian youth groups have promoted zero-budget natural farming (ZBNF), which enhances soil fertility without relying on chemical fertilizers (Choudhary et al., 2023).

Advocating for Sustainable Urban Planning and Infrastructure

Rapid urbanization has increased the vulnerability of cities to climate-related disasters, and young individuals are actively working towards sustainable urban development. They are involved in designing eco-friendly infrastructure, promoting renewable energy, and pushing for policies that make cities more resilient. In the Philippines, youth architects and planners under the "Green Rebuild Project" have designed disaster-resilient housing solutions for communities affected by typhoons. In Europe, the Youth Climate Council collaborates with governments to integrate green infrastructure, such as rooftop gardens and bike lanes, into urban planning. In India, students from IIT Bombay

developed sponge city models, which use natural solutions like rain gardens and wetlands to manage urban flooding (Kumar et al., 2021).

Utilizing Technology to Enhance Climate Adaptation Strategies

Young innovators are leveraging digital tools and emerging technologies to create effective climate adaptation solutions. From artificial intelligence to mobile applications, youth-led technology-driven projects are improving climate resilience worldwide. One notable example is the NASA Space Apps Challenge, where young coders develop solutions to monitor climate change impacts using satellite data. In Africa, the M-Farm app, created by young entrepreneurs, helps farmers access climate data to make informed decisions about crops and irrigation. Similarly, the e-Green Watch program in India uses GIS mapping to track deforestation and ensure effective reforestation efforts (Ayers & Forsyth, 2009).

Youth-led movements and initiatives have gained international recognition for their role in shaping climate resilience strategies. Their activism, innovation, and commitment to sustainability are essential in tackling climate change and creating a more adaptive world. Governments, educational institutions, and organizations must continue to support young individuals by providing resources, mentorship, and platforms for climate action. By empowering youth, we can build a future where climate adaptation is driven by creativity, science, and community engagement.

Technological Innovations in Climate Adaptation

Advancements in technology have significantly strengthened climate adaptation efforts, offering innovative solutions to mitigate environmental risks and enhance resilience. Youth-led initiatives have been at the forefront of integrating modern technology into climate action, ensuring more efficient and proactive adaptation strategies (Ayers & Forsyth, 2009).

Climate Data Monitoring: Using AI and Satellite Imaging to Predict Climate Patterns

Accurate climate data is crucial for predicting extreme weather events and planning adaptation strategies. Youth-led initiatives leverage artificial intelligence (AI), satellite imaging, and machine learning algorithms to analyze climate trends and issue early warnings (Dewitte et al., 2021). In Kenya, a youth-led project called DeepClimate uses AI-powered data analysis to forecast droughts and floods. By processing satellite imagery and historical climate data, the initiative helps farmers plan crop cycles more efficiently, reducing the impact of erratic weather. Through programs like NASA's GLOBE (Global Learning and Observations to Benefit the Environment) initiative, young scientists worldwide contribute to data collection for climate modeling. Their work assists researchers in understanding global temperature shifts and predicting extreme weather patterns.

Mobile Applications: Developing Apps for Early Warning Systems and Sustainable Practices

Mobile technology has become a powerful tool for climate adaptation, with youth-led teams developing apps that provide real-time information on disasters, sustainable practices, and resource management (Selvam & Al-Humairi, 2025). Developed by a group of university students, MyFloodRisk helps homeowners assess their vulnerability to flooding by providing real-time weather updates and suggesting preventive measures. The app has been widely adopted in flood-prone areas in the U.S. In Brazil, young software developers created the AgroClimate App, which offers farmers customized advice on drought-resistant crops, water conservation, and pest management. The tool has improved agricultural productivity in areas affected by erratic rainfall.

Renewable Energy Initiatives: Encouraging the Use of Solar and Wind Energy in Local Communities

Transitioning to renewable energy sources is key to reducing dependency on fossil fuels and building climate resilience. Youth-led projects promote the adoption of solar, wind, and bio-energy solutions at the community level. Bangladeshi students launched a project to install solar panels on rural school rooftops, ensuring uninterrupted power supply for students while reducing reliance on diesel generators. This initiative has been replicated in multiple communities, promoting clean energy access. In Tamil Nadu, young engineers developed low-cost wind turbines that provide electricity to off-grid villages. Their innovation has empowered communities by offering a sustainable and affordable energy solution (Kallis et al., 2021).

Smart Irrigation Systems: Optimizing Water Usage for Agriculture through IoT-Based Solutions

Efficient water management is critical for climate adaptation in agriculture. Youth-driven innovations in smart irrigation, using sensors and the Internet of Things (IoT), are helping farmers optimize water usage. Israeli students have pioneered smart drip irrigation systems that adjust water flow based on soil moisture levels. These systems, integrated with mobile apps, help conserve water while improving crop yields in arid regions. Young agricultural entrepreneurs in Australia have developed sensor-equipped irrigation networks that automatically regulate water distribution based on real-time climate data, reducing water wastage and enhancing efficiency (Obaideen et al., 2022).

Policy Advocacy and International Collaborations

Youth activists have been instrumental in advocating for climate policies at national and international levels. Organizations and youth-led movements are:

- Participating in United Nations Climate Conferences (COP)
- Lobbying for sustainable policies in local governments

- Engaging in global networks to exchange best practices
- Educating peers on climate rights and responsibilities

Such advocacy efforts help bridge the gap between policymakers and grassroots communities, ensuring that climate adaptation remains a priority in governance structures.

Challenges and Opportunities

Despite their commitment, young climate leaders face significant obstacles in driving change. Limited access to funding and resources often hampers the scalability of their projects, as seen in African nations where youth-led renewable energy startups struggle due to inadequate financial support. Additionally, the lack of institutional support and mentorship prevents young activists from receiving guidance from environmental experts and policymakers. Socio-political barriers also pose challenges, particularly in coal-dependent economies like Poland, where industries and political groups resist clean energy transitions (Mudombu et al., 2011). However, opportunities arise with increasing global attention to youth-led climate movements, as media coverage amplifies their efforts and fosters partnerships. Funding from international organizations, such as the Green Climate Fund (GCF) and UNEP, provides crucial financial backing for youth-driven sustainability projects (Sloan Morgan et al., 2024). Governments are also engaging with young leaders to co-develop climate adaptation policies, exemplified by the Netherlands' collaboration with youth activists on flood management and coastal resilience (Jones et al., 2024). Moreover, initiatives like UN Youth Climate Grants support youth-led startups focused on renewable energy and conservation, ensuring financial sustainability and strengthening climate adaptation efforts.

Conclusion

Youth-led climate adaptation strategies are crucial in creating resilient communities and mitigating the adverse effects of climate change. By harnessing technology, advocating for policies, and engaging local communities, young individuals are shaping a sustainable future. To enhance their impact, greater investment in youth-driven climate solutions and policy integration is necessary. Empowering young leaders today will ensure a climate-resilient world for future generations. By adopting a proactive stance and making conscious, eco-friendly choices, ordinary citizens can collectively catalyze meaningful change and contribute to a sustainable tomorrow.

References

- [1] Bolan, S., Padhye, L. P., Jasemizad, T., Govarthan, M., Karmegam, N., Wijesekara, H., & Bolan, N. (2024). Impacts of climate change on the fate of contaminants through extreme weather events. *Science of The Total Environment*, 909, 168388. <https://doi.org/10.1016/j.scitotenv.2023.168388>

- [2] Forster, P. M., Smith, C., Walsh, T., Lamb, W. F., Lamboll, R., Hall, B., & Zhai, P. (2024). Indicators of Global Climate Change 2023: annual update of key indicators of the state of the climate system and human influence. *Earth System Science Data*, 16(6), 2625-2658. <https://doi.org/10.5194/essd-16-2625-2024>
- [3] Miner, K. R., Turetsky, M. R., Malina, E., Bartsch, A., Tamminen, J., McGuire, A. D., & Miller, C. E. (2022). Permafrost carbon emissions in a changing Arctic. *Nature Reviews Earth & Environment*, 3(1), 55-67. <https://doi.org/10.1038/s43017-021-00230-3>
- [4] Lee, H., Calvin, K., Dasgupta, D., Krinner, G., Mukherji, A., Thorne, P., & Park, Y. (2023). IPCC, 2023: Climate Change 2023: Synthesis Report, Summary for Policymakers. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland.
- [5] Soler-i-Martí, R., Fernández-Planells, A., & Pérez-Altamir, L. (2024). Bringing the future into the present: The notion of emergency in the youth climate movement. *Social Movement Studies*, 23(4), 517-536. <https://doi.org/10.1080/14742837.2022.2123312>
- [6] Rooney-Varga, J. N., Brisk, A. A., Adams, E., Shulman, M., & Rath, K. (2014). Student media production to meet challenges in climate change science education. *Journal of Geoscience Education*, 62(4), 598-608. <https://doi.org/10.5408/13-050.1>
- [7] Pickering, J., Hickmann, T., Bäckstrand, K., Kalfagianni, A., Bloomfield, M., Mert, A., & Lo, A. Y. (2022). Democratising sustainability transformations: Assessing the transformative potential of democratic practices in environmental governance. *Earth System Governance*, 11, 100131. <https://doi.org/10.1016/j.esg.2021.100131>
- [8] Finkbeiner, F. (2013). Plant-for-the-Planet: A Worldwide Children's and Youth Movement. In *Sustainable Entrepreneurship: Business Success through Sustainability* (pp. 251-256). Berlin, Heidelberg: Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-642-38753-1_17
- [9] Aboorva, T., & Mani, R. (2024). Contribution of Environmentalists in Preserving Global Environment. *Quing: International Journal of Multidisciplinary Scientific Research and Development*, 3(2), 8-25. <https://doi.org/10.54368/qjmsrd.3.2.0002>
- [10] Renkl, M. (2018). More Trees, Happier People. *International New York Times*, NA-NA.
- [11] Choudhary, S. K., Kumar, R., & Kumar, A. (2023). General overview of Zero budget natural farming (ZBNF). *Agricultural Reviews*, 44(3), 328-335. <https://doi.org/10.18805/ag.R-2186>
- [12] Kumar, N., Liu, X., Narayanasamydamodaran, S., & Pandey, K. K. (2021). A systematic review comparing urban flood management practices in India to China's

- sponge city program. *Sustainability*, 13(11), 6346. <https://doi.org/10.3390/su13116346>
- [13] Ayers, J., & Forsyth, T. (2009). Community-based adaptation to climate change. *Environment: science and policy for sustainable development*, 51(4), 22-31. <https://doi.org/10.3200/ENV.51.4.22-31>
- [14] Dewitte, S., Cornelis, J. P., Müller, R., & Munteanu, A. (2021). Artificial intelligence revolutionises weather forecast, climate monitoring and decadal prediction. *Remote Sensing*, 13(16), 3209. <https://doi.org/10.3390/rs13163209>
- [15] Selvam, A. P., & Al-Humairi, S. N. S. (2025). Environmental impact evaluation using smart real-time weather monitoring systems: a systematic review. *Innovative Infrastructure Solutions*, 10(1), 1-24. <https://doi.org/10.1007/s41062-024-01817-7>
- [16] Kallis, G., Stephanides, P., Bailey, E., Devine-Wright, P., Chalvatzis, K., & Bailey, I. (2021). The challenges of engaging island communities: Lessons on renewable energy from a review of 17 case studies. *Energy Research & Social Science*, 81, 102257. <https://doi.org/10.1016/j.erss.2021.102257>
- [17] Obaideen, K., Yousef, B. A., AlMallahi, M. N., Tan, Y. C., Mahmoud, M., Jaber, H., & Ramadan, M. (2022). An overview of smart irrigation systems using IoT. *Energy Nexus*, 7, 100124. <https://doi.org/10.1016/j.nexus.2022.100124>
- [18] Sloan Morgan, O., Melchior, F., Thomas, K., & McNab-Coombs, L. (2024). Youth and climate justice: Representations of young people in action for sustainable futures. *The Geographical Journal*, 190(1), e12547. <https://doi.org/10.1111/geoj.12547>
- [19] Trott, C. D. (2025). Rewriting the climate story with young climate justice activists. *Geographical Research*, 63(1), 134-152. <https://doi.org/10.1111/1745-5871.12662>
- [20] Jones, L., Parsons, K. J., Halstead, F., & Wolstenholme, J. M. (2024). Reimagining activism to save the planet: Using transdisciplinary and participatory methodologies to support collective youth action. *Children & Society*, 38(3), 823-838. <https://doi.org/10.1111/chso.12819>
- [21] Ngcamu, B. S. (2023). Climate change effects on vulnerable populations in the Global South: a systematic review. *Natural Hazards*, 118(2), 977-991. <https://doi.org/10.1007/s11069-023-06070-2>
- [22] Baldwin, C., Pickering, G., & Dale, G. (2023). Knowledge and self-efficacy of youth to take action on climate change. *Environmental Education Research*, 29(11), 1597-1616. <https://doi.org/10.1080/13504622.2022.2121381>
- [23] Cloughton, I. (2021). Global youth activism on climate change. *Social Work & Policy Studies: Social Justice, Practice and Theory*, 4(1).
- [24] Mudombi, S., Nzeyimana, E., & Weisheit, A. (2011). A youth perspective on climate change opportunities and challenges for climate resilient development. *Young*

Professionals' Platform for Agricultural Research for Development (YPARD–Africa), 2-11.



HOW TO CITE

Nandini Bali (2025). Climate Adaptation Strategies: Youth-Led Community Initiatives. Ed. by Dr. Monita Dhiman in “Youth Voices for a Sustainable Future” (pp. 138-146). Vyom Hans Publications.

DOI: <https://doi.org/10.5281/zenodo.15520562>

ISBN: 978-81-970890-9-1

CHAPTER-17

THE FUTURE WE WANT: VISIONARY IDEAS FROM THE NEXT GENERATION

Ms. Yuvika Khanna

Khalsa College for Women,
Civil Lines, Ludhiana, Punjab, 141002

Email ID: yuvikakhanna04@gmail.com

ORCiD ID: 0009-0002-4060-8347

Abstract

Innovative ideas from the next generation on shaping the future are explored by this paper. Significant potential in addressing global challenges such as climate change, technological ethics, education, international cooperation, and political engagement is held by the youth of today. Sustainable policies, digital advancements, and governance are influenced by their forward-thinking perspectives, providing a roadmap for transformative change. Movements that aim to redefine societal norms are being pioneered by young people with increased access to technology and information. A shift toward a more inclusive and conscious future is indicated by their advocacy efforts in sustainability, AI ethics, and peace building. Academic literature, case studies, and real-world examples are delved into by this review to assess the impact of youth-led initiatives on global progress. Leadership is fostered, technology is integrated into education, and ethical decision-making is promoted by the younger generation, resulting in industries and governance models being reshaped. As future leaders, it is expected that their contributions will be instrumental in ensuring a more equitable, innovative, and sustainable world. Key themes are highlighted and scholarly perspectives on the transformative potential of the next generation's visionary ideas are provided by this paper.

Key Words: Visionary, Z-Generation, Global Challenges

Introduction

The future is shaped by it today by those who envision. As unprecedented challenges are faced by the world, fresh perspectives and innovative solutions are offered by the next generation. Blueprints for a better world are served by their

ideas, centered on sustainability, technology, education, cooperation, and leadership. Key themes that define their vision are reviewed by this paper.

Sustainable policies, renewable energy, and eco-friendly innovations are advocated for by young activists. Commitment to reducing carbon footprints and promoting conservation is demonstrated by their initiatives, such as climate strikes and environmental startups. It has been shown by research that policy changes and corporate sustainability initiatives have been influenced by youth-driven environmental movements. Global recognition has been gained by organizations like Fridays for Future, which are led by young climate advocates, and millions have been mobilized to demand climate action. The significance of integrating sustainability into education to foster long-term environmental awareness is also highlighted by studies (Stanczyk, 2022; Yousuf & Zehra, 2024; Marquardt et al., 2024). The power of youth activism in shaping climate policy is increasingly being acknowledged by governments and businesses. The role of youth-led innovation in green technology, such as biodegradable materials and carbon capture methods, is also being gained traction. Sustainable alternatives are being developed by young entrepreneurs that help reduce environmental harm while promoting economic growth. It is ensured by their involvement in policy advocacy that sustainability remains a priority in governance (Saliba, 2024). Additionally, the impact of youth participation in climate-focused global summits has been amplified. The long-term effectiveness of youth-led climate policies and their integration into mainstream governance should be explored by future research to create lasting environmental change.

Industries are being transformed by emerging technologies, particularly artificial intelligence (AI), with the importance of ethical development being stressed by youth innovators. A balance between progress and privacy concerns is advocated for by them, with challenges such as algorithmic biases and data security being addressed. The growing role of young people in AI ethics, digital rights advocacy, and ensuring responsible AI deployment is highlighted by studies. Individuals are being equipped with the knowledge needed to navigate AI's ethical implications by youth-led initiatives like AI For Good and digital literacy programs (Isoieva et al., 2024; Kinnula et al., 2024)), helping to promote a safer, more equitable technological landscape.

The way is also being led by young entrepreneurs in the development of AI solutions for social good, such as AI-driven medical diagnostics targeting underserved communities. Policymakers are increasingly being urged to include youth voices in AI regulatory discussions to ensure equitable progress is served by the technology. The need for inclusive AI governance is highlighted by research, where the contributions of young technologists are considered crucial in addressing the risks associated with AI. A future where AI is used ethically and responsibly is shaped by their involvement, fostering innovation while privacy and digital rights are safeguarded.

Education Reforms for the Future Redesigning

Critical thinking, digital literacy, and vocational skills must be integrated into education for the next generation. Personalized learning and technology-driven education are being advocated for by students. It is shown by research that engagement and knowledge retention are boosted by student-led curriculum changes. Traditional education models are being evolved, with experiential, skills-based methodologies being pushed for by youth. Education is being reshaped by digital platforms, gamified learning, and adaptive curricula to meet modern demands (Kem, 2022; Kokkinos, 2024). Furthermore, mental health education and inclusivity in curricula are being lobbied for by youth organizations, with the importance of holistic development being recognized and education being ensured to align with future workforce needs. The integration of AI and virtual reality in classrooms, driven by young innovators, is resulting in immersive and interactive learning environments (Worsley et al., 2022). Collaboration with students in co-creating curricula that align with future workforce needs is being urged by policymakers and educators. It is highlighted by research that more dynamic and effective learning outcomes are led to by student involvement in education policy. The forefront of educational reform is increasingly occupied by youth, with the importance of a modern, student-centered approach that combines technology, experiential learning, and skills development being emphasized. An education system better equipped for future challenges is promised to be shaped by their involvement. Youth participation in global diplomacy and conflict resolution is being grown. Through activism and social media, dialogue and cultural understanding are being fostered by young people. The impact of youth-led peace initiatives on global harmony is highlighted by literature, with peaceful conflict resolutions and humanitarian efforts being advocated for by young leaders. Cross-border collaborations are facilitated by organizations like Global Peacebuilders Initiative, demonstrating the power of youth in conflict resolution (Breed et al., 2024; Sommer and Fassbender, 2024). Misinformation is being countered and factual narratives are being promoted by young activists, with significant contributions being made to global peace. It is suggested by research that involving youth in diplomatic negotiations leads to more sustainable peace agreements. Grassroots peacebuilding initiatives are also being engaged in by many young people, with local tensions being addressed and community-based efforts being fostered. The importance of integrating youth voices into international relations and diplomacy is emphasized by their influence in peace efforts. Global peace initiatives are being driven by young people, with a key role being played in shaping the future of international cooperation. A tangible difference is being made by their use of digital platforms and collaborative efforts on the ground, with the capacity of the next generation to lead in conflict resolution and peacebuilding being showcased. Leadership in politics is being reshaped by youth, with social justice, human rights, and policy reforms being pushed for by young advocates. It is shown by studies that governance and grassroots movements are being increasingly influenced by youth. Social media is leveraged

by many young individuals to amplify their voices and mobilize communities, with legislative changes being driven in areas such as climate activism and racial justice. It is confirmed by research that policy reforms are being influenced by youth-led political organizations, proving that governance is being actively participated in by the younger generation (Acharya, 2024; Marah et al., 2024). A shift toward a more inclusive political landscape is marked by this.

The political landscape is being changed by the rise of young politicians worldwide, with an emphasis on diversity and inclusion. More platforms for youth representation in policymaking are being urged to be created by governments, ensuring that national and international decisions are contributed to by their perspectives. A long-term transformation toward more inclusive governance structures is signaled by the growing engagement of young leaders in civic activities. Their significant role in shaping political discourse and ensuring that the needs and values of the next generation are reflected in future policies is demonstrated by their advocacy for systemic change, from climate policy to social justice.

Youth as Catalysts for Social and Political Change

Powerful catalysts for social and political change are seen in youth, with movements being driven that challenge existing systems and advocate for justice and equity. From climate activism to gender equality, legislative reforms are being pushed for by young leaders that reflect the values of the next generation. Communities are mobilized, voices amplified, and awareness raised on critical issues by youth leveraging digital platforms and social media. Policy decisions are influenced by youth-led organizations, with inclusion and sustainability being demanded. Political discourse is being reshaped by their leadership, ensuring that marginalized voices are heard. A more just and inclusive future is being built by youth as essential participants in governance.

Collaborating for a More Inclusive Future: Youth and Policymakers

Collaboration between youth and policymakers is considered key to building a more inclusive future. Fresh perspectives, innovation, and a strong commitment to social justice are brought by young people, making their involvement in policymaking regarded as crucial. By engaging in dialogue with policymakers, policies can be shaped by youth that reflect the needs and aspirations of future generations. The power of this collaboration is demonstrated by youth-led movements advocating for climate action, racial equality, and digital rights. When youth are included in decision-making processes by policymakers (Marah et al., 2024), it is ensured that policies are more inclusive, sustainable, and forward-thinking, paving the way for a more equitable and just society for all.

Empowering Youth for Future-Ready Education Systems

Participation by youth in global diplomacy and peacebuilding is becoming increasingly influential. Dialogue, cultural understanding, and peaceful conflict resolution are being promoted by young leaders through activism and social

media. Digital platforms are being used by them to combat misinformation, advocate for peace, and facilitate cross-border collaborations, like those led by the Global Peacebuilders Initiative. Involvement by youth in diplomatic efforts is transforming peacebuilding approaches, ensuring that peace agreements are made more inclusive and sustainable (Javed, 2025). As active participants in global discussions, the potential of the next generation to reshape international relations is being demonstrated by young leaders, fostering long-lasting peace and promoting a more collaborative global future.

The Role of Youth in Shaping AI Ethics and Governance

The ethical framework of artificial intelligence (AI) is shaped by the next generation, which is crucial. AI systems that are innovative yet ethical are focused on developing by youth-driven initiatives, with privacy, security, and fairness prioritized. Discussions on AI's societal impact are being led by young technologists, activists, and advocates, with issues like algorithmic biases and ethical usage being addressed. Inclusive, transparent AI governance frameworks are pushed for, and youth representation in policy decisions is advocated for. An equitable AI landscape that respects digital rights and ensures that AI technology aligns with broader societal goals is created by these efforts, benefiting society without compromising human rights (Kinnula et al., 2024).

Conclusion

The next generation is playing an instrumental role in shaping the future of our world, driving change across various sectors including education, technology, governance, and social justice. By advocating for sustainable policies, ethical AI, and inclusive education systems, youth are challenging outdated frameworks and pushing for innovation that aligns with the values of equity, fairness, and sustainability. Their influence is reshaping industries, transforming governance, and inspiring new models of global cooperation. Through activism, technological advancements, and leadership in global diplomacy, young people are redefining the future of politics, conflict resolution, and societal norms.

Youth-driven movements, such as those advocating for climate action, racial equality, and digital rights, demonstrate the power of collective action in pushing for systemic change. Their involvement in policymaking ensures that future laws and regulations reflect the needs and aspirations of younger generations, ensuring a more inclusive and just world. Additionally, youth participation in the development of AI ethics and governance frameworks is crucial in addressing challenges like algorithmic biases and data security, ensuring that technological advancements benefit society as a whole while safeguarding human rights.

As active participants in global discussions, youth are proving that their contributions are essential for creating a future that is equitable, innovative, and sustainable. The role of the next generation in shaping the world cannot be overstated, as their ideas, leadership, and commitment to positive change will determine the direction of future progress across the globe.

References

- [1] Stanczyk, A. (2022). Getting to COP27: bridging generational divide. *Development (Society for International Development)*, 65(1), 42. <https://doi.org/10.1057/s41301-022-00335-2>
- [2] Yousuf, R., & Zehra, A. (2024). Empowering sustainability: bridging science, community, and youth for a brighter future. *Bulletin of the National Research Centre*, 48(1), 116. <https://doi.org/10.1186/s42269-024-01269-0>
- [3] Marquardt, J., Lövbrand, E., & Buhre, F. (2024). The politics of youth representation at climate change conferences: who speaks, who is spoken of, and who listens?. *Global Environmental Politics*, 24(2), 19-45. https://doi.org/10.1162/glep_a_00736
- [4] Saliba, C. (2024). Green guidance: enhancing the role of career guidance in Maltese state secondary schools (Master's thesis, University of Malta).
- [5] Isoieva, M., Marchenko, O., Diedkov, M., Lobanchuk, O., & Khrypko, S. (2024). Threats and Benefits of AI in the context of targeting SDGs: A Youth Perception Approach. *European Journal of Sustainable Development*, 13(2), 173-173. <https://doi.org/10.14207/ejsd.2024.v13n2p173>
- [6] Kinnula, M., Gazulla, E. D., Hirvonen, N., Malmberg, J., & Haukipuro, L. (2024). Nurturing systems thinking among young people by developing business ideas on sustainable AI. *International Journal of Child-Computer Interaction*, 40, 100656. <https://doi.org/10.1016/j.ijcci.2024.100656>
- [7] Kem, D. (2022). Personalised and adaptive learning: Emerging learning platforms in the era of digital and smart learning. *International Journal of Social Science and Human Research*, 5(2), 385-391.
- [8] Kokkinos, L. (2024). Revolutionizing education: The dynamic intersection of technology and learning. *Educational Research (IJMCER)*, 6(1), 26-32.
- [9] Worsley, J. D., Pennington, A., & Corcoran, R. (2022). Supporting mental health and wellbeing of university and college students: A systematic review of review-level evidence of interventions. *PLoS one*, 17(7), e0266725. <https://doi.org/10.1371/journal.pone.0266725>
- [10] Breed, A., Marambio, H. U., Pells, K., & Timalisina, R. (Eds.). (2024). *Children, Youth, and Participatory Arts for Peacebuilding: Lessons from Kyrgyzstan, Rwanda, Indonesia, and Nepal*. Taylor & Francis. <https://doi.org/10.4324/9781003230038>
- [11] Sommer, U., & Fassbender, F. (2024). Environmental Peacebuilding: Moving beyond resolving Violence-Ridden conflicts to sustaining peace. *World Development*, 178, 106555. <https://doi.org/10.1016/j.worlddev.2024.106555>
- [12] Acharya, A. (2024). Influence of Youth Engagement on Nepal's Political Evolution: An Analysis of Emerging Youth-Led Movements. *Interdisciplinary Journal of*

Management and Social Sciences, 5(2), 1-13.
<https://doi.org/10.3126/ijmss.v5i2.69438>

- [13] Marah, T. S., Pradhan, H. D., & Shuhood, F. A. (2024). YOUTH PARTICIPATION IN GLOBAL GOVERNANCE: OPPORTUNITIES AND CHALLENGES: OPPORTUNITIES AND CHALLENGES. *Journal of Governance and Public Administration*, 2(1), 238-249.
<https://doi.org/10.70248/jogapa.v2i1.1718>
- [14] Javed, F. (2025). Preparing for Tomorrow: Evaluating and Innovating Educational Systems for Future Competence. In *Fostering Teacher Skills and Critical Thinking in Modern Education* (pp. 43-78). IGI Global Scientific Publishing.
<https://doi.org/10.4018/979-8-3373-1692-5.ch003>



HOW TO CITE

Yuvika Khanna (2025). The Future We Want: Visionary Ideas from the Next Generation. Ed. by Dr. Monita Dhiman in “Youth Voices for a Sustainable Future” (pp. 147-153). Vyom Hans Publications.

DOI: <https://doi.org/10.5281/zenodo.15528325>

ISBN: 978-81-970890-9-1



Dr. Monita Dhiman M. Sc. (Hons), PhD. Zoology is an academican, a teacher and a visionary, gifted with an optimistic demeanor. She has completed her Post-graduation from Panjab University Chandigarh and Doctorate from Punjabi University Patiala. Her area of Specialization and Interests includes Biodiversity, Environment, Fishery Science and Aquaculture, Leadership, Education, Youth.

She has 12 years of experience in teaching Undergraduate classes. She has published 06 research paper and seven chapters in book of National and International repute. As a learner, she has completed 8 courses from NPTEL. She presented her research work as papers and posters in various National and International Conferences/seminars. She has also edited two books. She has attended 9 Workshops, one capacity Building Programme and an International Short term Training Programme. She also has Co-ordinated various workshops and events organized by Panjab University and Khalsa College for Women.

She is not only excelling in her academic arena but is also equally steadfast and responsive towards environment and society. As an in-charge of youth club of the college, she endeavors to engage the youth for positive environmental changes. She has experience in coordinating a 4 day Workshop on 'Employability Skills through Life Skills Approaches' and delivered a talk on the topic 'Positive Attitude'. Previously, she acted as Teacher In-charge for the YLC-2018 and Administrative Officer for the YLC-2019 organized by Department of youth Welfare, Panjab University, Chandigarh. She coordinated 7 days online Youth Training Workshop on 'Personality Development'. Further, she served as organizing secretary in online YLC-2021.

She is an epitome of kindness, hardwork and solidarity, an active researcher and always ready to serve towards the escalation of society, in particular and Nation, at large.

Rs. 450/-

VYOM HANS PUBLICATIONS

967/EH1, Industrial Area, DeraBassi,

PIN-140507, Pb, India.

Mob: +91 9781711925

