

Fostering Youth-led Innovations to Accelerate Progress on the United Nations Sustainable Development Goals:

A GUIDE FOR POLICY MAKERS

PRESENTING ORGANIZATIONS



Ecolnnovation Network



Center for Sustainable Development
EARTH INSTITUTE | COLUMBIA UNIVERSITY



UNIVERSITY OF WATERLOO | FACULTY OF ENVIRONMENT



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Foreword

In today's world, to address the most pressing global challenges, education must equip all learners with the values, skills, and knowledge that nurture cooperation, resilience, respect for diversity, gender justice, and human rights. This concept is called Global Citizenship Education which is a target of the Sustainable Development Goal 4 – Quality Education.

I commend the Mission 4.7 initiative facilitated by Columbia University's Center for Sustainable Development, UNESCO, UN SDSN and the Ban Ki-moon Centre for Global Citizens, for playing a pivotal role in addressing SDG Target 4.7 and on the release of the "Fostering Youth-led Innovations to Accelerate Progress on the United Nations Sustainable Development Goals: A Guide for Policy-makers at COP28."

The report recommends that policymakers create supportive

In today's world, to address the most pressing global challenges, education must equip all learners with the values, skills, and knowledge that nurture cooperation, resilience, respect for diversity, gender justice, and human rights. This concept is called Global Citizenship Education which is a target of the Sustainable Development Goal 4 – Quality Education.

H.E. Ban Ki-moon
8 th Secretary-General,
United Nations
Co-chair, Mission 4.7
Co-chair, Ban Ki-moon Centre
for Global Citizens



environments for youth innovators by establishing or opening innovation hubs, incubators, and accelerators for young individuals. A key element is the renewed emphasis on integrating global citizenship and systems thinking into school curricula to foster sustainable development. Global Citizenship Education and youth empowerment is essential for a better future, I hope that this report contributes to shaping the agenda on SDG Target 4.7 at COP28 and beyond.

H.E. Ban Ki-moon
8th Secretary-General, United Nations
Co-chair, Mission 4.7
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Foreword: Voices of Youth

Vidya Bindal, a sophomore at Millburn High School in NJ, USA said “Eco innovation, to me, means implementing sustainable solutions to everyday challenges. Education, especially in the field of scientific research, plays a crucial role in promoting global sustainability. Whether it’s businesses addressing climate issues or individuals making environmentally friendly choices like biking instead of driving, every action counts. Schools should prioritize foundational learning, encompassing not only literacy and numeracy but also social, emotional, and mental skills. It is crucial to incorporate green learning into every subject and allocate time for mental health matters. Continuous curricula focused on climate change and sustainability shape students’ perspectives and foster a values-based approach towards the Earth.”

Eshaan Jain, a junior at the Pingry School in New Jersey, USA noted “As a participant in Columbia University’s Eco-Ambassador program, I have developed a passion for the Sustainable Development Goals (SDGs) and local environmental issues, with a focus on reducing plastic pollution and preserving our oceans. Participating in the Eco-Ambassador program has connected me with inspiring mentors and global leaders. I attended workshops and engaged with students worldwide, motivating me to drive positive change. These initiatives demonstrate the power of youth-led action in advancing the SDGs and creating a more sustainable future.”



H.E. Ban Ki-moon



Shriya Iyer, Grade 9 (aged 14 years) at Millburn High School, New Jersey, USA said “It was an honor to be a part of the Eco Ambassador workshop at Columbia University on September 17, 2023. Discussing the regional problems with people from all over the world during the event was truly eye-opening. Our conversations brought to light the issues people of different backgrounds face. Whether it be education, or the changing environment, facing these core problems with a different perspective generated ideas we certainly wouldn’t have thought of alone.”

Eshan Akula, Grade 10 (aged 15 years) at Millburn High School, New Jersey, USA noted “Eco-initiatives, in my opinion, help responsibly manage our planet’s resources. They represent a concerted effort to reduce the negative consequences of climate change, conserve biodiversity, and promote sustainability to assure the well-being of future generations. These projects cover a wide range of activities, from carbon footprint reduction to campaigning for policies that promote environmental conservation. Eco-initiatives are a call to action, a reminder of our obligation to protect the world around us.”

Suvid Bordia, Grade 8 (aged 13 years) at Newark Academy, New Jersey said “I was in a group that consisted of people from very diverse backgrounds, from a Canadian immigrant of Kenya to students of Andhra Pradesh, India. We spoke ardently about how various countries’ climate situations and capabilities differ, whether it is due to economic, political, or other reasons. All of our group members gave specific examples they had experienced in their communities, and we made some discoveries. The workshop hosted by Columbia University was truly a great experience and I was able to gather so much knowledge about our environment and eco-innovation.”

Aaryan Jain, Grade 10 (aged 15 years) at Millburn High School, New Jersey, USA noted “Attending the ‘Educating a Child’ event at Columbia University was an enriching experience for me, helping me better understand the motives and needs of other communities around the world. I had the privilege to talk with a group of amazing students from South India and discuss how we could address sustainability globally. It was enlightening to talk and learn about students from other parts of the world, who face many of the same challenges, but who experience them in different circumstances and deal with them in different ways. They helped me understand that for a sustainable future, we must acknowledge the common ground we share with each other and prioritize solutions that serve us all.”

All of our group members gave specific examples they had experienced in their communities, and we made some discoveries.

Suvid Bordia

Grade 8 (aged 13 years) at Newark Academy, New Jersey



I. Executive Summary

A. Overview

This guide includes case studies and insights from experts around the world, highlighting the important role of youth in driving sustainable development, climate action, and innovation. It provides recommendations for policymakers and leaders in sustainability to support and expand on youth-led innovations. The guide emphasizes the need for sustainability education to empower young entrepreneurs as global citizens to address climate change and the United Nations Sustainable Development Goals (SDGs) through transformative approaches. While the authors provide globally transferable insights, the Guide emphasizes the North American context. Its aim to draw global attention to youth-led innovations as a keystone element of current and future climate policy planning, encouraging investment and promotion of these innovations. Policymakers are urged to use this guide for targeted programs, funding priorities, and partnerships that align with Agenda 2030 challenges, especially in anticipation of COP 28.

B. Key Findings

The Guide arose from the webinar series 'Fostering Youth-Led Innovation for the SDG' co-led by the University of Waterloo and Columbia University and highlights the following insights:

- Youth play a critical role in driving sustainable development, climate action, and innovation.
- They are not just beneficiaries, but also essential stakeholders and change agents in achieving the SDGs.
- Young people, up to 24 years old, comprise some 40% of the population and possess the creativity and energy needed for transformative solutions.
- Youth-led innovations are currently under-resourced and overlooked, despite the unique talents, creativity, and entrepreneurial spirit that young people possess.
- Six pathways where youth-led innovations can advance the SDGs were identified: integrating Education for Sustainable Development (ESD) in higher education institutions; empowering youth through designing curricula on climate justice; improving climate communication strategies; fostering mindfulness and engagement; promoting global citizenship in carbon capture, use, and storage (CCUS) and new carbon economy, and harnessing ethics in action through community-based organizations and NGOs.
- Policymakers should enhance education and awareness about sustainability issues by integrating topics such as global citizenship and systems thinking as mandatory within school curricula.

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- Policymakers should create enabling environments for youth innovators by establishing innovation hubs, incubators, and accelerators and extending programmatic support including funding, mentoring, and connections.
- Policymakers should promote mentorship initiatives that connect young innovators with experienced advisors and professionals.
- Progress towards the SDGs in North American countries varies; Canada has made strides in Quality Education (SDG 4) and Clean Water and Sanitation (SDG 6), the United States faces challenges in No Poverty (SDG 1) and Reduced Inequalities (SDG 10), and Mexico has made progress in Affordable and Clean Energy (SDG 7) and Industry, Innovation, and Infrastructure (SDG 9).
- Youth engagement in SDG innovation is an untapped opportunity across North America, and their voices should be heard and their educational needs met to enable their full contribution to society.
- International frameworks, like UNESCO's Operational Strategy on Youth (OSY) and UNICEF's Generation Unlimited initiative, emphasize engaging youth as leaders, fostering their skills, including them in decision-making, and empowering them to contribute to sustainable development.
- The paper showcases a case study of Vidya Bindal, a sophomore at Millburn High School in New Jersey, USA, who emphasizes the importance of foundational learning encompassing social, emotional, and mental skills along with literacy and numeracy. She also highlights the need for financial support from international companies to drive meaningful change.

C. Recommendations for Policymakers on Fostering Youth-led Innovations

The recommendations for policymakers seek to materially advance youth-led innovations and their uptake to deliver on the SDGs given the fierce urgency of the crises facing the world. Central to these is a **renewed focus on enhancing education and awareness about sustainability** issues by integrating topics such as global citizenship and systems thinking as mandatory within school curricula. This relies on active collaboration between educators and students to develop learning resources and design educational experiences that have the power to transform. Policymakers can also support training programs and workshops outside of formal classrooms to help build skills and competencies for sustainability innovation.

Policymakers are urged to focus on creating enabling environments for youth innovators by **establishing and/or opening up existing innovation hubs, incubators, and accelerators to young people**. These assets represent an innovation ecosystem often closed to youth. By extending the provision of programmatic support,

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including funding, mentoring, and connections, to help bring youth ideas to life, an innovation pipeline is by proxy, extended to the next generation. Policymakers can also ensure young innovators have access to appropriate funding streams and impact investors who understand the unique needs of sustainability ventures. Encouraging partnerships between youth and established organizations can offer valuable opportunities to scale innovations.

Additionally, there remains a growing need for policymakers to initiate and strengthen partnerships with the private sector actors, connecting youth-led innovations with key players, including established businesses, industries, and technology giants. The results will help to foster co-innovation and scale their solutions effectively. This could also serve as a way to establish cross-sectoral collaborations, where young innovators can gain insights from fields outside their immediate expertise, leading to holistic and interdisciplinary innovations. With the rising emphasis on sustainability, policymakers should specifically promote green innovation hubs specifically designed to support youth-led solutions addressing environmental challenges.

Lastly, policymakers should **promote mentorship initiatives** that connect young innovators with experienced advisors and professionals across established businesses, industries, government, and civil society organizations. This facilitates both capacity and capability building as well as the transfer of knowledge across generations and cross-fertilization of ideas among the various stakeholders. While the resources to support youth leadership may exist, the fear of failure often impedes them from action. Mentorship programs should be inclusive and diverse in the subject matter experts they recruit to ensure that they are able to advise youth of all backgrounds and foster leadership mindsets in an inclusive manner.

Together, these **three actionable recommendations** have the potential to drive up youth innovation in terms of scale, reach, and impact.

II. Introduction

A. Current status of the United Nations Sustainable Development Goals (SDGs).

As of 2023, progress towards the SDGs in North American countries varies.

In **Canada**, there is commitment to the SDGs, but progress is uneven. The country has made strides in Quality Education (SDG 4) and Clean Water and Sanitation (SDG 6) (Government of Canada, 2020). However, challenges persist in Reduced Inequalities (SDG 10) and Climate Action (SDG 13), especially for Indigenous communities (Statistics Canada, 2021). The federal government acknowledges the importance of youth engagement but there is a gap between value and action. More structured and inclusive platforms are

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needed for young people to contribute effectively (Government of Canada, 2020).

The **United States** faces challenges in No Poverty (SDG 1) and Reduced Inequalities (SDG 10), with significant disparities in income and wealth distribution (United Nations, 2020). Climate Action (SDG 13) is a contentious issue with varying levels of commitment across political administrations. Youth play a significant role in environmental and social justice movements, such as the 'kids climate trial' in Montana. However, grassroots efforts lack comprehensive support and recognition, limiting their impact (United Nations, 2020).

Mexico has made progress in Affordable and Clean Energy (SDG 7) and Industry, Innovation, and Infrastructure (SDG 9) (INEGI, 2021). However, it struggles with No Poverty (SDG 1) and Zero Hunger (SDG 2), particularly in rural areas and among Indigenous populations (OECD, 2020). Youth involvement in environmental conservation and climate action is commendable, but equal opportunities are lacking, especially for marginalized communities (INEGI, 2021). These national-level descriptions highlight the complexity of SDG implementation and the need for tailored strategies. Youth engagement in SDG innovation is an untapped opportunity across North America.

Not achieving the global goals will have a deep impact, especially on vulnerable populations and young people¹. Therefore, meaningful outreach mechanisms are needed to empower and support youth inclusively. Their voices should be heard and their educational needs met to enable their full contribution to society. Strengthening intergenerational bonds and dialogues is crucial for shared learning and youth influence in line with Agenda 2030.

B. Opportunities and International Frameworks for Fostering the Role of Youth in Sustainable Development

The role of youth in sustainable development is crucial for achieving the United Nations Sustainable Development Goals (SDGs). Young people bring fresh perspectives, innovative solutions, and dynamic energy to drive sustainable development. International frameworks, like UNESCO's Operational Strategy on Youth (OSY), emphasize engaging youth as leaders, fostering their skills, including them in decision-making, and empowering them to contribute to sustainable development.

Similarly, UNICEF's Generation Unlimited (GenU), world's first Public-Private-Youth Partnership (PPYP), is on a mission to skill and connect the world's 1.8 billion youth to opportunities. This global partnership aims to skill and connect young people to opportunities

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¹ "Transforming our world: the 2030 Agenda for Sustainable Development". United Nations. Accessed 10th October, 2023. <https://sdgs.un.org/2030agenda>

This global partnership aims to skill and connect young people to opportunities for entrepreneurship, employment and social impact which contributes to SDGs 1, 4, 5, 8, 10, 14 and 17. To prepare youth for the world of work and active citizenship, GenU focuses on developing the skills and mindsets required for success and well-being. Once young people have the skills, GenU connects them to employment, entrepreneurship and social impact opportunities while removing barriers, providing resources, and empowering young people to innovate and lead in their communities. These frameworks lay the foundation for youth-led innovation, enabling youth to drive progress towards the SDGs and sustainable development.

C. The Potential of Youth-led Innovations in Accelerating Progress on the SDGs

To achieve the SDGs, innovative solutions must be prioritized globally. It is important to empower young people to contribute significantly to creating a world that leaves no one behind. This guide emphasizes that youth are not just beneficiaries, but are essential stakeholders and change agents in achieving the SDGs. Young people, up to 24 years old, makeup over 40% of the global population and possess the creativity and energy needed for transformative solutions. However, youth-led innovations are currently under-resourced and overlooked. Proper support can make young people catalysts in bridging ambitions with actions to address climate crises and the SDGs.

This guide advocates for leveraging the unique talents of young people and harnessing their entrepreneurial spirit to cultivate the next generation of sustainability leaders across various domains. It extends insights from a webinar series, focusing on six topics or pathways where youth-led innovations can advance the SDGs.

- **Pathway 1:** 'Integrating ESD in Higher Education Institutions to Foster Youth-led Innovations' focuses on the role of universities in integrating Education for Sustainable Development (ESD) to create an environment that encourages youth-led innovations for achieving the SDGs.
- **Pathway 2:** 'Empowering Youth through Designing Curricula on Climate Justice' explores the potential of engaging young people in designing curricula centered around climate justice, promoting the development of solutions for the SDGs.
- **Pathway 3:** 'Improving Climate Communication Strategies in Early-Career Settings' emphasizes the importance of effective climate communication strategies in professional settings, which can be leveraged by young professionals to advance the SDGs.
- **Pathway 4:** 'Fostering Mindfulness, Citizenship, and Engagement for SDG Impact' highlights the role of mindfulness, active citizenship, and engagement in fostering youth innovations contributing to the SDGs.

Youth-led innovations are currently under-resourced and overlooked. Proper support can make young people catalysts in bridging ambitions with actions to address climate crises and the SDGs.



- **Pathway 5:** 'Promoting Global Citizenship in Carbon Capture, Use, and Storage (CCUS) and the New Carbon Economy' delves into the role of global citizenship in CCUS and the new carbon economy, highlighting opportunities for youth to drive innovations for the SDGs.
- **Pathway 6:** 'Harnessing Ethics in Action: The Role of Community-based Organizations and NGOs in Advancing SDGs' explores how community-based non-governmental organizations are uniquely suited to drive ethical actions that support youth-led initiatives and innovations for achieving the SDGs.
- This guide highlights six pathways where youth-led innovations can make a difference, including education, climate justice, communication strategies, mindfulness, global citizenship, and ethical action through community-based organizations. However, it is essential to adequately resource and recognize these initiatives to fully harness their potential. By investing in young people's capacities and providing them with necessary support, we can ensure they become active catalysts in bridging ambitions with actions to address climate crises and achieve the SDGs. The younger generation's unique talents can be leveraged to cultivate them into sustainability leaders of tomorrow, which is crucial for the future of sustainable development.

III. Challenges and Opportunities in Youth-led Innovations

A. Current State of SDG Progress and Youth Involvement in Sustainability Initiatives

The United Nations emphasizes the enormous potential impact of the world's largest youth population, aged 10-24 years, which is nearly two billion people. By focusing on improving health, promoting sustainable development, and fostering shared prosperity, young people have the power to make a positive difference. Empowering youth through education, skills development, compassion, resilience, and a love for the Earth presents an incredible opportunity to transform the world for the better. The UN recognizes the importance of including the youth voice and has identified key roles for young people, supported by youth-led campaigns and resources.⁴⁵⁶

²"Youth and the SDGs" United Nations, Accessed 9th October 2023. <https://www.un.org/sustainabledevelopment/youth/>

³"Engaging Young People for Health and Sustainable Development" World Health Organization. Accessed Oct 9th 2023 <https://iris.who.int/bitstream/handle/10665/274368/9789241514576-eng.pdf>

⁴"Torch Bearers for the SDGs", United Nations, Accessed Oct 9th 2023 <https://www.un.org/youthenvoy/>

⁵"Young Leaders Sustainable Development Goals", United Nations, Accessed Oct 9th 2023 <https://www.un.org/youthenvoy/about-the-young-leaders-for-the-sdgs/>

⁶"Youth and the SDGs" United Nations, Accessed 9th October 2023. <https://www.un.org/sustainabledevelopment/youth/>

This guide highlights six pathways where youth-led innovations can make a difference, including education, climate justice, communication strategies, mindfulness, global citizenship, and ethical action through community-based organizations.



Youth play critical roles as thinkers, change-makers, innovators, communicators, and leaders in accelerating progress towards the Sustainable Development Goals (SDGs)⁷. Education, both formal and informal, is essential in enabling young talent to contribute to society. We need to prioritize youth involvement in community projects and incorporate SDGs into the curriculum to promote sustainable living. However, research shows that youth's knowledge of the SDGs is limited in several regions (Morley, 2020; Ismail, 2022).

B. Barriers to Youth-led Innovation

1. Limited Access to Resources and Funding

Students and learners worldwide are concerned about the state of the world and many are actively working towards a more inclusive and sustainable future. Several grassroots movements include young people in informal, charity, and non-governmental sectors, as well as environmental and climate action clubs in educational institutions. However, these groups often lack resources and funding, relying heavily on volunteer efforts. This limits their inclusivity and hinders their ability to fully engage in sustainability initiatives. Limited access to digital tools, professional advisors, and financial support prevents the full realization of the benefits of youth involvement in these initiatives.

2. Lack of Mentorship and Guidance

Young people have immense potential to drive change, but often lack effective mentorship. The transition from academic environments to real-world activism remains challenging and uncertain for many young leaders. Without proper guidance, the ability of youth to deliver on their full potential becomes threatened. Mentors can be found in various settings but may not provide the necessary guidance for becoming agents of change. Youth driving sustainable development efforts face challenges that can negatively impact their emotional well-being, so it is crucial to connect their individual concerns with collective action through targeted guidance and support. This is essential for ensuring their continued contribution and preventing burnout and eco-anxiety, especially given the mental health crisis among young people emerging from the COVID-19 pandemic.

3. Insufficient Education and Awareness on Sustainability Issues

Education for Sustainable Development (ESD) is a recognized field of study that is increasingly being incorporated into schools and higher education institutions. However, these efforts often occur outside of the formal curriculum and do not offer academic credits. As a result, only students who have the time and resources to engage in such learning experiences are able to participate.

Additionally, ESD is often seen as a classroom activity rather than an opportunity for community engagement or digital learning. This means that many young people may graduate from formal

The transition from academic environments to real-world activism remains challenging and uncertain for many young leaders.



⁷ "Youth and the SDGs" United Nations, Accessed 9th October 2023. <https://www.un.org/sustainabledevelopment/youth/>

education without a comprehensive understanding of climate issues or the sustainable development agenda. Building awareness is crucial, and ESD plays a vital role in creating this awareness. If ESD continues to be treated as an optional educational offering rather than an essential competency for all, sustainable development will remain on the fringes of societal and economic transformations necessary for a just transition.

4. Cultural and Societal Norms

Young leaders often face biases due to their age, with their efforts sometimes being perceived as naive or not well-informed. Overcoming such perceptions and proving their credibility can be an added challenge. In certain cultures or societies, young people may also be expected to follow traditional paths, and deviation towards activism or unconventional initiatives might not be well-received, thus adding to the pressure and challenges faced by young leaders.

C. Opportunities for Youth-led Innovations

Youth-led innovations can be grouped into three main areas: commercial/service, civic/political, and cultural/subcultural/ countercultural domains (Sebba et al., 2009). Youth have a significant impact on the economy, culture, and society, and they play a role in shaping the education system (Sebba et al., 2009). The top youth-led innovations selected at the United Nations #YouthLead Festival, World Economic Forum's #Generation Restoration Youth Challenge, Generation Unlimited's Global imaGen Ventures Youth Challenge included elements of community/networks, education, and technology. While technology is important in youth innovations, the best ideas address local issues and focus on resource-scarce settings (World Economic Forum, 2020)*. Access to broadband internet and cell phones has increased significantly over the past 20 years, providing youth with access to information and technology (World Economic Forum, 2020)*. Youth are concerned about climate change and are actively involved in environmental and climate activism (Hickman, Marks, Pihkala, Clayton, Lewandowski, Mayall, Wray, Mellor, Susteren, 2021)⁺. They are willing to contribute to climate action and sustainability. With the global youth population expected to increase, there is a critical need to embrace youth-led innovations for sustainability. Youth leadership presents significant opportunities to accelerate progress on the SDGs, as they have firsthand experiences and advocate for more inclusive and peaceful societies (UN ECOSOC).

IV. Youth Innovation-promoting Practices and Case Studies

A. Youth-led Innovation Initiatives around the World

1. Organization-led programs: Many private companies and other organizations engage with youth via short/mid/long-term programs.

Youth have a significant impact on the economy, culture, and society, and they play a role in shaping the education system (Sebba et al., 2009).



*World Economic Forum (2020). How has the technology changed- and changed us -in the past 20 years? <https://www.weforum.org/agenda/2020/11/heres-how-technology-has-changed-and-changed-us-over-the-past-20-years/> Accessed 28th Nov 2023.

⁺ Hickman, Caroline, Elizabeth Marks, Panu Pihkala, Susan Clayton, R Eric Lewandowski, Elouise E Mayall, Britt Wray, Catriona Mellor, and Lise van Susteren. 2021. "Climate Anxiety in Children and Young People and Their Beliefs about Government Responses to Climate Change: A Global Survey." *The Lancet Planetary Health* 5, no. 12 (December 1, 2021): e863–73. [https://doi.org/10.1016/S2542-5196\(21\)00278-3](https://doi.org/10.1016/S2542-5196(21)00278-3).

These programs cover middle-school students, high school students, college/university students, teachers/ faculty, and holders and allies. These programs have specific objectives, support others in the youth age group. They may also include other stakeframework (including mentorship), engagement platforms (often supported by technology), dedicated program managers, measures of effectiveness, and are thus very focused. For example:

- Education-sector programs include employment (e.g., internships, apprenticeships), scholarships, fellowships, skill development initiatives (workshops, seminars, etc.), innovation-focused initiatives (grants, training, etc.), meet-ups, etc.
- Community programs focus on specific areas such as interests, technology, expertise, streams, and/or geography and bring youth from across sectors and disciplines; they may also include non-youth stakeholders.
- Entrepreneurship-support programs encourage, nurture, and support youth entrepreneurs. These include partnerships with educational institutions that help generate a pipeline of start-ups and founders.

2. Citizen or climate assemblies: Relatively few countries, for example France, run citizen assemblies that invite randomly selected citizens together to debate issues and provide recommendations to the government. These convenings include youth and create an opportunity for them to find and hone their voice through engagement with community members. For example, the SDG Challenge⁹ provides opportunities for the youth to connect to the SDGs.

Case Studies

- **Investment Readiness Program** by SDSN Youth¹⁰: It is a remote 16-week accelerator program that supports youth-led start-ups with mentorship, funding, and a structured approach to grow their start-ups. The program has supported a total of 250 innovators across 118 countries. Along with programmatic support led by a staff from SDSN Youth, the mentors who guide the start-ups form a crucial component of the program. These mentors are selected via an application process, and come from different sectors and are located across the globe.
- **imaGen Ventures** is a flagship entrepreneurship program run by UNICEF's Generation Unlimited that provides young people with access to opportunities to develop entrepreneurial skills to catalyze social change and economic growth, and create a more sustainable future by addressing the SDGs. Co-designed with input from young people, and implemented through a constellation of partners from the private sector, the education community, grassroots youth-led organizations,

UNICEF's Generation Unlimited provides young people with access to opportunities to develop entrepreneurial skills to catalyze social change and economic growth, and create a more sustainable future by addressing the SDGs.



⁸ "The Citizens Assembly of Climate" The French Government, Accessed 9th October 2023.

<https://missionspubliques.org/pf/citizens-assembly-on-climate/?lang=en>

⁹ "Challenge today, Improve Tomorrow" SDG Challenge. Accessed 9th October 2023.

<https://university.sdg-challenge.com/>

¹⁰ "Youth Solutions Program". SDSN Accessed 8th October 2023. <https://www.sdsnyouth.org/initiatives/youth-solutions-program>

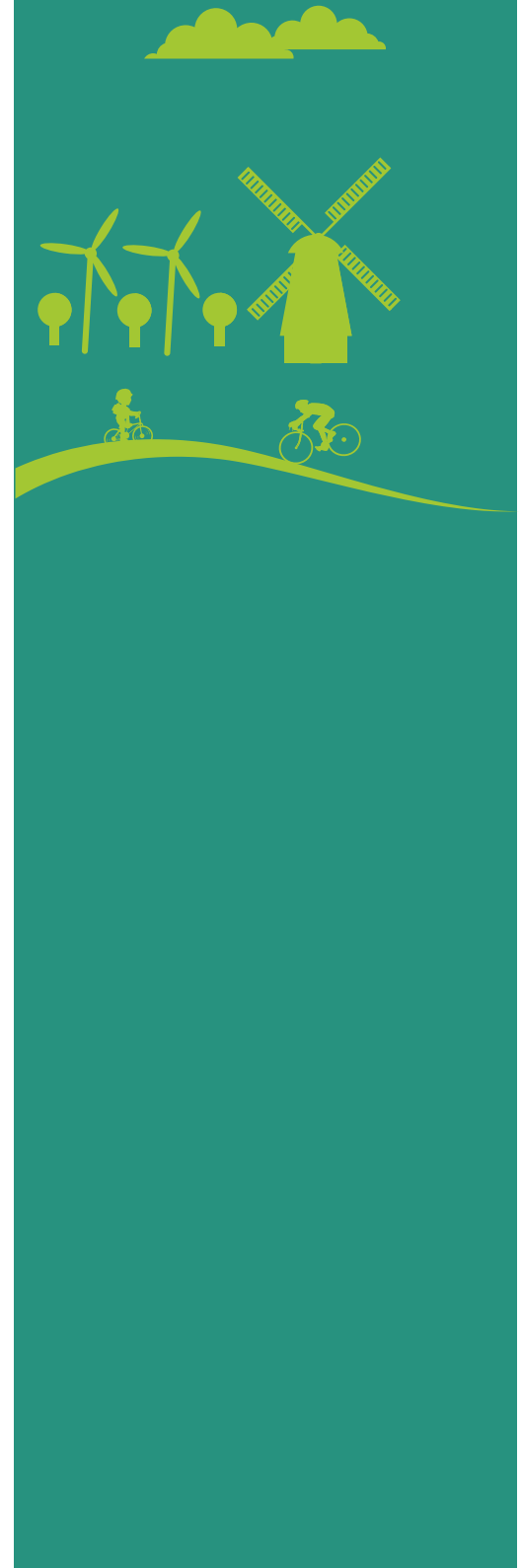
and local and global incubators, the programme aims to nurture a large group of young entrepreneurs who have the mindset, skills, and opportunities to make significant contributions towards achieving the SDGs. Since it was established in 2018, imaGen Ventures has supported over 100,000 young people in 60 countries to generate entrepreneurial innovations and incubated over 3,000 youth-led innovative ventures that catalyze social and environmental impact and economic growth and create a more sustainable future for humanity and the planet. The initiative has two key pillars. First, empowering youth for economic growth, and secondly, and championing climate-centric entrepreneurship and it achieves these two goals through nurture skills for the future, foster an innovation and entrepreneurial mindset, support innovative ventures with grants, funding, and mentorship opportunities, and inspiring millions to build growth-oriented and socially motivated enterprises.

- **Google Developer Student Clubs (GDSC)** is a program run by Google for college/university students to learn developer skills, and apply those skills to solve problems. Currently present in 100 countries, the campus clubs are run by student leads, who are selected via an application process. Along with workshops and other learning activities to develop skills, a highlight of the program is a solutions challenge "...to solve for one or more of the United Nations' 17 Sustainable Development Goals using Google technology."¹¹ The program in general encourages students to solve local problems, and this challenge not only brings SDGs to the front of students' focus, but also encourages them to develop tech solutions that have huge potential to incorporate their local learning experiences. Some examples of solutions developed are:
 - > **FarmX** - Nigeria which "... is a repository of digital tools that empower modern farmers to make informed decisions about their crops. The app provides a variety of features, including: crop recommendation, precision agriculture, crop disease detection."¹²
 - > **Isak** - South Korea which "... is an application that combines the activity of jogging and trash collection to make picking up trash more impactful."¹³

¹¹ "FarmX - Nigeria: 2023 Solution Challenge". Google for Developers. Accessed 9th October 2023. <https://developers.google.com/community/gdsc-solution-challenge>

¹² "2023 Peoples Choice Awards". Google for Developers. <https://developers.google.com/community/gdsc-solution-challenge/winners>

¹³ "Isak - South Korea, Soonchunhyang University" Google for Developers. Accessed 9th October 2023. <https://developers.googleblog.com/2022/07/top-10-winners-demo-Day-2022.html#:~:text=and%20educating%20them.%E2%80%9C-.Isak,-%2D%20South%20Korea%2C%20Soonchunhyang>



- > **GetWage** - India which "... provides a tool to help those impacted by unemployment and unfilled positions in the local economy find and post daily wage work with ease."¹⁴
- **The GREEN Program (TGP)** provides experiential sustainability education for students. The 8-10 day programs examine sustainability issues and solutions in different world regions. Over 4,000 students from 470 universities in 70 countries have participated. TGP aims to build a diverse workforce with the skills to guide communities toward a sustainable future. It provides access to sustainability experts and green technologies training. Each program includes a capstone project where students devise real-world sustainability solutions. TGP partners with universities to increase access to sustainability education. Alumni earn a professional certificate and career support including job postings, career coaching, and networking. A study found that 95% of participants experienced an increase in sustainability awareness and consciousness. 74% switched to sustainability-related fields. Alumni credit TGP with impacting their career choices and ability to make a difference. Nathaniel Foote of Microsoft called TGP "foundational; it made the sustainability industry immediately accessible and tangible." Maxine Dixon of the Philadelphia Energy Authority said "getting to see energy being produced and using that experience to educate others...is how you make an impact."
- **Case Study:** Competition Run by The Commission for Environmental Cooperation (CEC): The CEC is a tri-national body mandated with overseeing a series of international environmental agreements among the governments of the United States, Canada, and Mexico. Since 2017, it has organized an annual Youth Innovation Challenge¹⁵ that invites youth across North America to submit innovative ideas and solutions for improving both the environment and the economy. Each year, a winning entry from each of the three member countries receives a cash prize to help launch their idea. They also present their solution to top environmental decision makers, including the Administrator of the US Environmental Protection Agency (EPA), Minister of the Environment in Canada, and Secretary of the Environment in Mexico; this is an opportunity to directly influence policy in their countries. The YIC presents a model for similar initiatives.

¹⁴ "GetWage - India, G.H. Raisoni College of Engineering, Nagpur" Google for Developers. Accessed 9th October 2023. <https://developers.googleblog.com/2022/07/top-10-winners-demo-Day-2022.html#:~:text=system%20more%20intuitively.%E2%80%9D-,GetWage,-%2D%20India%2C%20G.H>

¹⁵ "Youth Innovation Challenge". CEC, Accessed 9th October 2023. <http://www.cec.org/get-involved/youth-initiatives/youth-innovation-challenge/>



V. Recommendations for Fostering Youth-led Innovations

A. Enhancing Sustainability Education and Awareness

1. Integrating Sustainability into Education

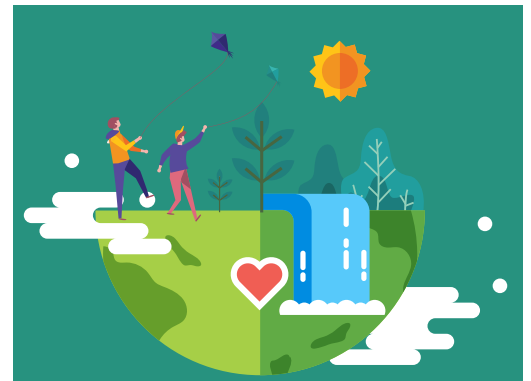
Educators have long aimed to integrate sustainability into curricula, with emerging consensus in three key areas, as outlined by Harvard University's Fernando M. Reimers in 'Empowering Students to Improve the World in Sixty Lessons':

- **Teaching Global Citizenship:** Students need a grounded perspective to grasp the impact of sustainability issues globally. This involves understanding how individuals in a connected global ecosystem are affected by environmental and development challenges.
- **Prototyping Educational Resources:** To advance sustainability education, proponents of global citizenship must move beyond theoretical discussions and actively prototype educational tools. This requires introducing and deploying new resources rather than debating theoretical merits.
- **Collaborative Curriculum Development:** Traditional top-down curriculum development methods must give way to more collaborative approaches. Educators and students should work iteratively to refine models, accelerating the deployment of effective educational approaches.

In 'Prioritizing Sustainability Education: A Comprehensive Approach,' editors Joan Armon, Stephen Scoffham, and Chara Armon invite youth to critique sustainability curricula, highlighting the growing importance of student engagement. A notable example is the University of Waterloo's course on 'Entrepreneurship and the UN's Sustainable Development Goals':

- **Real-world Engagement:** The course invites successful youth entrepreneurs as guest lecturers. For SDG 3 (Good Health and Well-being), founders of SheCycle, a Ugandan company producing environmentally-friendly feminine hygiene products, provide insights. For SDG 12 (Responsible Consumption and Production), the student founder of ESG Tree, a data company in the financial sector, shares expertise.
- **Youth Empowerment:** This approach allows students to prototype entrepreneurial solutions to sustainability problems, giving them control over course content and fostering a hands-on understanding of complex issues."

2. Providing Training and Workshops for Young Innovators (in and out of formal school spaces)



- **Alley Pond Environmental Center (APEC):** Located in North Eastern Queens, New York, USA, APEC exemplifies environmental education beyond the classroom. Situated in Alley Pond Park, spanning 635 acres of diverse ecosystems, it now shelters over 300 species of wildlife. Formerly a dumping site from the 1930s to the 1970s, APEC's transformation was driven by activists and educators led by Hy and Joan Rosner. Today, it hosts over 60,000 children and adults annually, fostering environmental awareness and education.
- **Rutgers University Students for Environmental and Energy Development (SEED):** SEED, a student-led club, focuses on applying scientific and technological solutions to environmental challenges. It emphasizes teamwork and leadership development in finding creative sustainability solutions.
- **Sprout Up:** A nationwide student-run program with chapters in US universities, Sprout Up educates kindergarten to fourth-grade youth in environmental science and sustainability concepts. The aim is to inspire young minds to embrace environmental stewardship and share its message.
- **The Oberlin Project:** A collaborative initiative involving the City of Oberlin, Oberlin College, and various partners, the Oberlin Project seeks to enhance community resilience, prosperity, and sustainability. It serves as a model for sustainable economic and community development, with a strong emphasis on student-led change.
- **U.S. Schools Leading in Sustainability:** In 2023, the U.S. Department of Education recognized 26 schools for their sustainability efforts. These schools expanded their impact beyond reducing environmental effects, incorporating health improvements and climate-based curriculum into their education systems. Notably, Illinois passed legislation to ensure carbon-free public schools.
- **Addressing Climate Education Challenges:** Research by NPR/Ipsos revealed that 4 out of 5 parents believe schools should teach about climate change. However, only 45% of teachers currently do so, citing potential parent complaints, subject unrelatedness, or insufficient knowledge as barriers. Initiatives like K-12 Climate Action are crucial for providing consistent professional development to educators, enhancing climate science education for a better future.

B. Creating Enabling Environments for Youth-led innovations

1. Establishing Innovation Support

The concept of incubators, initially introduced in 1959, aimed to mentor and nurture emerging entrepreneurs to reduce startup failure rates. Over the years, incubation has become widespread, leading to specialization in various fields. Environmental-focused incubation programs have emerged, often linked to post-secondary institutions where youth conduct sustainability research.

Incubation has become widespread, leading to specialization in various fields.



These platforms offer innovators programmatic support, including funding, mentorship, networking, and a launchpad for their projects. Notable examples include the Google Climate Change Accelerator, Foresight Cleantech Accelerator, Joules Accelerator, imaGen Ventures, and GreenHouse at the University of Waterloo. Additionally, a network of universities in North America has created an Ecolnnovation Network to share best practices in environmental incubation.

2. Facilitating Access to Funding and Resources

Traditional incubators primarily support information and communications technologies, posing challenges for sustainability startups focused on tangible resources like water and energy. Green ventures often require different types of funding due to higher startup costs and slower returns on investment. Environmental incubators often collaborate with government funding programs and impact investors. They provide specialized mentorship, addressing technical and scientific aspects unique to green startups. Some established incubators have introduced environmentally-focused programs, while others have emerged as standalone structures. Improved access to capital, mentorship, technical expertise, and industry collaboration is essential for young environmental entrepreneurs. Additionally, facilitating access to crowdfunding and micro-financing platforms can be alternative tools for youth-led innovative green ventures, allowing the general public to directly support innovative sustainability projects.

3. Promoting Collaboration between Young Innovators and Established Organizations

Innovation relies on an ecosystem of diverse actors and relationships. While leading innovation hubs have initiated youth engagement activities, true partnerships between young innovators and established organizations remain underdeveloped.

4. Fostering Institutional Support

Creating a culture of innovation requires psychological safety and dedicated spaces like maker spaces and incubators. The goal is to infuse entrepreneurial thinking into every educational setting, transcending traditional institutional boundaries. Knowledge-sharing platforms should extend beyond university campuses to benefit broader communities.

5. Expanding Existing Programs

Many programs support youth projects aligned with the Sustainable Development Goals (SDGs). However, some may not directly measure their impact against the SDGs. Strengthening such programs can encourage students to structure their projects around the SDGs.

6. Integrating AI and Data Science into Higher Education

To address complex sustainability challenges, higher education curricula should incorporate data science and AI through public-private partnerships. This approach aims to:



Improved access to capital, mentorship, technical expertise, and industry collaboration is essential for young environmental entrepreneurs.



- Widespread adoption of cyberinfrastructure tools and resources in climate and sustainability research.
- Integration of core CI skills and data-driven methods into instructional materials for climate and sustainability studies.

C. Promoting Mentorship and Guidance for Young Innovators

1. Connecting young innovators with experienced professionals in the field

Mentorship programs allow the exchange of experiences in a supportive environment for learning. Connections with experienced professionals and industry experts can offer valuable guidance in one-to-one sessions, advice, personalized feedback, and support in youth innovation journeys, as well as a space for networking. Nevertheless, to elevate/amplify young people's knowledges and insights, it is critical to engage in critically reflexive co-mentoring. Lacy and Chen (2022) describe this type of equity-oriented, asset-based mentoring that affirms younger innovators' so that co-learning can manifest in ways that allow innovators to discover and interrogate together (in a community-based context) while developing even more fruitful outcomes (Stringer, 2015). Spaces for these exchanges are common in accelerator and incubation programs as well as educational institutions.

2. Encouraging intergenerational knowledge exchange (IKE)

In concert with mentorship by experienced professionals, IKE allows for informal learning from different experiences, perspectives, and worldviews. Notably, this reflexive mode of exchange transmits between older and younger generations with youth often pushing newer and more just opportunities and solutions. Opportunities abound for IKE when nurturing and edifying critically reflexive co-mentoring and co-learning practices in a manner in which Freeman et al. (2020) described youth and elders as "both givers and receivers of new knowledge (p. 291)." IKE is a central and well-proven component of educational approaches in many Indigenous communities. The Constitution of the Haudenosaunee (or Iroquois) Confederacy, for example, states that all people must "Look and listen for the welfare of the whole people and have always in view not only the present but also the coming generations..."¹⁶ The ability to embed IKE in educational approaches ensures that learning passes both information and wisdom between generations.

D. Scaling and commercializing youth-led innovations

1. Establishing supports and training programs

While some youth in some places are able to access environmental



Connections with experienced professionals and industry experts can offer valuable guidance in one-to-one sessions, advice, personalized feedback, and support in youth innovation journeys, as well as a space for networking.



¹⁶ "Internet Modern History Sourcebook: The Constitution of the Iroquois Confederacy", Article 28, Gerald Murphy, Fordham University, Accessed 9th October, 2023. <https://sourcebooks.fordham.edu/mod/iroquois.asp>

incubators and green entrepreneurship training programs, such initiatives are often dispersed and disconnected. Youth-led innovations are critical as they provide various new perspectives and they need to be more effectively supported. While some youth in some places are able to access environmental incubators and green entrepreneurship training programs, such initiatives are often dispersed and disconnected. Youth-led innovations are critical as they provide various new perspectives and they need to be more effectively supported. Globally, there are a number of separate competitions and structures encouraging youth to develop entrepreneurial solutions to sustainability challenges.

These include:

- The Hult Prize, supported by the Hult International Business School and the United Nations¹⁷
- UNICEF's Generation Unlimited's imaGen Ventures Global Youth Challenge¹⁸
- The Wege Prize, supported by Ferris State University's Center for Sustainable Design¹⁹
- The World's Challenge Challenge, a global competition hosted by Western University in Canada²⁰
- The Youth Innovation Challenge, organized for youth in Mexico, the United States and Canada by the Commission for Environmental Cooperation²¹

The formal innovation structures are augmented by efforts like SDSN Youth's SDG Students Program²², which helps educate students on climate related problems, and SDSN Youth's SDG Solutions Network²³, which showcases work done by the youth on the SDGs. Other efforts include the Youth for SDGs program²⁴, where students gain access to resources and knowledge they otherwise would lack. Students around the world are able to showcase their work on a global stage as well as discuss with like-minded youth leaders in conferences like Conference of Youth (COY17)²⁵.

17 "How will you Change the World", Hult, Accessed 9th October, 2023. <https://www.hult.edu/about/hult-prize/#:-:text=The%20Hult%20Prize%20is%20the,a%20scalable%2C%20sustainable%20social%20enterprise>

18 Generation Unlimited imaGen Ventures <https://www.generationunlimited.org/imagen>

19 "Collaborators". Kendall College of Art and Design, Accessed 9th October 2023. <http://www.wegeprize.org/collaborators#:-:text=Wege%20Prize%20is%20a%20competition,own%20talent%20for%20problem%2Dsolving>

20 "The World's Challenge Challenge" Western University, Canada, Accessed 9th October 2023. <https://international.uwo.ca/challenge/>

21 "The Youth Innovation Challenge". Commission for Environmental Cooperation, Accessed 9th October 2023. <http://www.cec.org/get-involved/youth-initiatives/youth-innovation-challenge/>

22 "The SDGs Student Program" SDSN Youth, Accessed 9th October 2023 <https://www.sdsn-youth.org/initiatives/sdg-students-program>

23 "Sustainability is a big word. We're making its impact even bigger." SDSN Youth, Accessed 9th October 2023

24 "Promoting Youth Involvement for the SDGs Worldwide" United Nations, Accessed 9th October 2023. <https://sustainabledevelopment.un.org/index.php?menu=2857>

25 "The 17th UN Climate Conference for Youth" United Nations, YOUNGO. Accessed 9th October 2023. <https://coy17eg.com/>



Youth-led innovations are critical as they provide various new perspectives and they need to be more effectively supported.



It is critical that all youth-led innovations get the reach they need to succeed. Through the programs described here, some students are fortunate in this regard and are able to leverage these opportunities to access funding and networks from universities or other donors. For most youth, however, this is a major struggle. Educators and youth must work together to expand the reach of these programs promoting the scaling and commercialization of youth-led activities. Scattered local initiatives can be useful, but linking these together across broader geographies will be important. Efforts to create international partnerships, like that of the EcoInnovation Network²⁶ linking university environmental innovation programs in Canada, the United States and Mexico, will be vital moving forward.

2. Showcasing successful youth-led projects at global platforms like COP28

The United Nations Framework Convention on Climate Change (UNFCCC) will meet from November 30-December 12, 2023 in the United Arab Emirates, Dubai in the 28th UNFCCC Conference of the Parties (COP28²⁷). The most important climate negotiations take place at this event, and important resolutions have come from this convening such as the Paris Agreement in 2015 COP21. The resolutions from UNFCCC COP are not just influential at the State level and climate policies, but also impact everyday lives and shape the future of emissions scenarios that will determine the fate of our planet.

Youth voices are of growing interest to the nations, especially with the rise of concern about climate change and its effects. To facilitate these discussions in a higher level forum, different spaces for youth engagement have been opened in COP. One example is COP28's International Youth Climate Delegate Program where 11 delegates joined the African Climate Summit. Not only did these participants engage in serious, and much needed negotiations, but they also assisted in creating a Youth Climate Champions (YCC) Help Desk. The YCC worked alongside YOUNGO (Youth Constituency for the UNFCCC) and the Green Jobs for Youth Pact of UNICEF's Generation Unlimited, ILO, and UNEP, to implement a green job fair, supporting individuals to find employment in industries in the green sector, along with networking opportunities that highlighted the success of youth-led projects while introducing them to growth opportunities via philanthropy or venture funds. This Green Job Fair will now be implemented on a much larger scale at COP28. Another example is Operación COP: Young Ambassadors for Climate, launched by the Climate Reality Project América Latina, to train young activists on the COP process and prepare them to participate in the conferences. In a two-phase program including specialized training, young people are selected to join their country's negotiation team for COP. A final example was COP27's Children and Youth Pavilion that was provided for the first time.

²⁶ "Eco Innovations". North American EcoInnovations Network, Accessed 9th October 2023. <http://ecoinnovationnetwork.org/>

²⁷ "International Youth Climate Delegate Program", UAE COP 28, Accessed 9th October 2023. <https://www.cop28.com/youth-program>



Educators and youth must work together to expand the reach of these programs promoting the scaling and commercialization of youth-led activities.



VI. Conclusions

Youth are the future and present of the planet - future workforce, innovators, entrepreneurs, and activists and it is imperative that their voices are heard and acted upon. The youth provide a critical and unique perspective on the problems facing the world today and going forward. Given their forward looking attitudes and their investment in building a better future for themselves, others and the planet, youth-led innovation is key to achieving the targets of the SDGs. Harnessing youth engagement through inclusion and equality, education, sustainable technology, and advocacy is core to creating a world that leaves no one behind.

The need to promote youth-led innovations for a sustainable future is becoming increasingly urgent at this mid-point in Agenda 2030. Young innovators possess unique perspectives and digital fluency that can help accelerate progress towards the SDGs. Youth can drive transformative change and bridge the gap between current challenges and a sustainable future. It is therefore crucial to prioritize and invest in youth-led initiatives.

The call to action is for leaders convening at COP28 to recognize, invest in, unleash, and benefit from the power of youth-led innovations. Young people need to be at the forefront of governance processes and SDG solution projects. Creating an enabling environment for these youth innovators relies on investing in mentorship, digital platforms, and innovation hubs that serve to connect youth across the innovation ecosystem. At this critical inflection point, this is an opportunity for targeted investment in a healthy future for people, planet, and shared prosperity.

VII. References

Adegbami, Adenike, and Umar Buratai Yusuf. 2020. "Effect of Dialogic Literary Gatherings on Undergraduates' Critical Thinking Skills." *The European Proceedings of Social and Behavioural Sciences*, no. 1: 32-44. <https://ebpj.e-iph.co.uk/index.php/EBProceedings/article/view/3240>.

Alley Pond Environmental Center. 2023. "Mission & History." Accessed February 22, 2023. <https://www.alleypond.org/mission--history.html>.

Association of American Colleges and Universities. "High-Impact Educational Practices." Accessed February 22, 2023. <https://www.aacu.org/trending-topics/high-impact>.

Barth, Matthias, and Thomas Rieckmann. "Academic Staff Development for the Purpose of Education for Sustainable Development: Theoretical Concepts and Best Practices." In *Handbook of Higher Education for Sustainable Development*, edited by Matthias Barth, Gerd Michelsen, Marco Rieckmann, and Ian Thomas, 199-215.



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London: Routledge, 2016. https://link.springer.com/chapter/10.1007/978-3-319-47889-0_12.

Badr, N. G., & Chebib, E. M. (2023). Engaging Youth Led Organizations for Inclusive Service Innovation: Illustrative Case Study. In ITM Web of Conferences, 51, 4003.

Carreira, Paulo, et al. "Towards Sustainable Development through Higher Education: University Social Responsibility and Sustainability." In Communications in Computer and Information Science, vol. 705, 69-82. Springer, 2017. <https://www.scitepress.org/Papers/2017/70517/70517.pdf>.

Commission for Environmental Cooperation. "Youth Innovation Challenge." Accessed February 22, 2023. <http://www.cec.org/get-involved/youth-initiatives/youth-innovation-challenge/>.

COY17 EG. Accessed February 23, 2023. <https://coy17eg.com/>.

COP28 UAE. "Youth Programme." Accessed February 23, 2023. <https://www.cop28.com/youth-program>.

Daily Sabah. "Turkey Declares Nov. 11 National Forestation Day." Daily Sabah, November 7, 2019. <https://www.dailysabah.com/turkey/2019/11/07/turkey-declares-nov-11-national-forestation-day>

European Commission. (2023). EU Emissions Trading System (EU ETS). UNESCO. (2023). Education for Sustainable Development: A roadmap.

Empowering Students to Improve the World in Sixty Lessons, Fernando M. Reimers et al, CreateSpace Independent Publishing Platform, North Charleston, South Carolina, 2017. This source has a Creative Commons license. The material here is drawn from Reimers introduction, pp. 1-37.

European Commission. "Carbon Border Adjustment Mechanism." Taxation and Customs Union. Accessed February 22, 2023. https://taxation-customs.ec.europa.eu/carbon-border-adjustment-mechanism_en.

European Commission. "The EU Emissions Trading System (EU ETS)." Climate Action: European Commission. Accessed February 22, 2023. https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets_en#:~:text=Delivering%20emissions%20reductions,-Under%20the%20European&text=As%20a%20first%20milestone%2C%20the,62%25%20compared%20to%202005%20levels. Eco-Innovation Network. Accessed February 23, 2023. <http://ecoinnovationnetwork.org/>.

Fordham University. "The Constitution of the Iroquois Nations." Internet History Sourcebooks Project. Accessed February 23, 2023. <https://sourcebooks.fordham.edu/mod/iroquois.asp>.



Freeman, S., Martin, J., Nash, C., Hausknecht, S., & Skinner, K. 2020. Use of a digital storytelling workshop to foster development of intergenerational relationships and preserve culture with the Nak'azdli First Nation: Findings from the Nak'azdli Lha'huti'en project. *Canadian Journal on Aging/La Revue canadienne du vieillissement*, 39(2), 284-293.

Girardin, C. A. J., Jenkins, S., Seddon, N., Allen, M., Lewis, S. L., Wheeler, C. E., Griscom, B. W., & Malhi, Y. 2021. "Nature-based solutions can help cool the planet-if we act now". In *Nature* (Vol. 593).

Generation Unlimited (n.d.). Generation Unlimited. <https://www.generationunlimited.org/>

Garcia, David, et al. 2023. "Youth-Led Innovation for the SDGs." arXiv preprint arXiv:2309.10808. <https://arxiv.org/abs/2309.10808>.

Hannon, Matthew J., et al. 2022. "An Ecosystems Perspective for Sustainable Innovation: A Review and Research Agenda." *Nature Reviews Earth & Environment* 3: 808-21. <https://www.nature.com/articles/d42473-022-00486-3>.

Ismail, T., MohdYusof ., M., Ab Rahman , F., & Harsono , D. 2022. "Youth and their Knowledge on the Sustainable Development Goals (SDGs)". *Environment-Behaviour Proceedings Journal*, 7(19). <https://ebpj.e-iph.co.uk/index.php/EBProceedings/article/view/3240>

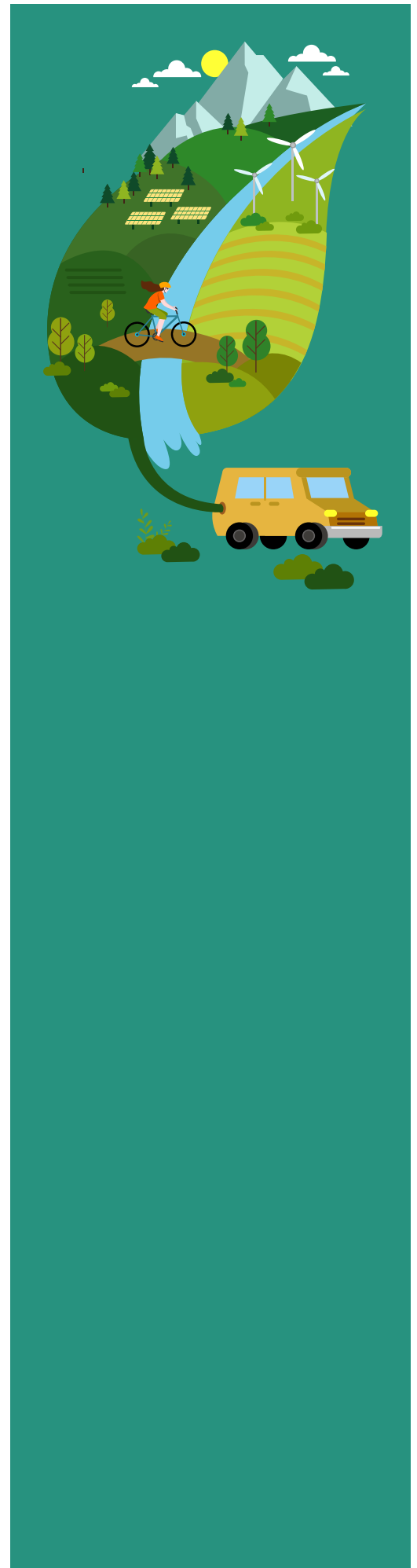
International Energy Agency. "Carbon Capture, Utilisation and Storage." Accessed February 22, 2023. <https://www.iea.org/energy-system/carbon-capture-utilisation-and-storage>.

IDIA. "What Is an Innovation Ecosystem?" IDIA: Inclusive Design, Innovation and Entrepreneurship Academy. Accessed February 23, 2023. <https://www.idiainnovation.org/what-is-an-innovation-ecosystem#:~:text=Adopting%20an%20ecosystems%20approach%20to%20transformative%20impact%20at%20scale>.

Kamenetz, Anya. "Schools Across The Nation Embrace Sustainable Practices." NPR, April 22, 2023. <https://blog.ed.gov/2023/04/schools-across-the-nation-embrace-sustainable-practices/>.

Lacy, N. B., & Chen, Y. W. 2022. "It takes a village": proposing critically reflexive (co-) mentoring with underrepresented students as racialized, gendered, and othered. *Communication Education*, 71(4), 370-373.

McCormick, Kes, et al. 2019. "Youth as Researchers: Benefits, Limitations and Ethical Considerations within a Participatory Project." *International Journal of Circumpolar Health* 78 (1). <https://www.jstor.org/stable/26924965>.



Morley, Sarah. 2020. Do young people in Australian educational systems receive adequate support to feel empowered in engaging with Sustainable Development Goals? *Consilience* 22, pp. 86-92. <https://www.jstor.org/stable/26924965>

National Education Association. "Green Schools NOW." *NEA Today*. Accessed February 22, 2023. <https://www.nea.org/nea-today/all-news-articles/green-schools-now>.

Negative Emissions Technologies and Reliable Sequestration. (2019). National Academies Press. <https://doi.org/10.17226/25259>

Organisation for Economic Co-operation and Development. 2015, October 14. *OECD Action Against Poverty: Youth Policy Note*. Retrieved February 25, 2023, from https://www.oecd.org/dev/pgd/OECD_AA%20Youth%20Policy%20Note_141015.pdf

O'Reilly, Michelle, et al. 2021. "The Impact of Social Media on Youth Mental Health: Challenges and Opportunities." *Clinical Psychology: Science and Practice* 28(4): 517-31. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8765767/#:~:text=Adolescents%20are%20often%20early%20adopters,during%20developmental%20windows%20of%20opportunity>.

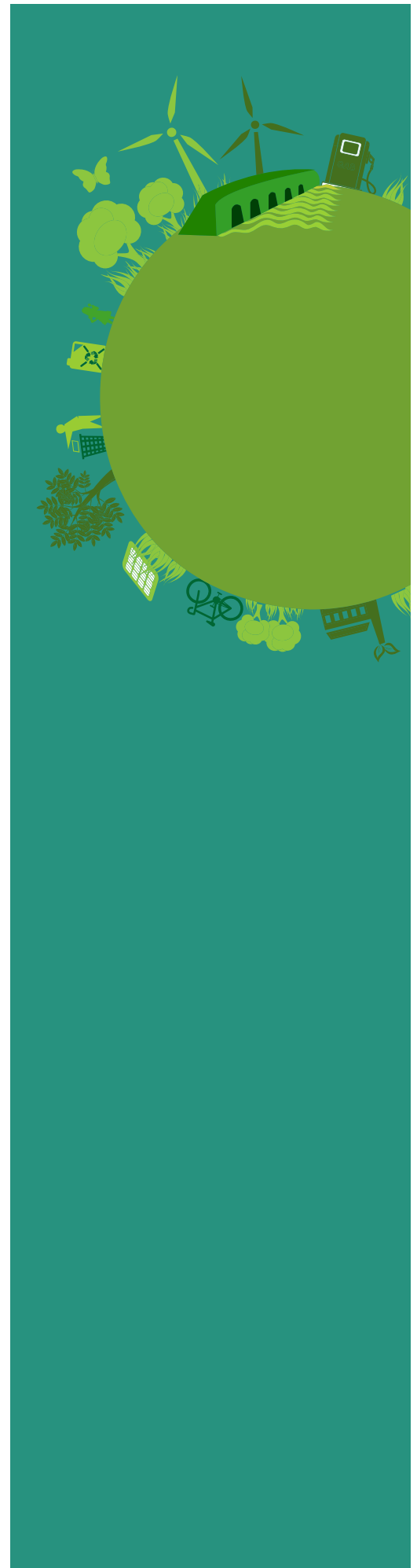
Orr, David W., et al. 2015. "Students as Change Agents in a Town-Wide Sustainability Transformation: The Oberlin Project at Oberlin College." *International Journal of Sustainability in Higher Education*, 16(4): 508-21. https://www.researchgate.net/publication/280032751_Students_as_change_agents_in_a_town-wide_sustainability_transformation_The_Oberlin_Project_at_Oberlin_College.

Oberlin Project. "Home." Accessed February 22, 2023. <https://oberlinproject.org/>.

Patton, George C., et al. 2021. "Our Future: A Lancet Commission on Adolescent Health and Wellbeing." *The Lancet* 398(10307): 1325-49. <https://www.thelancet.com/action/showPdf?pii=S2542-5196%2821%2900278-3>.

Artis, Zanagee., Cohen, Arielle Martinez ., Jaguzny, Ivy and Kieras, Kendall 2020. "This is Zero Hour: youth confront educators" . In *Prioritizing Sustainability Education : A Comprehensive Approach*, edited by Joan Armon , Stephen Scoffham and Chara Armon, eds. Routledge, New York, 2020.p. 27-35.

Parker, Kim, and Alec Tyson. 2021. "Gen Z, Millennials Stand Out for Climate Change Activism, Social Media Engagement with Issue." *Pew Research Center*. <https://www.pewresearch.org/science/2021/05/26/gen-z-millennials-stand-out-for-climate-change-activism-social-media-engagement-with-issue/>.



Morley, Sarah. 2020. Do young people in Australian educational systems receive adequate support to feel empowered in engaging with Sustainable Development Goals? *Consilience* 22, pp. 86-92. <https://www.jstor.org/stable/26924965>

National Education Association. "Green Schools NOW." NEA Today. Accessed February 22, 2023. <https://www.nea.org/nea-today/all-news-articles/green-schools-now>.

Negative Emissions Technologies and Reliable Sequestration. (2019). National Academies Press. <https://doi.org/10.17226/25259>

Organisation for Economic Co-operation and Development. 2015, October 14. OECD Action Against Poverty: Youth Policy Note. Retrieved February 25, 2023, from https://www.oecd.org/dev/pgd/OECD_AA%20Youth%20Policy%20Note_141015.pdf

O'Reilly, Michelle, et al. 2021. "The Impact of Social Media on Youth Mental Health: Challenges and Opportunities." *Clinical Psychology: Science and Practice* 28(4): 517-31. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8765767/#:~:text=Adolescents%20are%20often%20early%20adopters,during%20developmental%20windows%20of%20opportunity>.

Orr, David W., et al. 2015. "Students as Change Agents in a Town-Wide Sustainability Transformation: The Oberlin Project at Oberlin College." *International Journal of Sustainability in Higher Education*, 16(4): 508-21. https://www.researchgate.net/publication/280032751_Students_as_change_agents_in_a_town-wide_sustainability_transformation_The_Oberlin_Project_at_Oberlin_College.

Oberlin Project. "Home." Accessed February 22, 2023. <https://oberlinproject.org/>.

Patton, George C., et al. 2021. "Our Future: A Lancet Commission on Adolescent Health and Wellbeing." *The Lancet* 398(10307): 1325-49. <https://www.thelancet.com/action/showPdf?pii=S2542-5196%2821%2900278-3>.

Artis, Zanagee., Cohen, Arielle Martinez ., Jaguzny, Ivy and Kieras, Kendall 2020. "This is Zero Hour: youth confront educators" . In *Prioritizing Sustainability Education : A Comprehensive Approach*, edited by Joan Armon , Stephen Scoffham and Chara Armon, eds. Routledge, New York, 2020.p. 27-35.

Parker, Kim, and Alec Tyson. 2021. "Gen Z, Millennials Stand Out for Climate Change Activism, Social Media Engagement with Issue." Pew Research Center. <https://www.pewresearch.org/science/2021/05/26/gen-z-millennials-stand-out-for-climate-change-activism-social-media-engagement-with-issue/>.



Republic of Turkey Ministry of Culture and Tourism. "President Recep Tayyip Erdoğan Declares November 11th as National Tree Planting Day." Republic of Turkey Ministry of Culture and Tourism. Accessed February 22, 2023. <https://www.iletisim.gov.tr/english/haberler/detay/president-recep-tayyip-erdogan-declares-november-11th-as-national-tree-planting-day>.

Rousseau, Denise M., and Yair Berson. 2019. "Organizational Behavior in the Digital Age." *Annual Review of Organizational Psychology and Organizational Behavior*. 6(1): 515-37. <https://www.annualreviews.org/doi/abs/10.1146/annurev-org-psych-031413-091305>.

Rutgers University. "SEED: Students for Environmental and Ecological Development."

Rutgers Campus Labs. Accessed February 23, 2023. <https://rutgers.campuslabs.com/engage/organization/SEED>.

Rutgers University. "SEED: Students for Environmental and Ecological Development." Rutgers Campus Labs. Accessed February 22, 2023. <https://rutgers.campuslabs.com/engage/organization/seed>.

Svensson, Lupita, and Pauline Ståhl. 2017. "Good Examples as a Tool for Teaching Sustainability: A Theoretical Framework of Good Examples and Their Usage." *DIVA Portal*, <http://www.diva-portal.org/smash/get/diva2:1438448/FULLTEXT01.pdf>.

Students for Sustainable Development at New York University. (2023, February 24). Join the webinar series on fostering youth-led innovation for the SDGs. Retrieved February 25, 2023, from <https://www.sdsnusa.org/news/join-the-webinar-series-on-fostering-youth-led-innovation-for-the-sdgs>

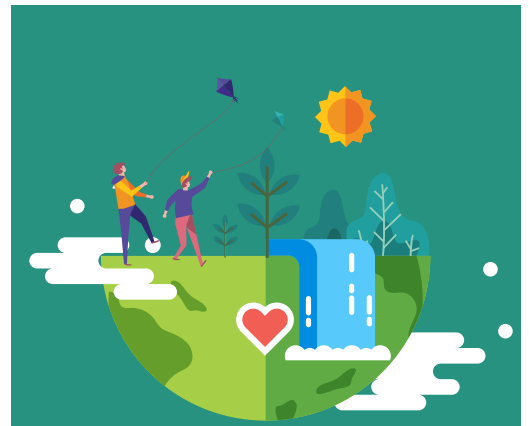
Schneider, M., & Bashir, S. 2020. "The role of youth in achieving the Sustainable Development Goals. *Sustainability*", 12(12): 4951.

Svensson, Lupita, and Pauline Ståhl. 2017. "Good Examples as a Tool for Teaching Sustainability: A Theoretical Framework of Good Examples and Their Usage." *DIVA Portal*, <http://www.diva-portal.org/smash/get/diva2:1438448/FULLTEXT01.pdf>.

SDG Talks. "Homepage." Accessed February 22, 2023. <https://sdg-talks.ai/>.

Sprout Up. "Our Story." Accessed February 22, 2023. <https://www.sproutup.org/our-story>.

SDSN Youth. "SDG Students Program." SDSN Youth Initiatives. Accessed February 23, 2023. <https://www.sdsn youth.org/initiatives/sdg-students-program>.



SDSN Youth. Accessed February 23, 2023. <https://www.sdsnyouth>.

SDSN Youth Canada. 2021. "SDG Coordinators Create Impact Across Canada". University of Waterloo. Accessed September 18. <https://uwaterloo.ca/sustainable-development-solutions-net-work-canada/news/sdg-coordinators-create-impact-across-canada>

SDSN Youth Canada. 2023. "SDG Week at Waterloo". University of Waterloo. Accessed September 18. <https://uwaterloo.ca/sustainability/events/sdg-week-waterloo>

SDSN Youth Mexico. 2021. "Video del lanzamiento del YSR México 2021". Facebook. Accessed September 18. <https://www.facebook.com/watch/?v=1707307609462791>

SDSN Youth USA. no date. "SDSN Youth USA". SDSN USA. Accessed September 18. <https://www.sdsnusa.org/sdsn-youth-usa>

Sebba, Judy, Vivienne Griffiths, Barry Luckock, Frances Hunt, Carol Robinson, Julie Farlie, Rajendra Mulmi, and Nicola Drew. 2009. "Youth-led innovation: Enhancing the skills and capacity of the next generation of innovators". National Endowment for Science, Technology and the Arts.

Stringer, H. 2015. Perspectives on capacity strengthening and co-learning in communities: Experiences of an Aboriginal community-based research steering committee. University of Victoria, School of Child and Youth Care (Master's Thesis), Retrieved from: https://dspace.library.uvic.ca/bitstream/handle/1828/7012/Stringer_Heather_MA_2015.pdf?sequence=9&isAllowed=y

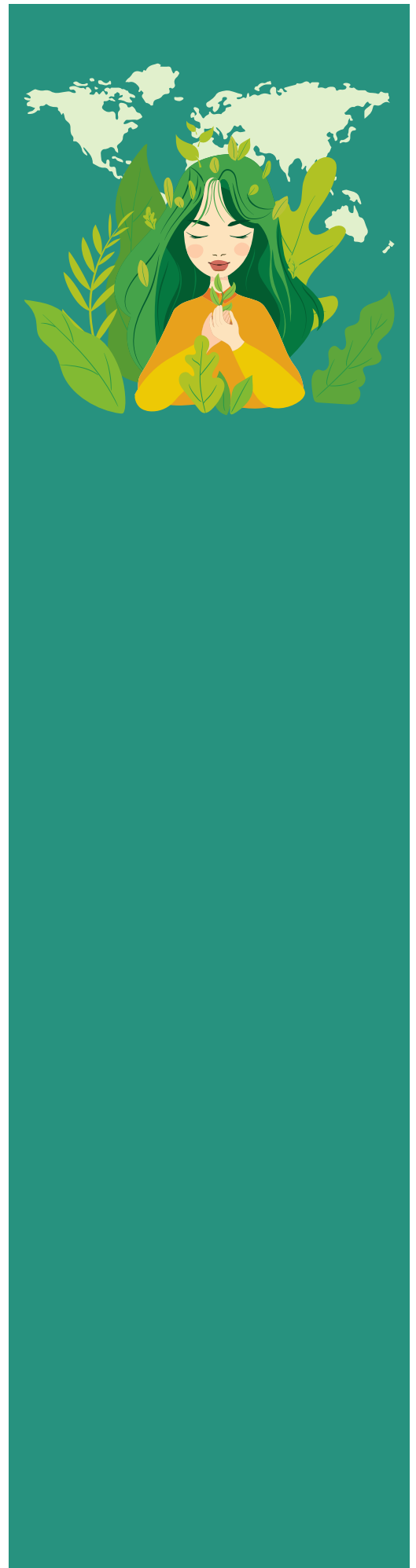
Sustainable Development." United Nations Sustainable Development Goals. Accessed February 22, 2023. <https://www.un.org/sustainabledevelopment/youth/>.

The Green Program. "Capstone Projects." Accessed February 22, 2023. <https://thegreenprogram.com/capstones/>.

The Green Program. "About Us." Accessed February 22, 2023. <https://thegreenprogram.com/about/United Nations>. "Youth and the 2030 Agenda for United Nations. (2023, September 20). The Sustainable Development Goals. Retrieved February 25, 2023, from <https://sdgs.un.org/goals>

United Nations. (2023, September 20). Leave no one behind. Retrieved February 25, 2023, from <https://unsdg.un.org/2030-agenda/universal-values/leave-no-one-behind>

United Nations. "Office of the Secretary-General's Envoy on Youth." United Nations. Accessed February 22, 2023. <https://www.un.org/youthenvoy/>.



SDSN Youth. Accessed February 23, 2023. <https://www.sdsnyouth>.

SDSN Youth Canada. 2021. "SDG Coordinators Create Impact Across Canada". University of Waterloo. Accessed September 18. <https://uwaterloo.ca/sustainable-development-solutions-network-canada/news/sdg-coordinators-create-impact-across-canada>

SDSN Youth Canada. 2023. "SDG Week at Waterloo". University of Waterloo. Accessed September 18. <https://uwaterloo.ca/sustainability/events/sdg-week-waterloo>

SDSN Youth Mexico. 2021. "Video del lanzamiento del YSR México 2021". Facebook. Accessed September 18. <https://www.facebook.com/watch/?v=1707307609462791>

SDSN Youth USA. no date. "SDSN Youth USA". SDSN USA. Accessed September 18. <https://www.sdsnusa.org/sdsn-youth-usa>

Sebba, Judy, Vivienne Griffiths, Barry Luckock, Frances Hunt, Carol Robinson, Julie Farlie, Rajendra Mulmi, and Nicola Drew. 2009. "Youth-led innovation: Enhancing the skills and capacity of the next generation of innovators". National Endowment for Science, Technology and the Arts.

Stringer, H. 2015. Perspectives on capacity strengthening and co-learning in communities: Experiences of an Aboriginal community-based research steering committee. University of Victoria, School of Child and Youth Care (Master's Thesis), Retrieved from: https://dspace.library.uvic.ca/bitstream/handle/1828/7012/Stringer_Heather_MA_2015.pdf?sequence=9&isAllowed=y

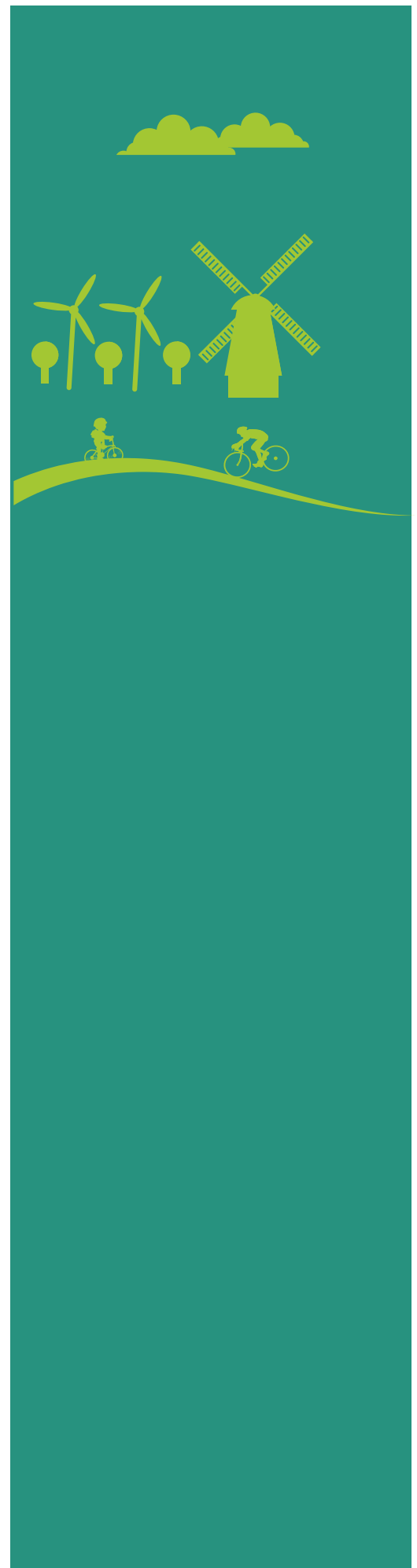
Sustainable Development." United Nations Sustainable Development Goals. Accessed February 22, 2023. <https://www.un.org/sustainabledevelopment/youth/>.

The Green Program. "Capstone Projects." Accessed February 22, 2023. <https://thegreenprogram.com/capstones/>.

The Green Program. "About Us." Accessed February 22, 2023. <https://thegreenprogram.com/about/>. United Nations. "Youth and the 2030 Agenda for United Nations. (2023, September 20). The Sustainable Development Goals. Retrieved February 25, 2023, from <https://sdgs.un.org/goals>

United Nations. (2023, September 20). Leave no one behind. Retrieved February 25, 2023, from <https://unsdg.un.org/2030-agenda/universal-values/leave-no-one-behind>

United Nations. "Office of the Secretary-General's Envoy on Youth." United Nations. Accessed February 22, 2023. <https://www.un.org/youthenvoy/>.



United Nations. "Young Leaders for the Sustainable Development Goals." United Nations Office of the Secretary-General's Envoy on Youth. Accessed February 22, 2023. <https://www.un.org/youthenvoy/about-the-young-leaders-for-the-sdgs/>.

United Nations. "Youth and the 2030 Agenda for Sustainable Development." United Nations Sustainable Development Goals. Accessed February 22, 2023. <https://www.un.org/sustainabledevelopment/youth/>.

United Nations. "Youth and the 2030 Agenda for Sustainable Development." United Nations Sustainable Development Goals. Accessed February 22, 2023. <https://www.un.org/sustainabledevelopment/youth/>.

UNESCO. 2017 "Education for Sustainable Development Goals: Learning Objectives." UNESCO Digital Library. <https://unesdoc.unesco.org/ark:/48223/pf0000261445>.

UNICEF. 2020 "Leaving No One Behind in Water, Sanitation and Hygiene: A Guidance Note." UNICEF. <https://www.unicef.org/media/102136/file/LNOB-in-WASH-Guidance-Note.pdf>.

United Nations Economic and Social Council. 2019. "High-Level Political Forum on Sustainable Development Concludes Ministerial Segment amid Calls for More Ambitious Climate Action, Financing for Development." United Nations. <https://press.un.org/en/2019/ecosoc6968.doc.htm>.

United States Geological Survey. "Wetlands." Frequently Asked Questions. Accessed February 22, 2023. <https://www.usgs.gov/faqs/why-are-wetlands-important#:~:text=Wetlands%20provide%20habitat%20for%20thousands,products%2C%20recreation%2C%20and%20aesthetics>.

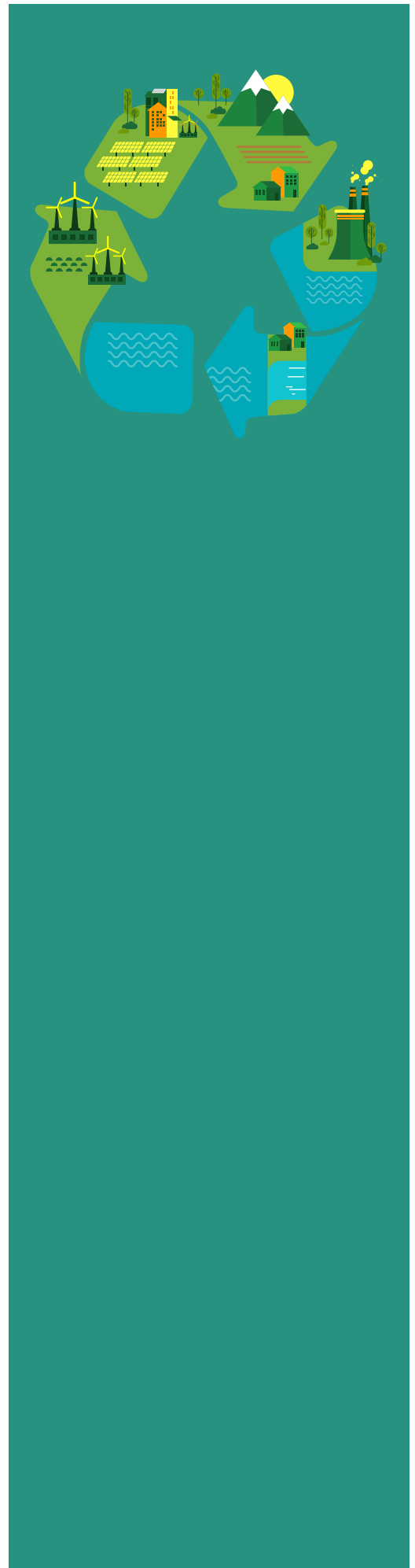
United Nations. 2022. World Population Prospects. <https://population.un.org/wpp/Graphs/Probabilistic/PopPer/o-24/900>

United Nations. 2023. "Four things you need to know about youth and SDGs". Department of Economic and Social Affairs. Accessed September 19.

UNESCO. 2020. "Education for Sustainable Development: A Roadmap." UNESCO Digital Library. <https://unesdoc.unesco.org/ark:/48223/pf0000261805>.

United Nations. 2019. "Youth Population Trends." United Nations Department of Economic and Social Affairs Population Division. <https://www.un.org/esa/socdev/documents/youth/fact-sheets/YouthPOP.pdf>.

University of Waterloo. "The Greenhouse." United College. Accessed February 23, 2023. <http://uwaterloo.ca/united-college/greenhouse>.



Wamsler, Christine. 2022. "Mind the Gap: The Role of Mindfulness in Adapting to Increasing Risk and Climate Change." *Sustainability Science* 17: 421-39. <https://link.springer.com/article/10.1007/s11625-022-01128-9>.

Wong, Charlene A., et al. 2021 "The Intersection of Climate Change and Mental Health for Children and Youth: A Systematic Review." *International Journal of Environmental Research and Public Health*. 18 (8). <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9883078/>.

World Health Organization. *Global Accelerated Action for the Health of Adolescents (AA-HA!): Guidance to Support Country Implementation*. Geneva: World Health Organization, 2017. <https://apps.who.int/iris/bitstream/handle/10665/274368/9789241514576-eng.pdf>.

World Economic Forum. 2020 "Here's How Technology Has Changed and Changed Us over the Past 20 Years." World Economic Forum, November 9, 2020. <https://www.weforum.org/agenda/2020/11/heres-how-technology-has-changed-and-changed-us-over-the-past-20-years/>.

Wiek, Arnim, and Daniel J. Lang. 2016. "Transformational Sustainability Research Methodology." In *Encyclopedia of Sustainability in Higher Education*, edited by Walter Leal Filho. Cham: Springer. https://link.springer.com/referenceworkentry/10.1007/978-3-319-95870-5_19.

Wege Foundation. "Collaborators." Wege Prize. Accessed February 23, 2023. <http://www.wegeprize.org/collaborators#:~:text=Wege%20Prize%20is%20a%20competition,own%20talent%20for%20problem%2Dsolving>.

Western University. "Western International Sustainability Challenge." International. Accessed February 23, 2023. <https://international.uwo.ca/challenge/>.

United Nations. "Youth." Sustainable Development Goals. Accessed February 23, 2023. <https://sustainabledevelopment.un.org/index.php?menu=2857>.

World Economic Forum. August 10, 2020. "3 defining characteristics of youth-led social innovation". World Economic Forum. Accessed September 19.

Zawya. "COP28 Youth Climate Champion Calls for Young People to Be Heard at Africa Climate Week." Press Releases. February 20, 2023. <https://www.zawya.com/en/special-coverage/cop-28-talking-climate-in-uae/youth-climate-champion-for-cop28-calls-for-young-people-to-be-heard-at-africa-climate-week-f32hgggyg>



Webinar/ Pathway	Key Contributions	Key Insights/ Speakers	Advancements in Policy, Education, or Practice
1. Integrating ESD in Higher Education Institutions to Foster Youth-led Innovations	Role of universities in integrating ESD. Encourages youth-led innovations for the UN SDGs	Won Jung Byun (UNESCO)	Policies: Universities can adopt policies to integrate ESD into their curriculum. Education: ESD can be implemented in the curriculum to foster a conducive learning environment. Practice: Encourages the practice of sustainable development in university settings.
2. Empowering Youth through Designing Curricula on Climate Justice	Potential of engaging young people in designing curricula centered around climate justice. Promotes the development of solutions for the SDGs	Nicole Doray (David Suzuki Foundation), Melissa Lee (The GREEN Program)	Policies: Encourages the development of curricula centered around climate justice. Education: Enhances student understanding and engagement in climate justice issues. Practice: Promotes the application of climate justice principles in real-world contexts.
3. Improving Climate Communication Strategies in Early-Career Settings	Importance of effective climate communication strategies in professional settings. Can be leveraged by young professionals to advance the SDGs	Ira Feldman (Adaptation Leaders), Claudia Akel (SDG Investors)	Policies: Supports the development of effective climate communication strategies in workplaces. Education: Enhances understanding and skills in climate communication. Practice: Encourages the use of effective communication strategies in professional settings.
4. Fostering Mindfulness, Citizenship, and Engagement for SDG Impact	Role of mindfulness, active citizenship, and engagement in fostering youth innovations contributing to the SDGs	Yishin Khoo, Barnaby Spring, Susan Bodnar, Kirsti Norris	Policies: Encourages the promotion of mindfulness and active citizenship for SDG impact. Education: Incorporates mindfulness and active citizenship into learning experiences. Practice: Encourages practices that foster mindfulness and active citizenship.
5. Promoting Global Citizenship in Carbon Capture, Use, and Storage (CCUS) and the New Carbon Economy	Role of global citizenship in CCUS and the new carbon economy. Highlights opportunities for youth to drive innovations for the SDGs	Amanda Ellis (Arizona State University), Jessica Fernandez (Arizona State University), Greg Dipple (University of British Columbia), Douglas Schmitt (Purdue University), Yunyue Elita Li (Purdue University)	Policies: Supports the integration of global citizenship concepts into CCUS policies. Education: Promotes understanding and engagement in CCUS through a global citizenship lens. Practice: Encourages practices that foster global citizenship in CCUS.

Webinar/ Pathway	Key Contributions	Key Insights/ Speakers	Advancements in Policy, Education, or Practice
6. Harnessing Ethics in Action: The Role of Community-based Organizations and NGOs in Advancing SDGs	How community-based non-governmental organizations Can drive ethical actions that support youth-led initiatives and innovations for achieving the SDGs	Santera Matthews (IL Green New Deal), Melanie Minuche (Alianza Americas)	Policies: Encourages ethical actions in community-based organizations and NGOs. Education: Enhances understanding of the role of ethics in achieving the SDGs. Practice: Promotes ethical practices in community-based organizations and NGOs.

APPENDIX-II

Voices of Youth

**Shriya Iyer, Grade 9 (aged 14 years).
Millburn High School, New Jersey, USA**

It was an honor to be a part of the Eco Ambassador workshop at Columbia University on September 17, 2023. Discussing the regional problems with people from all over the world during the event was truly eye-opening. Our conversations brought to light the issues people of different backgrounds face. Whether it be education, or the changing environment, facing these core problems with a different perspective generated ideas we certainly wouldn't have thought of alone.

The group I was with in the workshop consisted mainly of students from Andhra Pradesh, a state in the southern coastal region of India, as well as students from the coastal state of New Jersey, USA. Talking with them all made me realize the extent to which our education in school concerning the SDGs is lacking. Although we have a course on environmental science, which is a good start, it fails to mention global issues on the other SDGs, such as education, health, poverty, gender inequality, sustainable cities, etc. Our courses on environmental science are optional as well, meaning that a large majority of the student population will not gain exposure to these crucial topics. Not only this, but schools nationwide make very little effort to put all the theory about sustainable development into actionable plans. To combat this gap, we devised an outline of a program by which students, as well as teachers, around the globe could be educated on the issues we are currently facing. Our criteria for this program were to go beyond the environmental aspects of global issues and include the social and economical impacts involved; the course would be mandatory for all students. While the class may meet perhaps once a week, we believe that everyone should learn about the problems we are facing across the world.



Education is not the only way to garner advocates for the environment. Other groups in the workshop had amazing ideas on the use of artificial intelligence (AI) to further our progress. This is intriguing, especially considering the power we know AI has now and may have in the future. The support of AI envisaged included allowing the automation of repetitive tasks so that we can work on more advanced projects earlier. This would allow any insights within large amounts of unstructured data to be revealed sooner and avoid time-consuming human analysis and management. This way millions of resources across the world could be brought together to solve complex problems. AI can be used in the classroom as well, not only to help the students, but the teachers as well, creating more informative environments in which to learn.

Overall, a truly effective way to learn about global problems is to communicate with our peers from different countries. This workshop was an amazing experience, one I would definitely love to have again. It taught me about the different aspects of climate change, and how the problems that exist in our country may not be the same elsewhere. I am grateful for this life-changing educational experience.

**Eshan Akula, Grade 10 (aged 15 years).
Millburn High School, New Jersey, USA**

The afternoon workshop at Columbia University was a spectacular event. It was an enthralling experience that not only broadened my knowledge but also introduced me to new viewpoints and people who share a strong passion for environmental justice. In this reflection, I elaborate on what eco-initiatives mean to me personally, discuss how I envision the school's support in this endeavor, and elucidate my evolving perspectives on eco-innovation following the session. In addition, I reflect on what I learned from my intercultural and international encounters in the context of sustainability.

The workshop was absolutely fascinating. It presented participants with a one-of-a-kind platform and experiences. I couldn't help but be captivated by the varied eco-inventions exhibited while I sat with fellow participants. The variety of knowledge and dedication displayed by the student leaders each of whom are making a meaningful difference in their communities was absolutely astounding. This program provided a window into their world, allowing me to gain profound insights into their environmental concerns and the inventive solutions that were put in place. During the workshop, I was particularly drawn to the discussions surrounding the Sustainable Development Goals (SDGs). The workshop deepened my understanding of the interconnectedness of these goals and highlighted their importance. It reinforced my belief that eco-innovations have to cooperate together to be part of a broader strategy aimed at achieving the SDGs.

Eco-initiatives, in my opinion, help responsibly manage our planet's resources. They represent a concerted effort to reduce the



negative consequences of climate change, conserve biodiversity, and promote sustainability to assure the well-being of future generations. These projects cover a wide range of activities, from carbon footprint reduction to campaigning for policies that promote environmental conservation. Eco-initiatives are a call to action, a reminder of our obligation to protect the world around us.

In the context of our school, I believe there is a huge opportunity to support and engage students in eco-initiatives. While many students at our school are concerned about the environment, it frequently appears that they lack clear routes for action. To address this, the school could offer more opportunities to make an environmental impact as well as awareness raising programs. These programs would not only give students a place to share their thoughts and efforts, but would also allow them to act on their innovative ideas. We can empower students to take meaningful activities and promote good change by cultivating an environment of stewardship inside our schools. After our discussion with our international peers, the idea of creating forums for international collaboration stood out to me. Our peers from India explained that in their community and schools they lack initiatives such as Science, Technology Education, Arts and Mathematics (STEAM)-based competitions. They also expressed their interest in learning about international projects and activities. The potential for students from around the world to connect and collaborate on any type of innovative project is immense. Such exchanges would foster a global perspective and facilitate the sharing of practices. I believe that these intercultural and intercountry exchanges could be instrumental in accelerating progress toward our sustainability goals.

In conclusion, the workshop at Columbia University was an amazing experience that allowed me to learn so much. Eco-based initiatives represent a shared commitment to preserving our planet, and I see them as a call to action for all of us.

Suvid Bordia, Grade 8 (aged 13 years).

Newark Academy, New Jersey

Recently, I attended a conference at Columbia University that included a wondrous workshop where I was able to partner with other young climate ambassadors and explore current problems and solutions relating to the global environment. Although my group discussed a wide variety of topics, there were some specific ideas that resonated with me.

I was in a group that consisted of people from very diverse backgrounds, from a Canadian immigrant of Kenya to students of Andhra Pradesh, India. We spoke ardently about how various countries' climate situations and capabilities differ, whether it is due to economical, political, or other reasons. All of our group members gave specific examples they had experienced in their communities, and we made some discoveries. This topic then led to cooperation. We came to a conclusion that citizens and governments are equally important, as they both fuel each other to put in more effort.



For example, the government usually acts upon citizens' desires, so if a community is set on the environment, the government will try to satisfy what they want. This also works vice versa, as a government creates laws and movements, this will spread awareness throughout civilians and create a bigger movement to help the climate. This was an important finding that not only should be the base of all climate plans but also shows that it takes a small spark to ignite a larger motion. One type of administrative organization was our schools. We talked briefly about how they need to always be open to students' ideas because those will pave the way for the future.

We then transitioned to a more specific subject: food waste. It is very important because it negatively contributes to 10% of global emissions along with being the largest type of product in landfills. We discussed many solutions including a large scale response, modern technology usage, and consumer awareness. We presented our exchange to the other groups and participants of the workshop. I started by talking about food waste, and how I am developing an app that tries to reduce it for consumers. Then, my colleague gave an example of a small project started by two people to restore a lake that eventually became a larger program.

Next, another one of my colleagues talked about government incentives and how they are required to get people started in the movement. Finally, our great friends from Andhra Pradesh described current projects in India and their perspectives on those. The workshop hosted by Columbia University was truly a great experience and I was able to gather so much knowledge about our environment and eco-innovation.

**Aaryan Jain, Grade 10 (aged 15 years).
Millburn High School, New Jersey, USA**

Attending the 'Educating a Child' event at Columbia University was an enriching experience for me, helping me better understand the motives and needs of other communities around the world. I had the privilege to talk with a group of amazing students from South India and discuss how we could address sustainability globally. One idea that popped up was the Sustainable Development Forum, which would allow students from different parts of the world, who live in different climates, economies, and societies, to work together to come up with new ideas, and spread messages and movements globally. The concept was based on the principle that collaboration fuels innovation, and communication leads to empowerment. The students from India and the USA were unaware of the challenges that each group faced, and the unique solutions that were conceptualized to address them. Our discussions brought up a common theme: eco-innovation, which holistically addresses environmental and social problems by transforming technology, political systems, and other aspects of human life. Innovation, creativity, and a will to break precedents are required for societies to adopt a sustainable framework. From advances in renewable energy to more environmentally conscious methods of resource extraction, eco-innovation requires attention to the struggles of the



most marginalized and underrepresented. As sustainability aims to provide the same quality of life to all individuals on earth, eco-innovation must be democratized.

The Columbia University conference helped me realize the importance of schools in sustainability and innovation. They allow students to collaborate and work together from a young age and serve as a cultural and intellectual guide to students, influencing their beliefs and perspectives. In the future, schools will be key to nurturing sustainable mindsets and environmental consciousness in their students. However, this will require these institutions to adopt new curriculum standards and take a more hands-on approach to educating students about sustainability, encouraging students to help solve these problems themselves. This will be a radical transformation of the archaic, 20th-century scholastic model. It was enlightening to talk and learn about students from other parts of the world, who face many of the same challenges, but who experience them in different circumstances and deal with them in different ways. They helped me understand that for a sustainable future, we must acknowledge the common ground we share with each other, and prioritize solutions that serve us all.

Vidya Bindal, a sophomore at Millburn High School in NJ, USA.

I have been actively participating in the Eco-Ambassadors program since its pilot in 2019. Recognizing the significance of taking consistent action towards sustainability, I am dedicated to expanding my impact and inspiring others. Through this program, I have had the opportunity to engage with global voices like Dr. Sachs and witness inspiring initiatives in places like India and New York.

On Eco Innovation:

Eco innovation, to me, means implementing sustainable solutions to everyday challenges. Education, especially in the field of scientific research, plays a crucial role in promoting global sustainability. Whether it's businesses addressing climate issues or individuals making environmentally friendly choices like biking instead of driving, every action counts. Environmental activism also contributes to eco innovation by influencing policies and priorities.

How Schools Can Support:

Schools should prioritize foundational learning, encompassing not only literacy and numeracy but also social, emotional, and mental skills. It is crucial to incorporate green learning into every subject and allocate time for mental health matters. Continuous curricula focused on climate change and sustainability shape students' perspectives and foster a values-based approach towards the Earth.

Addressing Gaps:

Addressing the learning crisis requires a comprehensive approach. There is a gender gap in education and sustainability, with women being disproportionately affected by climate change. Providing green skills to females promotes education and helps break the cycle of poverty. Implementing new education standards poses



challenges for both developing and developed countries, necessitating the availability of tools and resources. Funding is a critical gap that needs to be addressed; Dr. Sachs emphasized the importance of significant contributions from companies towards green education.

Reflections on Eco Innovation:

Eco innovation knows no boundaries, encompassing educational programs and youth initiatives. Examples such as 'Globe from Home', which utilizes technology for climate action, and UNICEF's 'Think Equal', which promotes emotional skills globally, showcase the diverse possibilities. The lecture series highlighted the need for financial support from international companies to drive meaningful change.

Intercultural/Inter-country Engagements:

Engaging with diverse perspectives has underscored the fact that climate change is a global crisis affecting people worldwide. Collaborating with counterparts in India has provided a sense of unity despite cultural and language differences. These interactions have instilled hope that, as young people, we can work together to slow down and potentially reverse climate change.

Eshaan Jain, a junior at the Pingry School in New Jersey, USA.

As a participant in Columbia University's Eco-Ambassador program, I have developed a passion for the Sustainable Development Goals (SDGs) and local environmental issues, with a focus on reducing plastic pollution and preserving our oceans.

My interest in sustainability began in 5th grade when I joined my school's Green Team and was introduced to the concept of environmental justice. This experience opened my eyes to the environmental disparities in our town and sparked my interest in sustainability.

In 2018, I participated in an Earth Day Poster competition, where I learned about the severe consequences of plastic pollution in our oceans. My younger brother Aaryan and I launched a campaign to reduce single-use plastic in our community, successfully advocating for a local ordinance banning plastic straws and bags.

My commitment to sustainability has grown, and I have focused on initiatives such as promoting native plants to support ecosystems (SDGs 13 and 15) and engaging in discussions with local politicians about sustainability policies. I have also taken on the role of coordinating youth efforts for Millburn for Climate Action, a citizen volunteer group.

Furthermore, I co-founded AllForOceans, a student organization dedicated to ocean conservation (SDGs 13 and 14). We have expanded our reach, organized cleanup drives, and created awareness through social media campaigns.



During the Technological ESD Project with Columbia University and Tel Aviv University, I worked on integrating green technologies into schools in rural areas, emphasizing climate education.

Participating in the Eco-Ambassador program has connected me with inspiring mentors and global leaders. I attended workshops and engaged with students worldwide, motivating me to drive positive change.

Convenings that showcase youth-led projects and amplify their voices are crucial in promoting youth-led innovation for the SDGs. SDSN's national chapters, including Youth Chapters in Canada, Mexico, and the USA, serve as catalysts for such convenings. Examples of these include 'SDG Week' in Canada, the 'Youth Solutions Report Mexico 2020' in Mexico, and initiatives like the Globus Podcast and Pilot blog in the USA. In Millburn, New Jersey, the Eco-Ambassador program has made significant strides in sustainability education and advocacy.

These initiatives demonstrate the power of youth-led action in advancing the SDGs and creating a more sustainable future.

