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REGIONAL YOUTH LEADERSHIP MOBILITY PROGRAMME

THE GREEN TRANSITION KNOWLEDGE GAP AMONG YOUTH IN ALBANIA, NORTH MACEDONIA AND SERBIA

OPEN SOCIETY FOUNDATIONS
WESTERN BALKANS

Disclaimer

This Advocacy Research Report is prepared by the Youth action in the dual transition: digital and environment Working Group of the Regional Youth Leadership Mobility Program 2024 (RYLMP).

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The Regional Youth Leadership Mobility Programme is a collaborative effort between the Centre for Science and Innovation for Development (SCiDEV), the Youth Educational Forum (YEF) from North Macedonia, and the Youth Initiative for Human Rights (YIHR) from Serbia with the financial support of the Open Society Foundations in Western Balkans (OSFWB).

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Introduction

Climate change is a well-documented global threat, widely acknowledged since the late 20th century. Human activities, especially those originating from the industrial era and modern lifestyles after World War II, have played a significant role in environmental degradation. This awareness sparked international efforts to combat climate change, particularly during the 1990s.

In 1992, the foundation for combating climate change was established with the creation of the "United Nations Framework Convention on Climate Change" (UNFCCC)[1]. This was followed by key agreements such as the "Kyoto Protocol"[2] in 1997 and the "Paris Agreement"[3] in 2015. These agreements highlight climate change as one of the most significant challenges of the 21st century, with serious implications for future generations.

These international agreements have driven the development and adoption of new technologies aimed at protecting biodiversity, reducing greenhouse gasses, and mitigating pollution. These "green" technologies include renewable energy sources like solar panels, water and soil purification technologies, digital innovations, and new economic models such as circular economy. They are part of what is known as the "Green Transition."[4]

Amid the harm posed by COVID-19 and other climate-related issues, the European Union (EU) has emerged as a leader in the "Green Transition".

The EU's "European Green Deal"[5] aims to transform Europe into a modern, resource-efficient, and competitive economy with no net greenhouse gas emissions by 2050. This ambitious roadmap is designed to make Europe the first climate-neutral continent.

The EU's leadership in promoting sustainability and energy neutrality set a global standard, influencing not only its Member-States but also neighboring regions like the Western Balkans. This influence was seen during the "Western Balkans Sofia Summit" on 10 November 2020, where Albania, North Macedonia, and Serbia, along with the other Balkan countries, endorsed the "Sofia Declaration on the Green Agenda for the Western Balkans."[6] This declaration aligns closely with the "European Green Deal" and EU's "green" policies.

For Albania, North Macedonia and Serbia, the Green Transition presents an opportunity for progress. Each country is at a different stage in the transition, with efforts focused on improving energy efficiency, increasing renewable energy usage, and reducing pollution. But they face challenges such as outdated infrastructure, limited financial resources, and the need for comprehensive reforms. As aspiring EU-members, they also need to align their environmental policies with EU standards throughout the 4th Cluster of the negotiating process with the Union[7].

Since 2021, the European Commission has committed €1.25 billion to support the implementation of the Green Agenda in the Western Balkan under the "Western Balkans Investment Framework" (WBIF)[8], together with the adopted Energy Support Package for the Western Balkans.

Youth in these countries are particularly affected by climate change, with potential impacts on their quality of life, health, and economic opportunities. Although young people are highly adaptable to new technology and deeply concerned about environmental issues, they often face knowledge barriers to meaningful participation in green and digital initiatives.[9]

Addressing this gap along with the lack of engagement of youth is essential. By providing young people with the necessary knowledge and tools, we can drive their enthusiasm and creativity to look at pressing environmental issues and take action.

The goal of this research is to understand the Green Transition knowledge gap among youth in Albania, North Macedonia, and Serbia. This will help develop information and recommendations to advance youth participation and harness their potential to drive the Western Balkan countries towards a more sustainable and digital future, in alignment with their European counterparts.

Zooming in: Green, Digital and Youth Policies in Albania, North Macedonia, and Serbia

The Green Transition Knowledge Gap among Youth in Albania, North Macedonia and Serbia examines the differences in environmental awareness, education, and policy implementation in these Balkan countries as they work towards sustainable development. With the global push for green energy and sustainable practices growing stronger, it's important to understand how these nations are adapting.

To fully comprehend the current state of how young people are playing a part in the green and digital transitions in Albania, North Macedonia and Serbia, it is necessary to first do an overview of current policies. By analyzing these sources, we want to get insight into how these countries and their youth are handling environmental issues and incorporating digital technology to promote sustainability.

The methodology for this study combines desk research and in-person meetings. Desk research entails evaluating a variety of papers, including government policies, legislative actions, strategic plans, reports from non-governmental organizations, and academic studies. Key sources include national government websites, international organization databases, and scientific journals. In addition to desk research, we spoke with important stakeholders in each country to have a deeper understanding of the local and national context. These stakeholders included government officials, representatives from environmental and digital technology NGOs, professors who specialize in environmental research and policy, and young leaders involved in sustainability efforts. The meetings provided vital firsthand insights and helped corroborate the information gleaned from desk research.

Despite significant support from various stakeholders for environmental initiatives, a large gap remains in the knowledge and application of Green Transition principles at both governmental and societal levels. This research seeks to identify the root causes of this gap and provide actionable insights to bridge it, helping these countries effectively contribute and benefit from the global Green Transition.

Albania

Country Context

Albania, a country strongly committed to European and sustainable development, has advanced significantly in its green transformation. Through the use of its substantial hydroelectric resources and investments in solar and wind energy, Albania has made great strides towards becoming a more environmentally friendly country. Albania is becoming a regional leader in the energy transition, according to a recent article in Strategic Analysis.[10]

Albania generates between 97-100% of its electricity by hydropower. The largest hydropower plant in the country is the Drin River Cascade, consisting of three main plants: Fierza, Komani and Vau i Dejës. Albania has about 2,100 MW of installed hydroelectric capacity, and depending on the weather 5-7TWh of electricity is produced from hydropower each year.[11]

In addition, in recent years Albania has increasingly invested in solar energy; approximately 50 MW of solar capacity was constructed by 2023, while there are projects still in the planning stage. Notable solar parks are Karavasta and Spitalla; Karavasta alone is anticipated to contribute 140 MW to the grid.[12]

Wind energy development is still in its early stages. However, there are plans to increase the installed capacity with several wind farm projects, as the government has set ambitious goals to increase wind energy capacity, aiming several hundred MW by 2030.

Albania is working on integrating the Green Agenda aligned to the European Union's Green Deal[13], with the aim of harmonizing regional policies with EU standards, in order to facilitate the path towards EU accession and contribute to the goal of carbon-neutral Europe by 2050. Moreover, there are several projects enhancing waste management, promoting recycling in order to transition into a circular economy, and supporting sustainable economic growth.

Despite these efforts, environmental problems persist, including waste management, deforestation, and air and water pollution. Changes in environmental policy are driven by EU membership and are consistent with the EU Green Deal. [14]

Review of Documents, Institutions and Youth

Albania has implemented a number of frameworks and policies to address environmental sustainability and climate change, aligning with EU norms and worldwide standards. Albania's green policy landscape is supported by the following key documents:

- **National Strategy for Development and Integration (NSDI) 2015-2020:** this strategic document focuses on environmental protection, social inclusion and economic growth. It relies on integrating environmentally friendly methods across all sectors to ensure that development activities are not harming environmental integrity.[15]
- **Nationally Determined Contribution (NDC, revised 2018):** this document outlines Albania's dedication to reduce greenhouse gas emissions by 11.5% below business-as-usual levels by 2030. It emphasizes efforts to adapt in sectors such as urban planning and coastal zone protection.[16] These commitments are not without difficulties, though, especially in coastal areas where development pressures like urbanization and tourism could jeopardize the sustainability of the environment. For instance, questions concerning how to strike a balance between environmental preservation and economic

growth have been highlighted by certain large-scale initiatives, like the Jared Kushner project. This emphasizes how crucial it is to make sure that, via careful planning and observance of environmental standards, future development is in line with Albania's long term sustainability goals. [17]

- **Third National Communication (NC3):** This document details Albania's climate change activities, policies, and commitment to lowering greenhouse gas emissions. It outlines a long-term, low-carbon development strategy.[18]
- **National Renewable Energy Action Plan (NREAP):** This plan sets ambitious goals for increasing the share of renewable energy in Albania's energy mix. It outlines specific actions to promote renewable energy projects, enhance energy efficiency, and develop a sustainable energy market. Expanding upon Albania's substantial reliance on hydropower, the NREAP seeks to diversify energy sources through the encouragement of wind and solar energy projects, the improvement of energy efficiency, and the creation of a market for sustainable energy. As Albania moves towards a greener economy, the strategy also takes into account the larger environmental background, acknowledging the necessity of lowering waste and pollution. Effective waste management and reducing pollution from conventional energy sources are two current issues, which emphasizes how crucial the NREAP's objectives are to promoting a cleaner, more sustainable future for the nation.

Apart from diversifying the energy mix, the NREAP tackles important environmental issues like pollution and waste management. Albania produced 0.9 million tons of municipal waste in 2021 compared to 1.4 million tons in 2015; this decline was mostly attributed to better waste reporting practices rather than a real decrease in waste production. Out of this waste, paper accounted for 8.9%, plastic for 9.2%, and organic waste for 58.1%. Unfortunately, 73% of the waste produced is improperly managed, and a sizable amount of it is dumped into the Mediterranean Sea untreated, adding to the contamination of the maritime environment. Albania contributes significantly to plastic pollution; each year, about 20 kg of plastic are lost per person into the Adriatic-Ionian basin. Albania's recycling rate is still low at 17%, compared to the EU average of 49%, despite recent investments in recycling infrastructure, including five operating recycling plants and ongoing waste separation pilot projects. Furthermore, the environment and public health are still at risk from industrial air pollution, with the mining, cement, and oil industries producing most of the pollutants. [19]

Institutions

Several key governmental bodies play pivotal roles in driving Albania's green transition:

- **Ministry of Tourism and Environment**: Leads environmental policy development and implementation, including climate change and sustainable tourism initiatives.
- **Ministry of Infrastructure and Energy**: Shapes energy policies, promoting renewable energy projects and enhancing energy efficiency.
- **National Agency for Environment (AKM) and National Agency for Natural Resources (AKBN)**: Monitor environmental quality, enforce regulations, and manage the sustainable use of natural resources.
- International donors such as the **EU, GIZ, World Bank, and USAID** substantially assist Albania's efforts towards green development due to local funding constraints.

Youth

In Albania, young people represent a significant proportion of the population. According to the 2021 census, youth aged 15 to 29 account for nearly 20% of the total population. Most of them live in major cities like Tirana, Durrës and Shkodër. Youth participation in Albania's green transition efforts is still growing, but their potential achievements are becoming more visable. Youth Innovation Hubs are an important project that promotes this involvement. These hubs give young people access to the means, guidance and collaborative spaces to carry out responsive solutions to environmental problems. For instance, Ofiçina Hub is a creative space for innovation and co-working facility that assists young inventors and businesses. Ofiçina has played a significant role in involving Albanian youth in the green transition by organizing a number of events and initiatives targeted at encouraging innovation in fields including sustainable agriculture, waste management, and renewable energy. [20]

The National Youth Agency and the National Youth Strategy and National Youth Action Plan 2022-2029 mark significant steps toward involving young people in policy-making processes. These frameworks, developed through broad consultations with stakeholders and youth organizations, aim to promote environmental sustainability and green initiatives.

Programmes specifically designed to include young people into green transition initiatives are limited and vary greatly between locations. The plan includes efforts aimed at climate change adaptation and mitigation, ecosystem restoration, and creating green economies. These initiatives aim to provide employment and training opportunities for young people, empowering them to participate actively in the environmental conservation and sustainable development.

Digital Transformation

Albania is embracing digitalization as a key component of its green transition. Platforms such as the E-Albania Portal and the Albanian Investment Development Agency (AIDA) support renewable energy projects and improve energy efficiency by providing resources and services online. In addition, the Green Energy and Efficiency Fund (GEEF) leverages digital tools to manage and monitor projects focused on sustainability. Initiatives like the Circular City Labs are also being explored to promote circular economy practices in urban environments, fostering innovation and sustainable urban planning. These efforts highlight Albania's commitment to integrating digital solutions into its environmental strategies.

2.43 million people in Albania were online as of January 2024, which translates to an internet penetration rate of 85.8% of the total population. Even if the percentage of people using the internet dropped by 0.3% from the previous year, the majority of the population is now connected online. Nevertheless, at the beginning of the year, about 401,000 people or 14.2% of the total population, were not online. The aforementioned data highlights the continuous necessity of promoting digital inclusion as means of effectively involving all facets of society in the green shift. [21]

Though their potential contributions are increasingly recognized, young people's involvement in these efforts is still restricted. Although Albania has several youth representation organizations, such as the Youth Parliament, Student Governments, and municipal youth councils, specific programmes to actively involve youth in green transition efforts are still in the early stages of development.

North Macedonia

Country Context

North Macedonia, a landlocked country in Southeast Europe on the Balkan Peninsula, has faced numerous challenges since gaining independence three decades ago. According to the 2021 census, the population is declining steadily due to economic, political, and social issues, as well as the emigration of young professionals due to insufficient youth policies and low-quality education.[22] Health problems and environmental pollution also contribute to this decline. Major cities like Skopje and Tetovo experience poor air quality, particularly in winter, due to coal and wood heating, industrial emissions, and heavy traffic.[23]

In terms of environmental quality, the country ranks 114th according to the Youth Progress Index, behind neighbouring Western Balkan countries like Albania (90th) and Serbia (88th).[24]

Youth in North Macedonia is crucial for its future development. Surveys show they are aware of climate change, but there is lack of knowledge about sustainable and green development, as well as European and UN policies, due to limited institutional support, access to information, and practical experience.[25]

North Macedonia's goal of joining the EU depends largely on meeting EU regulations, particularly those related to environmental sustainability. The nation currently falls short of several key EU standards, which makes it difficult to negotiate with the EU, especially in the Green Agenda and sustainable connectivity areas (4th Cluster of the negotiating chapters).

The transition to green policies and digitalization is important not only for improving the quality of life but also for its EU aspirations. According to the European Commission's 2023 report, North Macedonia still needs to align with several key EU regulations. Challenges such as a lack of specialized staff and weak institutional and administrative capacity make it hard to carry out effective environmental impact assessments.

Overall, its policies on environmental sustainability have been insufficient, contributing to depopulation and making the EU accession process more difficult in the future.[26]

Part of this research aims to address the knowledge gap among young people in North Macedonia regarding the Green Transition. It will assess their current level of environmental awareness, educational opportunities, and engagement in environmental issues. Additionally, the research will present and explore the role of government institutions and NGOs in implementing this process and supporting youth in accessing the necessary skills and knowledge on this critical issue.

By identifying these gaps and challenges, the research will propose strategies to increase youth participation in the green transition, thereby improving environmental quality and promoting sustainable development in the region.

Overview of the Problem

As part of the Regional Youth Leadership Mobility Programme (RYLMP), a portion of this research was conducted during a two-week mobility period in North Macedonia from 25 March 2024 to 7 April 2024.[27]

During this period, we visited various government institutions and NGOs, including the

former President of the Republic of North Macedonia, H.E. Prof. PhD Stevo Pendarovski, Gjorgi Tasev, who served as the Associate of the Prime Minister for Youth Policies, Bojan Marichic, who served as the Deputy Prime-minister of the Government of the Republic of North Macedonia responsible for European Affairs, National Youth Council of Macedonia (NYCM), the President of the Student Assembly of UKIM, the Regional Youth Cooperation Office (RYCO), and the Ministry of Environment and Physical Planning.

**These visits occurred predominantly under the administration of the previous government, which changed on 23 June 2024. The current government consists of the previous opposition parties.*

From the data gathered, we identified the following challenges related to the Green Transition Knowledge Gap among Youth in North Macedonia:

Lack of Policy and Governance: Inconsistent environmental policies and poor governance make it hard to promote sustainability among the youth. Without clear government strategies, funding, organization, and support for green initiatives, the knowledge gap continues to grow.

Limited or Difficult Access to Information: There is not enough easy-to-find information on green technologies, sustainable practices, and user-friendly environmental policies. This makes it hard for young people to understand the benefits and opportunities of moving towards a greener future.

Outdated Education System: The education system in North Macedonia does not prioritize or promote environmental education and sustainability. As a result, many young people graduate without a solid understanding of environmental challenges and potential solutions. Government institutions also don't provide clear guidance on green job mapping or opportunities, which adds to the problem.

Lack of Media Coverage: Many young people in North Macedonia are not well-informed about environmental issues and the importance of sustainable practices. This lack of awareness extends to the broader concepts of climate change, renewable energy, and sustainable development goals. There is also little public discussion and media coverage on these topics, which limits young people's involvement in sustainable practices.

Economic Hardship: Economic factors also contribute to the gap. Young people often see sustainable technologies and practices as too expensive or hard to access, which discourages them from being environmentally friendly.

In summary, young people in North Macedonia encounter obstacles to developing green literacy. Unclear policies, lack of information, outdated education, and financial challenges hold them back from getting involved in sustainability efforts. Overcoming these barriers requires support from leaders, educators, and businesses to provide better resources and opportunities for youth to participate in creating a more sustainable future.

Review of Documents, Institutions and Youth

To more accurately identify the knowledge gap and the current level of awareness among youth regarding the Green Transition in North Macedonia, it is crucial to examine the following data in detail:

Youth Demographics:

According to North Macedonia's 2021 Census[28] emigration has significantly affected

young people aged 15 to 29. While big cities have seen a notable decrease in this age group, the situation is even worse in smaller municipalities in the Western and Eastern parts of the country. In these areas, more than half of the young population has emigrated over the past two decades, highlighting an especially alarming decline.

The percentage of youth in the total population dropped from 24% in 2002 to 18% in 2021. This decline indicates significant demographic changes over the past two decades. In numbers, there are about 80,000 fewer young people now in North Macedonia compared to 2002.

However, in contrast to other countries in the region and the European Union, North Macedonia boasts a higher proportion of young people in its overall population. By comparison, Serbia's young population is 16.6%, while Albania's is 25.3%, and North Macedonia's stands at 18%.

In terms of employability, 28% of the youth in North Macedonia are unemployed. This figure is slightly higher than in Albania, where the youth unemployment rate is 27.8%, and higher still compared to Serbia, where it stands at 20%.

Regarding education, 48% of young people in North Macedonia have completed secondary education as their highest level, 30% have completed primary education, and 14% have completed higher education.[29]

Climate Change Awareness:

In November 2021, the UNDP and the Ministry for Environment and Physical Planning conducted a significant survey on public perceptions of climate change in North Macedonia. This survey, part of the "Strengthening Institutional and Technical Capacity to Improve Transparency on Climate Change under the Paris Agreement" (CBIT) project, builds on earlier surveys from 2014, 2016, and 2019, and is considered the most relevant to date.[30]

The survey received 3,089 online responses from a wide age range. The largest group of respondents was aged 40–54 (38%), followed by 30–39 (25%), and 55–64 (13%). Women comprised 74% of respondents, consistent with the 2019 survey. In terms of education, 58.8% had completed undergraduate studies, and 17% held a master's degree, with 75.8% having higher education overall.

Key concerns highlighted by the survey were:

- Lack of clean drinking water (60%)
- Climate change (59%)
- Corruption and crime (58%)
- Nature degradation and extreme weather (55%)
- Poverty and food security (48%)
- Economic issues (46%)
- Poor education quality (44%)
- Unemployment (39%)

Nearly all respondents (98%) noticed environmental or climate change over the past decade, particularly extreme temperatures (30.3%), seasonal shifts (27.8%), and dry periods (19.1%). Motivations for environmental action included a desire for a healthy environment (28.7%), concern for future generations (24.4%), and a sense of civic duty (21.1%).

Challenges to taking action included the belief that government and industry should lead (49.9%), lack of information (17%), uncertainty about how to engage (16.9%), and doubts about personal impact (7.6%).

Respondents primarily got information from the Internet (18.3%), social media (15.9%), and television (14%). However, awareness of platforms like www.klimatskipromeni.mk (5%) and the Ministry's official site (4.9%) remains low, indicating a need for greater visibility and promotion.

In conclusion, the survey shows strong awareness and concern about climate change among North Macedonia's residents. There is a recognized need for collective action by governments and industries. While motivations for individual actions are varied, many people desire a healthier environment and feel responsible for future generations. Challenges such as insufficient information and uncertainty about effective engagement highlight the need for improved public education and outreach.

Education:

The Ministry of Education and Science is responsible for developing policies related to education, science, and innovation. This includes overseeing primary, secondary, and higher education.

Preschool Education:

Young children learn about the environment through games, nature walks, and discussions, with a focus on caring for plants, recycling, and keeping things clean.

Primary Education:

Environmental topics are taught in Natural Science for grades 1-6 and in Biology, Geography, and Chemistry for grades 7-9. Civic Education also covers democracy, human rights, and sustainability.

Secondary Education and Vocational Education and Training:

Environmental issues are included in subjects like Biology, Geography, and Chemistry. Eco-schools follow specific environmental guidelines, and vocational training includes relevant environmental topics.

Higher Education:

In 2016-2017, about 9% of the Master's degrees and 20% of the Doctoral degrees were in environmental and related fields. There is a shortage of graduates in environmental fields, challenging North Macedonia's Green Transition.

While environmental education is included from preschool through secondary education in North Macedonia, its implementation and impact are unclear. Higher education offers limited "green" degrees and practical training, resulting in few graduates in environmental fields. This shortage of green professionals makes the country's Green Transition more challenging. More efforts are needed to enhance environmental education and support the sustainable development goals.[31]

Energy:

In North Macedonia, the energy sector is the main contributor to climate change, making renewable energy vital. The country's aging, coal-dependent infrastructure dominates over 80% of energy demand, leading to high greenhouse gas emissions. Coal-based electricity

accounts for 50% of domestic production, and old power plants, inefficient heating, and transportation pollution worsen air quality and emissions.[32]

A 2019 UNECE review[33] found energy production responsible for significant pollution: 41% of NOx, 91% of SO2, 8% of CO, 11% of PM10, and 6% of PM2.5 emissions. Residential heating is a major PM source. Energy production also emits notable amounts of lead (38%), mercury (45%), and cadmium (49%). Lignite and heavy fuel oil dominate electricity production, with natural gas mainly used for heating. As of 2018, biofuels have not been used.

The European Commission's 2023 report[34] noted improvements in the legal framework for renewable energy investment. However, renewable energy made up only 17.3% of the mix in 2021. Amendments to the 2018 Energy Law encourage solar power investments, and the central bank supports financing for renewable energy projects. Progress includes regional gas interconnectors and solar power investments. The energy crisis highlights the need for North Macedonia to accelerate its Green Transition and reduce reliance on gas and coal.

Waste Management:

The waste sector in North Macedonia is a significant contributor to greenhouse gas emissions and air pollution, presenting a major environmental challenge for the country. In 2014, this sector accounted for 19% of the nation's total greenhouse gas emissions, making it the second highest emitting sector. The disposal of solid waste is the largest and fastest-growing source of these emissions.[35]

Air pollution remains a critical issue, especially in large cities, with limited progress in air quality monitoring and no recent legislative developments addressing air quality concerns. Despite the introduction of the first national plan for waste prevention (2022-2028) in September 2022, which outlines measures for various stakeholders, concrete improvements have been slow. The Criminal Code amendments that took effect on March 7, 2024, aim to combat environmental damage by penalizing ecocide, although prosecutions for environmental crimes are still rare despite frequent pollution incidents. The use of plastic bags has decreased by 80% since their ban at the end of 2021.

Waste management in North Macedonia relies heavily on landfilling rather than waste prevention and reduction. The Drisla Landfill, serving the Skopje region, is the only permitted landfill, while rural areas often use non-standard dumpsites. Efforts to close these non-standard landfills are ongoing. Composting is minimal, with only 2,239 tons of biological waste composted in 2016. Most landfills do not meet technical standards and pose environmental hazards. From 2014 to 2016, the average person generated 375 kg of municipal solid waste per year, with 77% going to landfills and the rest being incinerated or openly burned. Illegal landfills and their burning significantly contribute to air pollution, requiring continuous removal efforts by municipal authorities.

Some progress includes preparing tender documentation for a new regional landfill in Novaci, developing waste management infrastructure, and starting separate collections for electrical equipment, batteries, and packaging waste. Despite plans to start construction last year, the Novaci landfill project has not begun. Environmentalists urge acceleration to address pollution in the Pelagonija and Southwest Planning Regions and meet UNESCO recommendations. The previous minister promised completion by the end of 2024, but the current status is uncertain.

Non-Governmental and Civil Society Organizations:

North Macedonia has nearly 9,000 CSOs, but they are not classified by activity in the Central Registry[36], making it hard to estimate the number of environmental CSOs. The government's department for cooperation with NGOs[37] lists 42 organizations for nature protection and biodiversity, 40 for education and science, and 31 for children, youth, and students. These numbers can vary because many NGOs contributing to the green agenda might be registered under different sectors, and the system may not have been updated recently.

Some of the most active environmental CSOs in the country include:

- **Macedonian Ecological Society** (nature protection and biodiversity)
- Association for the Protection and Improvement of the Environment (policies)
- **Eco-Logic** (environmental protection and conservation)
- **Go Green** (environmental education, waste collection)
- **Zero Waste** (e-waste and battery collection)
- **Journalists for Human Rights** (environmental awareness, access to justice)
- **Front 21/42** (environmental awareness, access to justice)
- **Eko-Svest** (civic awareness, active participation)
- **Association for Education, Communication and Consulting** (environmental education)
- **Macedonia without Waste** (waste recycling)
- **ARNO** (social innovation)
- **Yes for Less** (sustainable living and awareness)
- **Milieukontakt Macedonia** (sustainable development).

An inter-party parliamentary group focused on nature protection, pollution control, and climate change, which included representatives from civil organizations, was active in the previous session of the country's Assembly until it disbanded due to regular elections on 13 February 2024.

In summary, NGOs and CSOs in North Macedonia play a crucial role in informing the public, developing policies, conducting research, and educating the youth on environmental issues.

Development Aid Agencies:

North Macedonia benefits from several development aid agencies that support its socio-economic growth across governance, economic development, education, and infrastructure, with a strong focus on the Green Transition, environmental protection, and youth engagement.

Key agencies and their initiatives include:

- **USAID:** Focuses on democracy, economic growth, education, and environmental protection. It promotes energy efficiency, renewable energy, sustainable agriculture, and youth empowerment.
- **GIZ:** Supports economic development, vocational training, and energy efficiency, particularly in buildings and solar energy, while strengthening municipal services.

- **AFD:** Targets climate, education, urban development, and governance. It works on reducing emissions, boosting energy efficiency, and supporting digital transformation, with a recent €50 million green investment package.
- **SIDA:** Focuses on human rights, democracy, gender equality, and climate, addressing air pollution, waste management, and public awareness.
- **SDC:** Promotes democratic governance, sustainable economic development, and climate-resilient infrastructure.

These agencies collectively advance North Macedonia's Green Transition, climate goals, and youth empowerment.

Institutional Framework

Until 7 June 2024, eight ministries in North Macedonia were actively engaged in Green Governance initiatives. The Ministry of Environment and Physical Planning continues to lead the development of climate policy and represents the country in global climate agreements, including the UNFCCC.[38]

Other ministries were Ministry of Agriculture, Forestry and Water Management, Ministry of Economy, Ministry of Transport and Communication, and Ministry of Finance.

Below is a table detailing the previous government agencies and their previous roles on the issue:

SN	Government agencies	Green Governance
1.	**Ministry of Environment and Physical Planning**	• Monitoring the environment • Protection of waters, soil, flora and fauna, air and the ozone layer from pollution • Proposing measures for solid waste treatment
2.	**Ministry of Economy and Deputy Prime-minister's Office for Economic Affairs** **restructured*	• Proposing measures for development and ongoing economic policy in the areas of production, trade, tourism, hospitality services and handicraft. • Energy infrastructure development and mining. • The Deputy oversees efforts to achieve the Sustainable Development Goals and manages the Green Climate Fund.
3.	**Ministry of Agriculture, Forestry and Water Economy**	• Agriculture, forestry and water management; • Monitoring and studying the situation of water bodies, maintenance and improvement of water regimes; • Hydrological and agro-meteorological measurements, as well as anti-hail protection; • Studying and research of meteorological, hydrological and bio-meteorological events and processes
4.	**Ministry of Transport and Communications**	• Promotion of other types of transport (cable cars and ski lifts, etc.)
5.	**Ministry of Labour and Social Policy** **restructured*	• Advancement of gender equality
6.	**Ministry of Education and Science**	• Education and science of all types and degrees

7.	**Ministry of Information Society and Administration** **restructured*	• Development and coordination of policies related to human resource management • Integration of digital technologies and digitized data across the economy and society.
8.	**Ministry of Finance**	• Preparation and execution of budget • Macro-economic policy and policy for development of national economy • Treasury system • Fiscal decentralization
9.	**National Hydro-meteorological service**	• Generate hydro-meteorological data
10.	**Crisis Management Center**	• National platform for disaster risk reduction

** These roles are expected to undergo partial reorganization under the new government, though the final structure has not yet been finalized. However, several ministries and agencies will continue to exist and operate with their current responsibilities.*

Other government entities are likely to remain involved in climate change and Green Transition initiatives in the country:

National Climate Change Committee: Established by the government, this committee serves as a key platform for national climate action. It includes representatives from government bodies, universities, the Macedonian Academy of Sciences and Arts, the private sector, and civil society.

The Ministry of Environment and Physical Planning publishes **Biennial Update Reports (BURs) on Climate Change** with the latest issued in 2021[39]. These reports are supported by international institutions like the Global Environmental Facility (GEF) and the United Nations Development Programme (UNDP).

*On 8 June 2024, the Assembly of the Republic of North Macedonia, elected during the 8 May 2024 elections, adopted significant amendments to the Law on Organization and Work of State Administration Bodies. The reorganization expands the number of ministries from 16 to 20.[40] Key changes related to the Green Transition, youth and climate change policies are as follows:

- Ministry of Labour and Social Policy: The labour segment was added to the Ministry of Economy, transforming it into Ministry of Labour and Social Policy.
- Ministry of Social Policy, Demography, and Youth: The existing Ministry of Labour and Social Policy was restructured and renamed.
- Ministry of Energy, Mining, and Mineral Resources: Responsibilities for mining and energy were transferred from the Ministry of Economy to this newly established ministry.
- Ministry of Digital Transformation: This new ministry replaced the current Ministry of Information Society and Administration.
- Ministry for Administration: A separate ministry was created to handle administrative functions.

The impact of these changes on the country's green and youth policies and the future implementation of the Green Transition process remains to be seen.

Law for Climate Action:

The European Commission's 2023 report on North Macedonia[41] highlights the urgent need for the country to fully implement the Paris Agreement. One crucial recommendation is the adoption of the Law on Climate Action, which aligns with the EU 2030 framework. This pending law aims to reduce greenhouse gas emissions, help North Macedonia adapt to climate change, and support the broader goal of a climate-neutral Europe by 2050. Notably, the law has received little to no media coverage.

The law has progressed through several stages and was scheduled for implementation in the fourth quarter of 2024 by some members of the previous government. However, recent changes in the government have cast doubt on this timeline. Additionally, many key political figures seem unaware of the law's existence. The law's development involved multiple institutions, but the process lacked clear leadership, transparency, and well-defined institutional responsibilities.

Digital Transformation

According to the European Commission's 2023 report,[42] North Macedonia is moderately prepared for digital transformation and media. The country has made limited progress, with slight increase in electronic services for citizens and businesses. The country is integrating digital skills into primary and secondary education, however, there is a need for stronger efforts to ensure coherent and inclusive digital transformation in education and training systems.

In 2022, 75.57% of households had access to fixed broadband. Broadband coverage with speeds between 30-100 Mbps was at 82.84%, while coverage for speeds over 100 Mbps stood at 63.1%. Mobile broadband adoption increased to 86.12%, but only 2.53% of the households had access to ultrafast broadband. Online shopping has increased, but data collection based on the Digital Economy and Society Index (DESI) indicators needs improvement to enhance statistical performance and digital competitiveness. North Macedonia continues to participate in the Digital Agenda for the Western Balkans and benefits from the regional roaming-free agreement. As part of the 2019–2023 national broadband plan, 5G coverage has expanded to Skopje. Authorities are also implementing activities from the 2018–2022 National Cyber-security Strategy.

The national "E-services" portal has been upgraded, with EU assistance aiding the reorganization of state institutions. Now, 230 fully automated public e-services are available. The number of institutions connected to the interoperability platform has increased, but most state institutions do not use it due to lack of communication software. Despite these advancements, the number of digital services offered through the governmental "E-services" portal remains modest, with only 392 services, many of which are rarely used. It has 96,940 registered users.

**On 8 June 2024, the Assembly of the Republic of North Macedonia amended the Law on Organization and Work of State Administration Bodies. This resulted in the dissolution of the Ministry of Information Society and Administration and the creation of two new ministries: the Ministry of Digital Transformation and the Ministry of Public Administration.*

The Ministry of Digital Transformation will focus on developing a revised roadmap for digital transformation, creating a new national ICT strategy with a strong emphasis on cyber-security. It will prioritize investments in digital infrastructure and human resources

to protect citizens' personal data and oversee the country's media. Key responsibility of this new ministry is to integrate the Administration for Keeping Civil Registers, previously managed by the Ministry of Justice, to fully digitalize civil services via the "E-services" portal. Results are yet to be seen.

North Macedonia has made progress in digital transformation[43], such as expanding internet access and participating in regional initiatives. However, challenges remain, including the need for better institutional coordination, legal framework improvements, and a more comprehensive approach to digital education. Addressing these issues is crucial for effective and inclusive digital transformation.

Serbia

Country Context

Serbia's green transition is heavily influenced by its ambition to join the European Union. As an EU candidate-country for over a decade, Serbia is required to align its environmental policies with EU standards, particularly the European Green Deal, which aims for climate neutrality by 2050 (European Commission, 2020a). This political commitment necessitates the adoption of stringent environmental regulations and the implementation of sustainable practices overall.

The Serbian government has adopted several national policies, including the National Emission Reduction Plan and the Climate Change Strategy, to meet EU accession requirements (Government of Serbia, 2019). These policies are designed to reduce greenhouse gas emissions, promote renewable energy sources, and improve energy efficiency. However, economically, Serbia faces challenges in transitioning to a green economy. The country's economy is still significantly reliant on coal for energy production, with over 70% of electricity generated from coal-fired power plants (International Energy Agency, 2021). This dependency creates substantial barriers to reducing carbon emissions and transitioning to renewable energy sources.

Public awareness and acceptance of environmental issues are growing extremely slowly, driven only by increased exposure to EU environmental standards and advocacy from civil society organizations. However, there is still a significant gap in public knowledge and engagement with green practices. This is especially true when it comes to Serbia's youth.

Serbia's green transition is shaped by its EU accession ambitions, economic dependencies, and social dynamics. While significant challenges remain, particularly in reducing reliance on coal and fostering public engagement, there are also substantial opportunities for economic growth and sustainable development through green investments and international support. The coordinated efforts of the government, private sector, and civil society are crucial for successfully navigating this transition.

Air pollution remains one of Serbia's most critical ecological challenges. The country's reliance on coal for energy production, coupled with industrial emissions and traffic-related pollution, has resulted in poor air quality, particularly in urban areas. According to the World Health Organization (WHO), several Serbian cities consistently rank among the most polluted in Europe (WHO, 2021). Key pollutants include particulate matter (PM10 and PM2.5), sulfur dioxide (SO2), and nitrogen oxides (NOx), which pose significant health risks to the population.

Water pollution is another pressing issue, driven by industrial discharge, inadequate

wastewater treatment, and agricultural runoff. The Danube and Sava rivers, crucial for the country's water supply and ecosystem, are particularly affected. A study by the European Environment Agency (EEA) highlights that only about 10% of Serbia's wastewater is treated before being discharged into rivers, leading to high levels of pollutants and a significant impact on aquatic life and human health (EEA, 2022).

Waste management in Serbia faces several challenges, including low recycling rates, inadequate waste disposal infrastructure, and illegal dumping. The European Commission's progress report on Serbia's EU accession highlights the need for substantial improvements in waste management practices to align with EU standards (European Commission, 2023). Efforts are underway to enhance recycling programmes and reduce landfill dependency, but progress remains slow.

Deforestation and biodiversity loss are significant environmental concerns. Illegal logging, urban expansion, and agricultural activities have contributed to habitat destruction and the decline of native species. The World Wildlife Fund (WWF) has noted that Serbia's rich biodiversity, particularly in areas like the Stara Planina and Šar Mountains, is under threat due to these activities (WWF, 2021). Serbia is increasingly experiencing the impacts of climate change, including more frequent and severe extreme weather events such as floods, droughts, and heat-waves. The Global Climate Risk Index ranks Serbia as highly vulnerable to climate change effects, emphasizing the need for adaptive strategies and robust climate policies (Germanwatch, 2022). These events not only cause significant economic damage but also affect agriculture, water resources, and public health.

Review of Documents, Institutions and Youth

In Serbia, several institutions and organizations are at the forefront of the green transition. These include government bodies, research institutions, non-governmental organizations (NGOs), and private sector entities.

Government Bodies

Ministry of Environmental Protection: This ministry is primarily responsible for creating and enforcing environmental policies and regulations. It also oversees the implementation of EU environmental standards and directives.

Serbian Environmental Protection Agency (SEPA): SEPA is responsible for monitoring environmental quality and providing data to support policy-making and public awareness.

Ministry of Mining and Energy: This ministry is involved in promoting renewable energy sources and energy efficiency measures.

Non-Governmental Organizations (NGOs)

- Center for Ecology and Sustainable Development (CEKOR): An NGO that advocates environmental protection and sustainable development.
- Young Researchers of Serbia (Mlada istraživači Srbije): Focuses on environmental education, conservation projects, and promotes sustainable development.
- Belgrade Open School (BOS): Through its programme "Energy, Climate, and Environment," BOS works on policy research and advocacy for sustainable development and climate action.
- RERI Centar za zelene politike: Engages in various environmental protection and

sustainability initiatives (Green European Foundation, 2023).

International Organizations and Collaboration

- UNDP Serbia: The United Nations Development Programme works with the Serbian government and local partners on various sustainable development and environmental protection projects.
- European Bank for Reconstruction and Development (EBRD): Provides funding and support for green projects, including renewable energy and energy efficiency initiatives.
- GIZ (German Agency for International Cooperation): Collaborates with Serbian institutions on projects related to climate change mitigation and sustainable development.

These institutions, inter alia, are key players in Serbia's efforts to transition towards a greener and more sustainable economy.

Review of Policies

Through desk research and meetings with stakeholders, the Law on Climate Change was highlighted as one of the most important policy documents in the country relating to green transition. The Law on Climate Change aims to establish mechanisms for timely, transparent, accurate, consistent, comparable, and complete reporting and verification of information on the fulfillment of obligations under various international climate agreements, including the United Nations Framework Convention on Climate Change, the Kyoto Protocol, and the Paris Agreement. It also aims to monitor and report on greenhouse gas (GHG) emissions and adaptation activities in an economically efficient manner (Serbian Government, 2023).

State bodies are required to adopt sectoral policies and measures to achieve the law's goals, based on documents such as the Low-carbon Development Strategy, the Action Plan for implementing the strategy, and the Programme for Adaptation to Climate Change. The Low-carbon Development Strategy and Adaptation Programme were mandated to be adopted by 1 March 2023, but were delayed. The Strategy was adopted on 1 June 1 2023, and the Adaptation Programme on 25 December 2023. Both documents were adopted later than required, and the Action Plan, essential for implementing the strategy, was not adopted by the end of 2023. This delay hinders effective monitoring and implementation of the strategy (Ministry of Environmental Protection, 2023).

The strategy and action plan are critical for setting GHG emission limits for various sectors over ten years. However, despite the adoption of the strategy, the government did not prescribe these emission limits by the end of 2023. This lack of implementation raises questions about the effectiveness of the law and the transparency of the document preparation process. Public participation provisions were met, but doubts remain about their adequacy for ensuring complete transparency. The National Council on Climate Change, responsible for overseeing climate-related measures, has been inactive, failing to meet regularly or publish annual reports. The Ministry of Environmental Protection confirmed the absence of these reports for 2017-2022, contradicting the Council's mandate for public transparency (National Council on Climate Change, 2023).

The Law on Climate Change establishes a system for monitoring and reporting GHG emissions in alignment with EU regulations. In December 2023, a rulebook was adopted to facilitate GHG emission permits for operators of stationary plants. The Ministry of Environmental Protection must also publish elements necessary for the monitoring

methodology. Operators must submit permit applications by June 2024, with a system in place for electronic submissions. However, this system lacks components for developing a monitoring plan. The law aims to prepare operators and the government for international mechanisms like CBAM. Permits issued in 2024 would enable plant-level monitoring to start in 2025, with the first reports due in 2026. This timeline suggests a delay in Serbia's ability to seek exemptions from CBAM, potentially affecting the competitiveness of its economy (Ministry of Environmental Protection, 2023).

The Green Transition Knowledge Gap of Serbian Youth:

Understanding the knowledge gap of young people regarding the green transition is critical for fostering a sustainable future. This section explores the current state of climate change awareness and environmental engagement of Serbian youth, drawing on various data sources, including a comprehensive interactive climate change map, UNDP-GCF project reports, and multiple surveys.

In Serbia, efforts to enhance climate change adaptation and mitigation are ongoing. The United Nations Development Programme (UNDP), in partnership with the Green Climate Fund (GCF), has been instrumental in advancing medium- and long-term adaptation planning. The NAP project (2019-2022) has focused on strengthening Serbia's legal and institutional frameworks, developing national and subnational adaptation plans, and integrating climate change adaptation (CCA) measures into decision-making processes. Key activities have included the development of a web-based application for climate vulnerability assessments and extensive training sessions for institutional representatives (UNDP, 2022).

Despite these efforts, a significant knowledge gap remains among young people. A 2022 UNICEF U-Report poll involving over 800 Serbian youth (aged 15-19) highlighted alarming statistics: two-thirds had never heard of the Paris Agreement, 85% were unaware of Nationally Determined Contributions (NDCs), and 92% did not know that Serbia has committed to reducing its greenhouse gas emissions by 13.7% by 2030 compared to 2010 levels. These findings underscore a critical lack of awareness about national climate policies and commitments (UNICEF, 2022).

Serbia continues to face significant hurdles in aligning with internationally accepted standards, particularly in terms of administrative capacity for enforcement and monitoring, closing non-compliant landfills, investing in waste reduction, separation and recycling, improving air quality monitoring, advancing river basin management, and preparing for the Natura 2000 strategy (EC Serbia Country Report 2022). The financing system for environmental protection and climate change remains inadequate. From 2020 to 2022, the country allocated an average of 0.5% of its GDP to environmental issues, which falls short of the required reforms. According to a 2022 report by the Fiscal Council, the government had the fiscal space to increase investment in municipal infrastructure and the environment but opted not to do so. Over the past 11 years, more than RSD 100 billion were collected through environmental taxes, but only RSD 40 billion were spent as intended, with the rest (about €550 million) diverted to other uses. In 2020, the Green Fund was abolished at the national level, leaving no financial resources allocated for 2021 and 2022 (Fiscal Council of the Republic of Serbia, 2022).

While the legal framework for protecting the environment from the harmful effects of plans and projects has improved, implementation remains a significant challenge. Citizen initiatives related to environmental decision-making are increasing, with some gaining national attention (e.g., movements against lithium mining in Jadar, opposition to Rio

Tinto's potential lithium mining, and concerns over Zijin Copper's environmental practices in Bor). The Serbian Environmental Protection Agency reports that approximately 2.5 million people are exposed to excessively polluted air, an issue gaining rapid public attention. However, the Working Group for the Systematic Solution of Air Protection Issues has failed to draft any meaningful measures. Serbia has yet to align its legislation with the EU acquis on national emission ceilings (European Commission, 2023).

Issues such as poor control of groundwater use, unregulated use of river sediments, and illegal construction along rivers remain unaddressed. Groundwater and soil pollution from untreated industrial wastewater are frequent problems (SEPA, 2023).

The UNICEF survey also revealed that many young Serbs feel disconnected from the decision-making processes related to climate policy. Nearly half (43%) of the respondents felt they lacked sufficient avenues to express their opinions on climate targets and plans, while a substantial proportion were uncertain (37%) or unaware of such opportunities (19%). Furthermore, young people emphasized the need for greater state involvement (42%) and media engagement (14%) in including youth perspectives in climate strategies (UNICEF, 2022).

Consultations with youth further indicated a sense of invisibility in policy-making, a demand for accessible climate change data, and a call for increased financial investment in environmental education. The desire for formal education to incorporate NDC dialogues and related discussions in schools and universities was strongly expressed, highlighting a gap in the current educational framework (UNICEF, 2022).

Digital Transformation

Serbia has adopted several policies to align with EU directives, including the National Emission Reduction Plan and the Digital Serbia Initiative. These policies aim to reduce greenhouse gas emissions and foster digital innovation. The Digital Serbia Initiative focuses on enhancing digital infrastructure, education, and entrepreneurship to support overall economic growth and sustainability (Government of Serbia, 2019; Digital Serbia Initiative, 2021). Similarly, the Digital Strategy emphasizes digital transformation across sectors to boost innovation and sustainability (European Commission, 2020a, 2020b).

One key area of digital innovation is the development of smart grids, which are crucial for integrating renewable energy sources into the national grid, improving energy efficiency, and reducing carbon emissions. In Serbia, projects like the “Smart Grid Initiative" aim to modernize the electrical grid by incorporating digital technologies such as IoT (Internet of Things) sensors, advanced metering infrastructure (AMI), and data analytics (Stojanović et al., 2022).

The IoT also plays a significant role in environmental monitoring and management. IoT devices can collect real-time data on air quality, water quality, and soil conditions, providing critical information for environmental protection and sustainable agriculture. In Serbia, initiatives like “IoT for Serbia" are exploring the use of IoT to monitor pollution levels in urban areas and optimize resource usage in agriculture (IoT for Serbia, 2021; Popović et al., 2021).

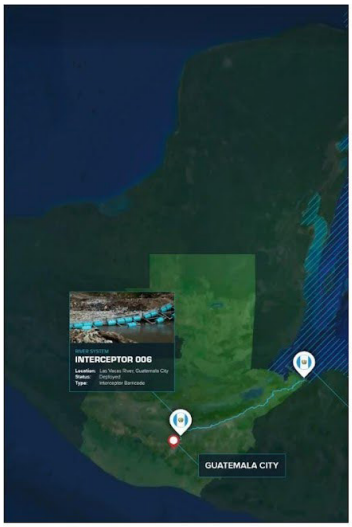
Despite the numerous opportunities presented by digital tools, several challenges must be addressed. These include the high initial costs of digital technologies, the need for digital skills development, and the importance of robust data protection measures. Addressing these challenges requires coordinated efforts from the government, private sector, and academia (Jovanović et al., 2021; Milovanović et al., 2022).

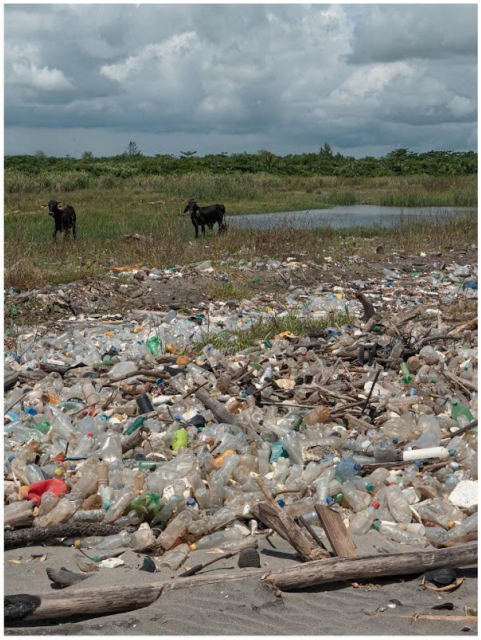
Digital Tools for Green Transition: Review of Best Practices

The process of adopting best case practices in using digital tools for generating green solutions entails doing a thorough review of successful implementations in a variety of scenarios. This methodology involves carrying out a comprehensive evaluation of existing studies, research papers, and project outcomes to identify significant strategies and technologies that have proven beneficial. Understanding how digital tools such as satellite monitoring, search engine technology, artificial intelligence and data analytics may be used to promote sustainable practices, improve resource efficiency, raise awareness and reduce environmental impact is one of the objectives. By looking into these study cases, we aim to gain useful insights and provide recommendations that may be adopted and scaled for future initiatives, ensuring that green solutions are innovative and practical. The ultimate goal of this research is to recommend the use of technological solutions to help assist the twin transition to a greener, more digitally connected world, while also giving actionable advice to legislators, businesses, and communities in their sustainability initiatives.

The Ocean Cleanup

The Ocean Cleanup project is a breakthrough initiative to address the persistent issue of plastic waste in our oceans, using cutting-edge digital techniques to multiply its impact. Satellite imaging and data analytics are used to locate and track plastic accumulation zones; artificial intelligence algorithms to predict the flow of ocean waste, and autonomous vessels equipped with sensors and GPS for efficient collecting operations. These digital solutions are more than just about improving the cleanup process; they encapsulate the essence of the twin transition by combining digital transformation and green activities. The project not only mitigates environmental damage but also establishes a model for blending technology with ecological protection.





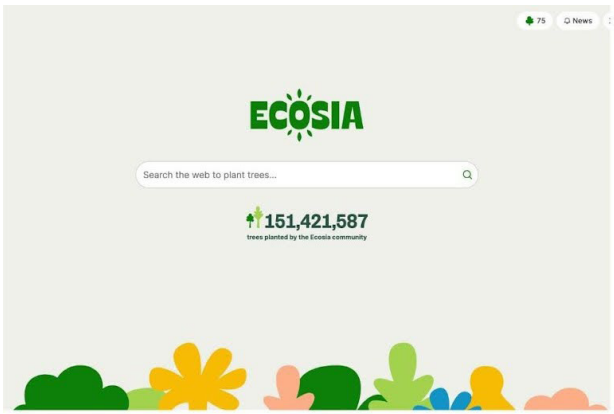
The Ocean Cleanup project uses advanced satellite imaging and aerial drones to collect detailed information on oceanic plastic distribution. These tools provide real-time information about the location and quantity of plastic garbage, allowing for more targeted cleanup efforts. High-resolution photos and advanced algorithms analyze the movement and accumulation patterns of ocean plastics, guiding the strategic deployment of cleanup equipment. The project relies heavily on artificial intelligence (AI) and machine learning methods. These techniques can forecast the movement of ocean waste, allowing scientists to predict where enormous amounts of plastic would accumulate. AI helps optimize the timing and location of cleanup operations by processing massive volumes of data from diverse sources, resulting in greater efficiency and effectiveness. Ocean Cleanup uses autonomous vessels known as Interceptors, which are outfitted with sensors and GPS technology to collect plastic debris from rivers before it enters the oceans. These smart vessels navigate and alter their operations autonomously, using real-time data. The usage of autonomy decreases the need for human intervention while increasing the project's scalability. The Ocean Cleanup project monitors and verifies its operations using digital tools to verify their efficacy. Satellite data and on-the-ground sensors monitor the progress of cleanup efforts and measure their influence on plastic reduction. This constant monitoring enables real-time adjustments while also ensuring transparency and responsibility when reporting project outcomes. Platforms such as Slack, Trello, and video conferencing software improve communication and project management, allowing engineers, scientists, and volunteers to collaborate seamlessly. These tools contribute to a cohesive approach and guarantee that everyone is on the same page with the project's objectives. Ocean Cleanup uses social media, digital campaigns, and instructional content to engage worldwide population. Interactive websites, virtual reality experiences, and detailed project updates keep the general public informed and engaged. These digital outreach projects raise awareness about plastic pollution and encourage people and organizations to help the cause. By integrating cutting-edge technology with a defined environmental goal, the initiative demonstrates how digital innovation may have a significant ecological impact. Moving forward, Ocean Cleanup intends to improve its digital skills, expand operations, and inspire worldwide action to combat plastic pollution.

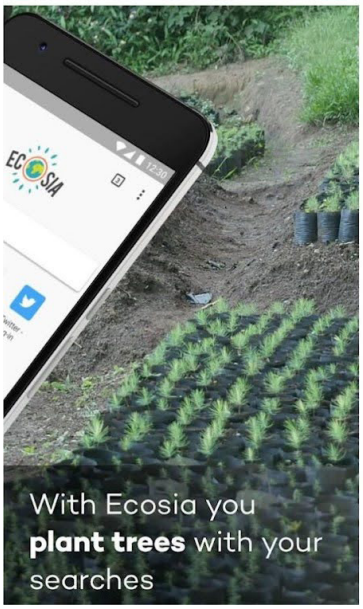
The Ocean Cleanup project in the Rio Motagua Basin near El Quetzalito, Guatemala focuses on intercepting plastic waste before it reaches the ocean. By installing sophisticated waste collection devices in the river, the initiative collects a significant amount of garbage that would otherwise end up polluting the ocean. In order to conserve marine ecosystems and lessen plastic pollution in the Caribbean Sea, this endeavour is essential. [45]

Ecosia

The eco-friendly search engine uses its advertising revenue to fund tree-planting projects around the world. Ecosia, founded in 2009 by Christian Kroll, runs similarly to other search engines but with a distinct mission: to oppose deforestation and encourage reforestation efforts around the world. It relies on Bing's search technology as the foundation for its search engine. When users click on these ads, a portion of the ad revenue is directed to Ecosia. This system efficiently converts user activity into funding for tree-planting projects. This collaboration ensures that customers receive consistent and speedy search results that are comparable to other major search engines. However, Ecosia tailors its algorithms to improve the user experience and assure relevance in search results. Transparency is one of Ecosia's core values. To do this, Ecosia uses digital tools to publish monthly financial reports and tree-planting receipts on their website. These reports provide information on

revenue produced, operational costs, and the amount allotted to tree-planting. This kind of openness fosters confidence and allows users to view the exact results of their searches. Ecosia monitors and verifies tree-planting projects with Geographic Information System (GIS) technology and satellite imagery. These digital tools help guarantee that trees are planted in the appropriate areas and thrive. Satellite data gives Ecosia a bird's-eye view of forestry work, allowing them to monitor the health and growth of newly planted trees. Ecosia uses social media platforms, blogs, and other digital communication tools to engage and educate its user-base about environmental issues. These methods enable Ecosia to reach global audience, create awareness about the importance of reforestation, and promote sustainable living practices. Ecosia places high value on user privacy. It anonymizes search results within a week and does not sell user information to third parties.





Ecosia employs modern encryption and security techniques to keep user-data safe from unauthorized access. Ecosia prioritizes privacy, ensuring that people can search the internet safely and without fear of their personal information being abused. Ecosia provides a mobile app and browser extensions, allowing users to easily incorporate the search engine into their regular routines. These digital tools improve accessibility and convenience by allowing users to contribute to tree-planting with each search, regardless of the device they use. Ecosia uses its own solar energy plants to power its servers, making the search engine carbon-negative. By investing in renewable energy, Ecosia assures that every search is environmentally beneficial. The computerized systems utilized to run and monitor these solar plants assure efficient energy generation and consumption. Ecosia's digital tools have allowed them to plant millions of trees worldwide, making a substantial

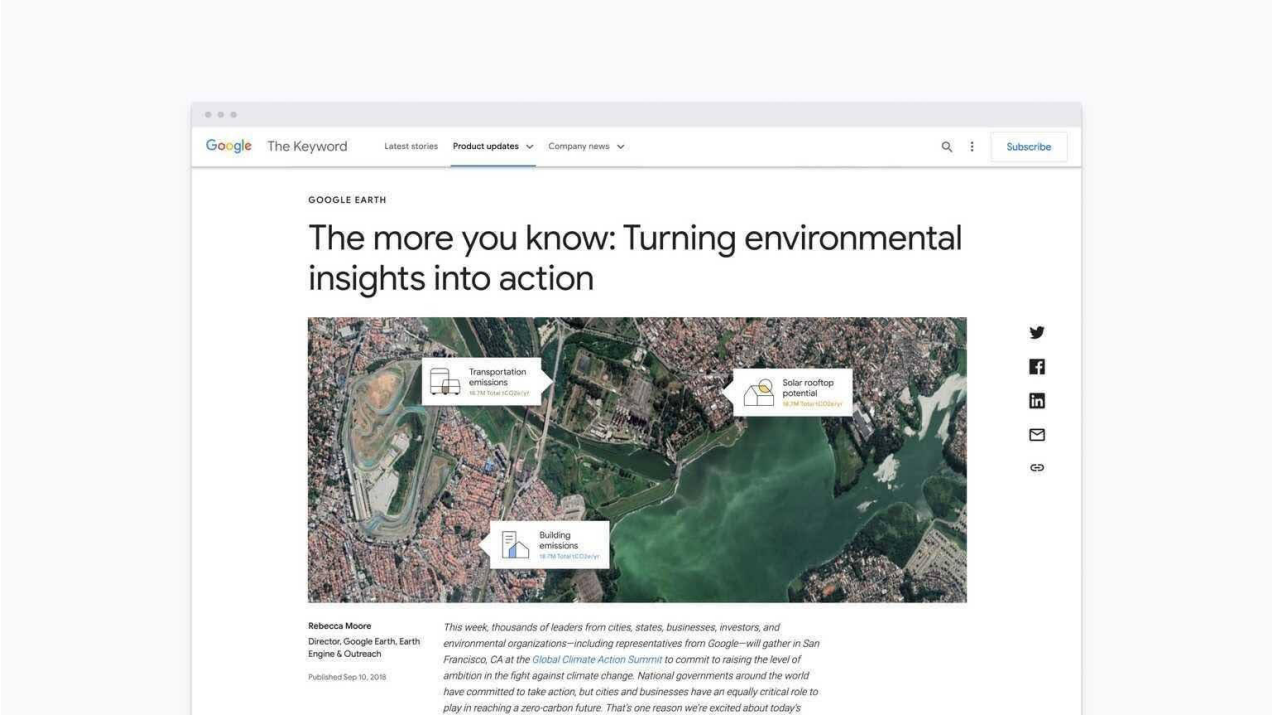
contribution to global forestry efforts. Ecosia demonstrates how digital innovation may generate good environmental change by combining the power of technology with a dedication to sustainability. As Ecosia grows, it plans to expand its use of digital technologies to boost its effect and inspire other businesses to embrace sustainable practices. [46]

WWF's Earth Hour

WWF's Earth Hour is a global environmental movement that uses digital tools to raise awareness and mobilize action to combat climate change. It primarily uses digital campaigns and social media platforms to convey its message and engage a worldwide audience. The campaign uses social media channels such as: Facebook, Twitter, Instagram and YouTube to disseminate information, mobilize participants and generate viral material. Hashtags like #EarthHour and #Connect2Earth is used to increase reach and stimulate user-generated content, instilling a feeling of global community and collective action. The official Earth Hour website acts as a hub for information, resources and participation. It offers educational materials, toolkits and guidelines to individuals, corporations, and organizations interested in participating. Interactive elements like countdown timers, event maps, and pledge forms encourage active participation and make it easier to coordinate worldwide events. Mobile applications and other digital tools are created to increase user participation and engagement. These applications offer real-time updates, event information, and methods for users to participate in local Earth Hour activities. They also provide carbon footprint calculators and sustainable living suggestions, allowing people to make ecologically conscientious decisions in their daily lives. In recent years, Earth Hour has expanded its scope by incorporating virtual activities and live broadcasting. These internet events let people from all around the world engage in Earth Hour activities, regardless of their location. Live streaming services such as Facebook Live, Instagram Live, and YouTube Live are used to broadcast performances, talks, and special events, resulting in a more inclusive and engaging experience. WWF employs data analytics to assess the effectiveness of Earth Hour campaigns. By analyzing social media interaction, website traffic, and participation indicators, they can obtain insight into the effectiveness of their activities and identify areas for development. This data-driven strategy guarantees that the campaign evolves over time and maximizes its impact in raising environmental awareness and promoting action. Earth Hour participants collaborate and share ideas using digital community interaction platforms. Individuals and organizations can interact, share best practices, and inspire one another through online forums, discussion groups, and joint initiatives. These platforms contribute to the formation of a supportive network of environmentally conscious people who want to make a difference. Earth Hour creates a plethora of educational content and digital storytelling to enlighten and motivate people to take action. Videos, infographics, blogs, and films emphasize the value of biodiversity, climate change, and sustainable living. This content is extensively disseminated across digital channels, making complicated environmental challenges understandable and engaging to a large audience. Earth Hour's digital capabilities have helped it grow into one of the world's largest grassroots environmental initiatives. Earth Hour's use of technology has motivated millions to take action against climate change and advocate for a more sustainable future. Moving forward, the WWF intends to improve its digital capabilities, broaden its reach, and deepen its effect by continuing to innovate and adapt to the ever-changing digital environment.[47]

Google Environmental Insights Explorer

Google Environmental Insights Explorer (EIE)[48] leverages a suite of advanced digital tools and technologies to provide cities with comprehensive data on their environmental impact. It uses detailed geographic data from Google Maps to map out urban areas, including building footprints, roads and other infrastructure. This data is important for analyzing transportation patterns and building energy use. Google Earth Engine allows access to satellite imagery and geospatial data, which EIE utilizes to assess land use, vegetation cover, and solar potential on building rooftops. Earth Engine's robust data processing capabilities allow for large-scale environmental investigation. EIE uses machine learning to analyze massive volumes of data and provide precise estimates of carbon emissions from buildings and transportation.



These algorithms use data from a variety of sources, such as satellite imaging, traffic sensors, and public records, to generate useful insights. AI approaches increase the accuracy and efficiency of data analysis. For example, AI can find patterns in traffic data to more accurately estimate emissions or predict future energy consumption trends based on existing data. EIE relies on GCP's powerful cloud architecture to meet its large data processing and storage requirements. GCP offers real-time data analysis and provides the scalability required to cover cities worldwide.

Cloud computing also makes collaboration easier because it allows multiple stakeholders to access and analyze data at the same time. Google BigQuery is a strong data analytics platform that EIE uses to efficiently manage massive datasets. It enables rapid data querying and analysis, allowing towns to acquire valuable insights from their environmental data. EIE uses powerful data visualization technologies to present complex data in a clear and accessible fashion. Interactive dashboards, charts, and maps allow users to visualize emissions, energy use, and solar potential, making it easier to evaluate data and make informed decisions. To analyze mobility patterns, EIE incorporates traffic data from many sources such as Google Maps traffic reports, city sensors, and mobile GPS. This analysis contributes to the estimation of vehicle miles traveled and transportation-related emissions. By analyzing data from various modes of transportation (e.g., automobiles,

buses, bikes), EIE provides insights into how people move around the city and suggests potential to cut emissions through modifications to transportation infrastructure. EIE assesses solar potential on building rooftops using satellite photography and machine learning. This research determines the best locations for solar panel installations, allowing towns to prepare for increased renewable energy use. Google Environmental Insights Explorer operates an online portal through which city planners, policymakers and the general public can access and engage with environmental data. This platform promotes collaboration by allowing stakeholders to share best practices and effective strategies. It assures that all data utilized is aggregated and anonymized in order to preserve individual privacy. Advanced encryption and security techniques are used to protect sensitive information and ensure compliance with data protection rules. EIE offers materials and technologies to help educational institutions incorporate environmental data into their courses. This offers access to information, case studies, and interactive tools to assist students and researchers in understanding and analyzing urban environmental effects. Google EIE intends to continuously enhance its capabilities by incorporating more diverse data sources, improving data accuracy, and improving user interfaces. Future advances could include more improved predictive modeling, stronger integration with municipal planning tools, and wider coverage to more cities worldwide. Google Environmental Insights Explorer uses these digital tools to help cities analyze their environmental footprint and establish successful plans for lowering carbon emissions, encouraging energy efficiency, and expanding renewable energy use. This convergence of digital technology with sustainability activities highlights the simultaneous move to a greener and more digitally connected world.[49]

The table below is created to demonstrate a comparative analysis of previously discussed environmental campaigns on their use of digital technologies and tools. The table highlights specific technologies and digital platforms each of the campaigns employs to drive eco-friendly actions and raise awareness. The goal is to illustrate how diverse digital strategies are applied in the realm of environmental advocacy, emphasizing the role of technology in promoting sustainability and the green transition.

The Ocean Cleanup	Ecosia	WWW's Earth Hour	Google Environmental Insights Explorer
Data collection & analysis	Search engine technology	Digital campaigns and social media	Google Maps and Earth Engine
AI & Machine Learning	Revenue generation & ad integration	Earth Hour website and resources	Machine Learning & AI
Autonomous cleanup systems	Transparency & accountability	Mobile apps and digital tools	Cloud Computing
Monitoring & verification	Tree-plantin g verification	Virtual events and live streaming	Big Data Analytics
Digital collaboration platforms	Data privacy and security	Data analytics and impact measurement	Transportation insights
Community engagement & education	Solar-powered servers	Community engagement platforms	Renewable energy assessment
	Community engagement and education	Educational content and digital storytelling	Community engagement and collaboration platforms
	Mobile app & browser extensions		Privacy and security
			Educational and Training Tools

Survey

Introduction

The analysis in the following segment will be based on the findings of a survey. The questionnaire was conducted in the period 1st June 2024 – 10th July 2024. All participants answered online and anonymously. Within the open period, a total of 400 answers were collected. All respondents aged 18 to 35 were from Albania, North Macedonia and Serbia in order to provide insight into the countries as a whole but also an individual standpoint of each one respectively. The survey contains a total of 28 questions, ranging from basic demographic information, to general questions about climate and the environment to deeper understanding of the dual transition process.

The drawbacks of the survey data are mainly focused in three points: the survey was conducted online, therefore allowing space for some irregularities in answering unmonitored; the answers from each country are not equal in number, with Albanian responses in the lead and Serbian responses lagging behind, which could lead to different outcomes from each sample; and the survey was additionally disseminated in certain groups which have an interest or concern for green policies, which might lead the sample to show more positive outcomes.

The survey distribution strategy varied across regions: in Albania, it was predominantly

shared among university students and through educational networks, whereas in North Macedonia and Serbia, social media, NGOs, and influencers played a more significant role in disseminating the survey. This variation in distribution methods reflects the unique social engagement dynamics in each country.

Regardless of the possible drawbacks, the required sample from both a demographic and educational background was reached and at least the predetermined minimum number of responses were collected for each country respectively, allowing for an objective and reliable collection of qualitative data.

Demographic Data

The demographic breakdown of the survey reveals some important aspects about the sample population. As mentioned, the country distribution was uneven, with Albania providing the majority of the responses (251), followed by North Macedonia (95), and Serbia (54). The age of respondents ranged from 18 to 35, aligning with the common definition of youth across Europe and the Balkans.

In terms of gender, the sample showed a significant skew towards female respondents. A total of 301 respondents identified as female, 94 as male, and 5 as non-binary. This gender gap is not uncommon in survey-based research, where women are often more likely to participate than men, potentially due to differences in social engagement patterns (Smith, 2008). Such gender disparities in survey response rates may influence the overall findings, especially regarding gendered perceptions of climate change and green policies.

The level of education among respondents was relatively high, with 48.5% holding bachelor's degree, 36.2% possessing master's degree, and 2% having completed a doctoral degree. Only 13.3% of the respondents had attained just secondary education. This distribution indicates that the sample was somewhat over-represented in terms of higher education, as the proportion of respondents with university-level degrees was higher than the actual educational attainment rates in these countries. However, this overrepresentation may still provide useful insights, as education often correlates with awareness and understanding of environmental issues (Wolf & Moser, 2011).

General Knowledge and Personal Opinions on Green Transition

One of the key findings of the survey is the high level of concern about climate change among young people. Over 80% of the respondents across all three countries stated that they believed strongly or very strongly that climate change was a significant issue. This mirrors global trends where youth are increasingly vocal about the threat of climate change and its future impact (Chaaraoui, 2023).

Furthermore, most respondents also believed that climate change was affecting their country directly. This highlights a widespread awareness among youth about the local consequences of global environmental issues, particularly as countries in the Western Balkans have experienced extreme weather events and environmental degradation in recent years. Youth in these regions seem acutely aware of the consequences of inaction, not just globally but within their own borders.

However, when asked about how much their daily lives were affected by climate change, the responses were more varied. While some youth feel moderately impacted, only a minority rated the impact on their everyday lives as extreme. This disparity suggests that

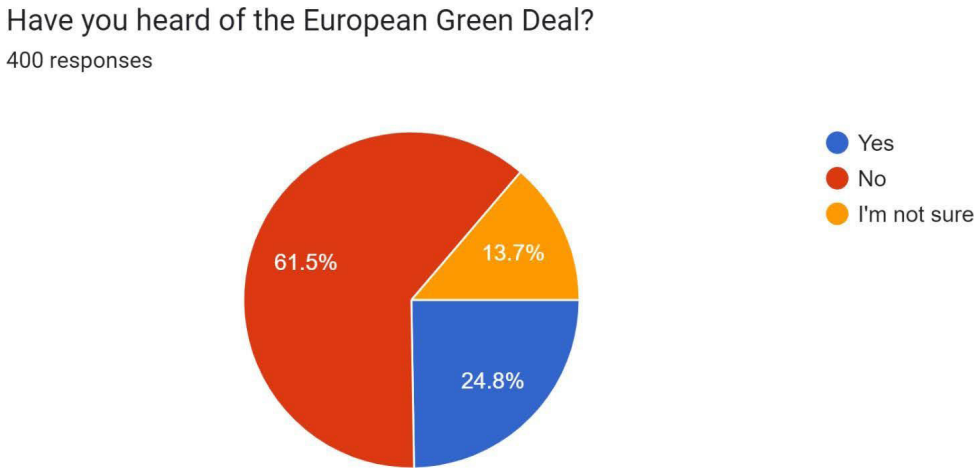
while the broader concern for climate change is high, the perceived immediate effects may not yet be fully visible or disruptive in their daily routines.

The survey also highlighted a significant gap in knowledge about the green transition. When asked if they had heard of the green transition, more than 74% of respondents answered "No" or "I'm not sure." This lack of awareness about one of the most important contemporary environmental and economic shifts shows that while young people are concerned about climate change, they may not fully grasp the policies and frameworks designed to address it.

Moreover, the respondents who were aware of the green transition exhibited varying levels of understanding. Some displayed deep knowledge of green policies, while others had only a superficial or vague awareness. This uneven distribution of knowledge reflects broader societal trends, where environmental awareness is often concentrated among certain groups with access to better education or information channels (Mochizuki & Bryan, 2015).

EU-WB Relationship and the Green Agenda

The European Union (EU) has played a pivotal role in advancing green policies, with the European Green Deal (EGD) being the cornerstone of its strategy to address climate change and promote sustainable economic growth. The EU's influence extends to the Western Balkans, where countries like Albania, North Macedonia, and Serbia have committed to align with EU environmental regulations and green transition goals. However, the survey reveals that despite these long-standing efforts, youth in these countries have limited awareness of the EGD and the broader green agenda for the Western Balkans.



Less than half of the respondents had any substantial knowledge of the European Green Deal or the associated Green Agenda for the Western Balkans. This is surprising given that North Macedonia, for example, has been a candidate for EU membership since 2004, with environmental alignment being a key condition of the accession process (European Commission, 2020).

The lack of awareness among youth suggests that while policy commitments exist on paper, they may not be sufficiently communicated to the general public, especially the younger generation, which is supposed to drive these initiatives forward.

Despite the lack of awareness, respondents were generally optimistic about the EU's role in promoting green transition efforts. Many believed that EU membership would positively

influence their countries' environmental policies, further suggesting that youth see the EU as a critical player in the region's path toward sustainability.

Government Institutions and Climate Policies

One of the more concerning findings of the survey is the low level of awareness on national climate policies. Only 5.8% of the respondents claimed they were very aware of their country's climate policies, while 53% said they had little to no knowledge of such policies. This widespread lack of awareness points to significant communication and educational gaps between governments and the public, particularly regarding environmental initiatives.

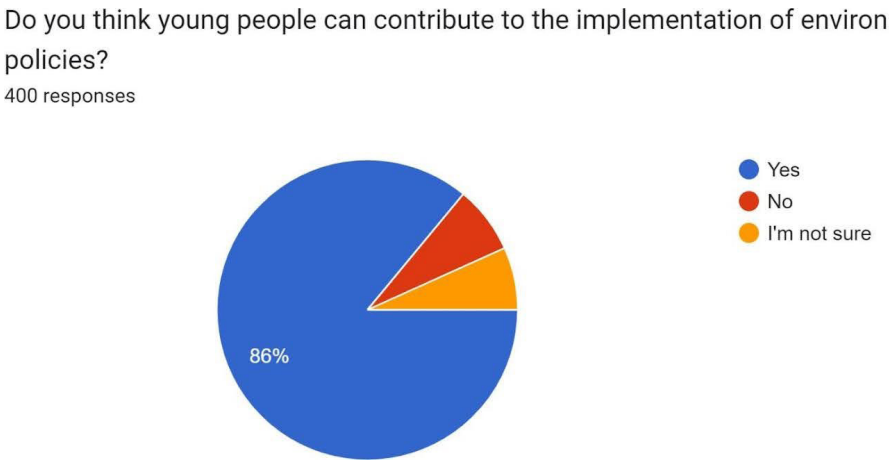
Additionally, the majority of the respondents (over 62%) expressed dissatisfaction with their governments' performance in implementing green transition policies. Only 5% believed that their respective governments had been successful in executing green transition plans. This level of discontent reflects broader trends of institutional mistrust across the Western Balkans, where public confidence in government institutions has been historically low (Bartlett, 2021). The green transition, which relies heavily on policy execution, is clearly an area where governments need to build greater trust and transparency with their populations.

Interestingly, despite this dissatisfaction, when asked which institutions should be responsible for leading the green transition, the overwhelming majority pointed to the Ministry of Environment in each country. This suggests that while youth may not feel satisfied with current governmental efforts, they still recognize the role of formal institutions in spearheading the green transition.

Conclusion: As for which institutions are "in charge" of the transition, an overwhelming majority mentioned the Ministry of Environment (for each country respectively), as the primary expected institution that carries the green policies in action.

Barriers to Youth Participation

Survey responses also identified several barriers that prevent youth from participating more actively in the green transition. Beyond the knowledge gap, many respondents indicated that there was a lack of governmental support for youth engagement in climate policy discussions. Even when young people were informed about climate issues, they often struggled to find platforms where they can meaningfully contribute to policy development or advocacy efforts.



This finding is consistent with the research indicating that young people often feel marginalized in decision-making processes, even on issues that directly affected them (Gonzalez et al., 2021). In context of the Western Balkans, where political institutions may be less accessible to younger generations, this barrier becomes even more pronounced. Despite their enthusiasm, youth may feel disempowered by the lack of formal channels for involvement in green policy discussions.

Moreover, 50% of the survey's respondents believed that young people in their countries were not taking sufficient action on climate issues. This points to a perception that, despite their concern, youth are not yet mobilized effectively—largely due to structural barriers and lack of government initiatives in facilitating their participation.

Youth and the Green Transition

Despite these barriers, the survey also highlighted several key factors that could motivate young people to engage more actively in the green transition. One of the most frequently mentioned motivators was the need for educational programmes and workshops that provide clear, actionable knowledge on the green transition. Respondents expressed that without access to such resources, they were often left uncertain about how to contribute to environmental efforts.

Another motivating factor was the availability of job opportunities in the green economy. Many young respondents believed that the prospect of employment in sectors such as renewable energy, sustainable agriculture, and environmental conservation would encourage greater participation. This aligns with global trends, where the green economy is expected to create millions of new jobs in the coming decades (ILO, 2019). For young people in the Western Balkans, where unemployment rates are high, green jobs represent a vital opportunity to both contribute to climate action and secure economic stability.

Finally, financial incentives were identified as another motivating factor. Some respondents mentioned that monetary rewards or government grants could provide an immediate, practical reason for engaging in environmental initiatives. This highlights the importance of addressing the economic realities facing young people in the region, where financial security is often a prerequisite for long-term engagement in climate activism.

Conclusions

The survey of young people in Albania, North Macedonia, and Serbia provides unique insights into their attitudes about climate change and the green transition. Despite several limitations, including the survey's online format and uneven response distribution across countries, the data gathered is important for assessing regional youth knowledge and perspectives.

The survey results are relevant as they provide insights into young people's opinions, awareness, and participation in climate and green transition topics in Albania, North Macedonia and Serbia. The views and engagement of youth in these countries will shape future initiatives, making this information useful for organizations and policymakers working towards sustainability. The findings highlight significant knowledge gaps that could allow the development of future educational programmes and campaigns to promote green initiatives. This information is crucial for the governments of the three countries and

NGOs, to assess their current strategies and identify gaps for improvement. By comparing the responses of the participants from the three countries, the survey also highlights differences in awareness and engagement. The survey indicates that youth believe EU membership could positively impact green transition efforts, which underscores the importance of EU integration in advancing sustainability in the region. These findings can support ongoing negotiations and efforts to align with EU policies.

The study showed a considerable gender difference, with more women than men participating. This tendency is consistent with previous research demonstrating that women are more inclined to participate in surveys. Furthermore, respondents tend to have greater education levels, implying that those with a higher academic background may be more likely to participate in conversations regarding climate change and the green transition.

Climate change is a major source of concern and awareness among young people, with more than 80% understanding its relevance. This concern is shared by the three countries, demonstrating a regional grasp of environmental challenges. Respondents understand the impact of climate change on their own countries, suggesting an awareness of local environmental issues. This implies that young people are not just aware of global climate challenges, but also comprehend how they manifest and impact local communities.

Despite widespread concern about climate change, there remains a considerable information gap about the green transition. More than 74% of respondents are either unaware or unsure about the green transition, indicating a significant area for development in education and awareness campaigns. The disparity in respondents' understandings of the Green Transition suggests that, while some young people are strongly involved, many lack the required information to actively participate in green projects. This highlights the need for specialized educational programmes to close the knowledge gap and empower youth.

According to the study results, the European Green Deal (EGD) and the Western Balkan Green Agenda are not well known among young people. Despite ongoing EU negotiations, public awareness of these measures remains low, indicating a gap between policy progress and public perception. However, youth believes that EU membership and the EGD might have a positive impact on their nations' green transition efforts, demonstrating an openness to European influence and support for sustainable development programmes.

Respondents report little awareness of their country's climate policies and a broad distrust of government institutions. With 62% feeling that their government has failed to properly achieve green transition goals, there is a strong sense of inefficiency and a need for improved communication and transparency from the authorities. The Ministry of Environment is designated as the major organization in charge of green policy, but lack of awareness and trust indicates a need for improved visibility and accountability of government activities in the green transition.

NGOs can play an important role in promoting awareness and engaging youth in environmental projects since they frequently act as go-betweens for the general population and the policymakers.

The survey reveals diverse levels of youth engagement and understanding of the green transition. According to the research, while some young people are knowledgeable and active, many stay detached from green activities, emphasizing the importance of more inclusive and accessible education and participation possibilities.

Recommendations

Building onto the findings from the survey, it is clear that while there is a strong awareness of climate change among youth in Albania, North Macedonia, and Serbia, a significant knowledge gap about the Green Transition also exists. Despite their concern for environmental issues, many young people lack complete understanding of the Green Transition and the policies driving it, such as the European Green Deal and the Western Balkan Green Agenda. This gap highlights the need for targeted interventions to improve education, increase engagement, and build trust in government institutions. To address these challenges, the following policy recommendations are proposed for government institutions, NGOs, and development agencies to effectively close the knowledge gap and empower youth in leading the Green Transition in their countries.

Government Institutions:

Improved Educational Curricula:

Integrate Green Transition Education: Governments should work with educational institutions to integrate comprehensive climate change and Green Transition topics into the curricula at all educational levels. This could include partnerships with universities and vocational schools to develop specialized courses that focus on sustainable practices and the European Green Deal (EGD).

Promote Gender-Inclusive Education Programmes: Recognize the higher participation of women in environmental surveys and ensure that educational programmes are designed to engage all genders equally, encouraging more balanced participation.

Public Awareness Campaigns:

Launch National Awareness Campaigns: Governments should implement large-scale awareness campaigns focused on the Green Transition, targeting youth through social media, public forums, and educational institutions. These campaigns should be designed to clarify what the Green Transition stands for and its relevance to local and national contexts.

Increase Visibility of Climate Policies: Ensure that information on national climate policies and the responsibilities of relevant ministries, like the Ministry of Environment, is widely accessible and transparent. This could involve regular updates via digital platforms and local media, highlighting progress and goals in the Green Transition.

Strengthening Institutional Trust:

Improve Government Transparency: Governments should adopt transparent communication strategies about their Green Transition efforts, including regular public reporting on progress, challenges, and achievements. This could help build trust among youth and the broader population.

Engage Youth in Policy-Making: Create youth advisory councils or involve youth representatives in Green Transition policy-making processes to ensure their perspectives and concerns are addressed. This could enhance trust and make policies more responsive to the needs and interests of young people.

Non-Governmental Organizations (NGOs):

Capacity Building and Youth Engagement:

Organize Workshops and Training Programmes: NGOs should focus on developing

capacity-building initiatives that target youth, particularly those with lower levels of education. These programmes can equip them with the knowledge and skills needed to engage in the Green Transition.

Foster Local Environmental Projects: Promote and support local, youth-led environmental initiatives that demonstrate the principles of the Green Transition in action. This could include community-based projects on renewable energy, waste management, and sustainable agriculture.

Advocacy and Awareness Campaigns:

Advocate for Policy Changes: NGOs should advocate for policies that enhance youth engagement in the Green Transition, ensuring the alignment of government actions with the needs and aspirations of young people.

Use of Social Media and Digital Platforms: Use social media to reach broader audience, particularly focusing on interactive content that educates and engages youth in the Green Transition. This can include webinars, online forums, and interactive quizzes to raise awareness and knowledge.

Building Networks and Partnerships:

Facilitate Collaboration: NGOs should facilitate collaborations between youth, educational institutions, and government bodies to create a more cohesive approach to the Green Transition. Establishing networks that bring together different stakeholders can foster a more integrated effort toward sustainable development.

Development Agencies:

Support for Educational Initiatives:

Fund Educational Programmes: Development agencies should fund educational initiatives that focus on bridging the knowledge gap from the Green Transition. This could include scholarships, grants, or funding for curriculum development in schools and universities.

Pilot Projects in Schools: Support pilot projects in educational institutions that integrate Green Transition topics into existing curricula, with a focus on practical, hands-on learning experience.

Regional Cooperation and Knowledge Sharing:

Promote Regional Cooperation: Encourage and fund regional cooperation initiatives that allow for sharing best practices and knowledge across Albania, North Macedonia, and Serbia.

This could include exchange programmes, regional conferences, and joint research projects.

Support Data Collection and Research: Invest in further research and data collection to continuously monitor the knowledge gap and the effectiveness of educational interventions.

This would provide basis for evidence-based policy-making and programme development.

Improving Youth Participation:

Fund Youth-Led Initiatives: Provide funding and technical assistance to youth-led initiatives that aim to promote the Green Transition. Support could be directed towards innovative projects that engage young people in practical activities related to climate action.

Create Platforms for Youth Voices: Development agencies should create or support platforms where youth can share their ideas, experience, and innovations related to the Green Transition. These platforms can help increase youth voices in policy dialogues at the national and regional levels.

References

United Nations. Framework Convention on Climate Change (1992). Retrieved from https://treaties.un.org/doc/source/RecentTexts/unfccc_eng.pdf

Kyoto Protocol to the United Nations Framework (1997). Retrieved from https://unfccc.int/resource/docs/convkp/kpeng.pdf

United Nations. Paris Agreement (2015). Retrieved from https://unfccc.int/sites/default/files/english_paris_agreement.pdf

United Nations. A just green transition: concepts and practice so far (2022). Retrieved from https://www.un.org/development/desa/dpad/wp-content/uploads/sites/45/publication/PB_141.pdf

European Commision. What is the European Green Deal (2019). Retrieved from https://ec.europa.eu/commission/presscorner/api/files/attachment/859152/What_is_the_Europe an_Green_Deal_en.pdf

Regional Cooperation Council. Sofia Declaration on the Green Agenda for the Western Balkans (2020). Retrieved from https://www.rcc.int/files/user/docs/196c92cf0534f629d43c460079809b20.pdf

European Commission. EU accession process (2022). Retrieved from

https://neighbourhood-enlargement.ec.europa.eu/system/files/2022-10/eu_accession_process_ clusters%20%28oct%202022%29.pdf

European Commission. A Green Agenda for the WesternBalkans (2022). Retrieved from https://neighbourhood-enlargement.ec.europa.eu/system/files/2023-10/factsheet%20green%20 agenda%20oct2023%20final_0.pdf

Generation Climate Europe. The State of Youth Engagement in the Process of Just Transition in the Western Balkans (2023). Retrieved from

https://gceurope.org/wp-content/uploads/2023/11/REPORT-3.-The-state-of-youth-engagement-i n-the-implementation-of-the-EU-Just-Transition-Mechanism-April-2023-4.pdf

Council of Ministers, R. o. (2016). National Strategy for Development and Integration, 2015 - 2020. Tirana.

Government of Albania. (2021). Albania Revised Nationally Determined Contribution. United Nations Framework Convention on Climate Change. Retrieved from https://unfccc.int/sites/default/files/2022-08/Albania%20Revised%20NDC.pdf

Mihalčatinová, C. (2024). Is Albania a New Regional Champion in the Energy Transition?

Retrieved from Strategic Analysis:

https://www.strategicanalysis.sk/is-albania-a-new-regional-champion-in-the-energy-transition/

Ministry of Tourism and Environment. (2023). Albania's National Adaptation Plan: First progress report. NAP Global Network. Retrieved from

https://napglobalnetwork.org/resource/albania-nap-progress-report/

Musabelliu, M. (2021, July). Albania social briefing:. Weekly Briefing | China - CEE Institute,

42(3). Retrieved from https://china-cee.eu/wp-content/uploads/2021/07/2021s07_Albania.pdf Lukic et al. (2018) "Renewable Energy Sources in Serbia: Current State and Perspectives"

Dedinec et al. (2018) Energy Efficiency in Serbia

Chaaraoui, L. (2023, August). Young people are worried about climate change and rightfully so.; Harvard Political Review.

Earth Hour. (2024). The Biggest Hour for Earth. Получено из Earth Hour: https://www.earthhour.org/about/the-biggest-hour-for-earth

Google. (2024). Build a resilient, sustainable future for your city or region. Получено из Environmental Insights Explorer: https://insights.sustainability.google/

Kiril, I. (2019). Impact of Values on Strategic Decision-Making with Respect to Business Model Design The Case of Ecosia. 4th International Conference on New Business Models. Berlin.

The Ocean Cleanup Technologies B.V. (2024). The largest cleanup in history. Получено из The Ocean Cleanup: https://theoceancleanup.com/

Republic of North Macedonia State Statistical Office. Statistical Atlas (2021). Retrieved from https://www.stat.gov.mk/publikacii/2022/Statistichki-atlas-mk-en-web.pdf

Westminster Foundation for Democracy in North Macedonia. Youth and Census (2022).

Retrieved from

https://www.wfd.org/what-we-do/resources/insufficient-funds-youth-policies-amidst-decrease-yo uth-population-north

Youth Progress Index. Environmental Quality. Retrieved from https://youthprogressindex.org./ranking

Unicef. Knowledge, attitudes and practices study on climate change and the environment (2021). Retrieved from

https://www.unicef.org/northmacedonia/media/9566/file/mkd-kap-citizens-climatechange-2022.p df

European Commission. North Macedonia Report (2023). Retrieved from https://neighbourhood-enlargement.ec.europa.eu/north-macedonia-report-2023_en

Center Science and Innovation for Development (SCiDEV) in Albania, the Youth Education Forum (YEF) in North Macedonia, and the Youth Initiative for Human Rights (YIHR) in Serbia.

Retrieved from

https://scidevcenter.org/2023/11/30/regional-youth-leadership-mobility-programme-2023-2024/

Westminster Foundation for Democracy in North Macedonia. Youth and Census (2022).

Retrieved from

https://www.wfd.org/what-we-do/resources/insufficient-funds-youth-policies-amidst-decrease-youth-population-north

Republic of North Macedonia State Statistical Office. Statistical Atlas (2021). Retrieved

from https://www.stat.gov.mk/publikacii/2022/Statistichki-atlas-mk-en-web.pdf

Ministry of Environment and Physical Planning of the Republic of North Macedonia. Perception of climate change and level of awareness: Online survey of the citizens of the Republic of North Macedonia (2021). Retrieved from https://anketa2021.klimatskipromeni.mk/dokumenti/PerceptionofClimateChange-2021.pdf

Climate Integration Support Facility Blanket Purchase Agreement AID-OAA-E-17-0008, Order Number AID-OAA-BC-17-00042 (2018). Retrieved from https://www.climatelinks.org/sites/default/files/asset/document/2019_USAID_Macedonia_CRP.pdf

Analysis of the progress of the transposition and implementation of national legislation on environment and climate change with EU legislation. Shadow report for Chapter 27 (2022).

Retrieved from

https://fosm.mk/wp-content/uploads/2023/01/second-shadow-report-eng-15.12-2.pdf

United Nations Economic Commission for Europe. 3rd Environmental Performance Review of North Macedonia (2019). Retrieved from

https://unece.org/sites/default/files/2021-12/ECE.CEP_.186.Eng_.pdf

Ministry of Environment and Physical Planning of the Republic of North Macedonia. Macedonian Third Biennial Update Report on Climate Change (2021). Retrieved from https://unfccc.int/sites/default/files/resource/1%20TBUR_EN_f.pdf

Central Register of the Republic of North Macedonia. Retrieved from https://www.crm.com.mk/en

Government of the Republic of North Macedonia. Department for cooperation with NGOs. Retrieved from https://www.nvosorabotka.gov.mk/?q=node/43

Ministry of Environment and Physical Planning of the Republic of North Macedonia. Climate Budget Tagging in the Republic of North Macedonia (2021). Retrieved from https://api.klimatskipromeni.mk/data/rest/file/download/b7237187fb7ace50cb566904daffebe2a3e6050aefde6e246ae1d9b1985a8d59.pdf

Government of the Republic of North Macedonia. Structure of the 20th Government (2024). Retrieved from https://vlada.mk/node/18031?ln=en-gb

UNDP. Digital Readiness Assessment North Macedonia (2023). Retrieved from https://www.undp.org/sites/g/files/zskgke326/files/2024-01/dra_mk_06.pdf

European Commission. (2020a). The European Green Deal. Retrieved from europa.eu European Commission. (2020b). A Europe Fit for the Digital Age. Retrieved from europa.eu Government of Serbia. (2019). National Emission Reduction Plan. Retrieved from gov.rs Digital Serbia Initiative. (2021). Retrieved from digitalsrbija.org

Stojanović, D., et al. (2022). "Smart Grid Initiative in Serbia: Progress and Challenges." Journal of Sustainable Energy, 45(2), 123-135.

IoT for Serbia. (2021). Projects and Initiatives. Retrieved from iotserbia.rs

Popović, M., et al. (2021). "Environmental Monitoring Using IoT: A Case Study from Serbia." Environmental Science and Pollution Research, 28(5), 5432-5443.

AgriTech Serbia. (2022). Precision Agriculture Technologies. Retrieved from agritechserbia.rs Industry 4.0 Serbia. (2021). Smart Manufacturing. Retrieved from industry40serbia.rs

Jovanović, V., et al. (2021). "Digital Skills and Competencies for Green Transition in Serbia." Journal of Education for Sustainable Development, 15(1), 45-60.

Milovanović, M., et al. (2022). "Data Protection Challenges in the Digital Era: A Serbian Perspective." Journal of Cybersecurity, 18(3), 233-250.

European Commission. (2023). Serbia 2023 Report. Retrieved from ec.europa.eu

European Environment Agency. (2022). Serbia: Wastewater Treatment and Water Quality. Retrieved from [eea.europa.eu](https://www.eea.europa.eu/)

Germanwatch. (2022). Global Climate Risk Index 2022. Retrieved from [germanwatch.org](https://www.germanwatch.org/)

Statistical Office of the Republic of Serbia. (2022). Demographic Statistics. Retrieved from [stat.gov.rs](https://www.stat.gov.rs/)

WHO. (2021). Air Quality Guidelines. Retrieved from [who.int](https://www.who.int/).

World Wildlife Fund. (2021). Biodiversity in Serbia. Retrieved from [wwf.org](https://www.wwf.org/)

1 United Nations. Framework Convention on Climate Change (1992). Retrieved from https://treaties.un.org/doc/source/RecentTexts/unfccc_eng.pdf

2 Kyoto Protocol to the United Nations Framework (1997). Retrieved from https://unfccc.int/resource/docs/convkp/kpeng.pdf

3 United Nations. Paris Agreement (2015). Retrieved from https://unfccc.int/sites/default/files/english_paris_agreement.pdf

4 United Nations. A just green transition: concepts and practice so far (2022). Retrieved from https://www.un.org/development/desa/dpad/wp-content/uploads/sites/45/publication/PB_141.pdf 5 European Commission. What is the European Green Deal (2019). Retrieved from

https://ec.europa.eu/commission/presscorner/api/files/attachment/859152/What_is_the_European_Green_Deal_en.p df

6 Regional Cooperation Council. Sofia Declaration on the Green Agenda for the Western Balkans (2020). Retrieved from https://www.rcc.int/files/user/docs/196c92cf0534f629d43c460079809b20.pdf

7 European Commission. EU accession process (2022). Retrieved from

https://neighbourhood-enlargement.ec.europa.eu/system/files/2022-10/eu_accession_process_clusters%20%28oct% 202022%29.pdf

8 European Commission. A Green Agenda for the Western Balkans (2022). Retrieved from

https://neighbourhood-enlargement.ec.europa.eu/system/files/2023-10/factsheet%20green%20agenda%20oct2023% 20final_0.pdf

9 Generation Climate Europe. The State of Youth Engagement in the Process of Just Transition in the Western Balkans (2023). Retrieved from

https://gceurope.org/wp-content/uploads/2023/11/REPORT-3.-The-state-of-youth-engagement-in-the-implementation- of-the-EU-Just-Transition-Mechanism-April-2023-4.pdf10 Mihalčatinová, C. (2024). Is Albania a New Regional Champion in the Energy Transition? Retrieved from Strategic Analysis: https://www.strategicanalysis.sk/is-albania-a-new-regional-champion-in-the-energy-transition/

11 National Agency of Natural Resources. (2019). Hydro-Energetic: Potential of Albania. AKBN. : http://www.akbn.gov.al/wp-content/uploads/2019/05/Hydro-Energetic-Potential-of-Albania2.pdf 12 National Agency of Natural Resources. (2019). Hydro-Energetic: Potential of Albania. AKBN.

Todorović, I. (2023, 10 5). Voltalia completing its 140 MW solar power plant Karavasta in Albania. Retrieved from Balkan Green Energy News;:

https://balkangreenenergynews.com/voltalia-completing-its-140-mw-solar-power-plant-karavasta-in-albania/

13 European Commission, Directorate-General for Research and Innovation, (2021). European Green Deal : research & innovation call, Publications Office of the European Union. https://data.europa.eu/doi/10.2777/33415

14 Musabelliu, M. (2021, July). Albania social briefing: Weekly Briefing | China - CEE Institute, 42(3). Retrieved from https://china-cee.eu/wp-content/uploads/2021/07/2021s07_Albania.pdf

15 Council of Ministers, R. o. (2016). National Strategy for Development and Integration, 2015 - 2020. Tirana

16 Government of Albania. (2021). Albania Revised Nationally Determined Contribution. United Nations Framework Convention on Climate Change. Retrieved from

https://unfccc.int/sites/default/files/2022-08/Albania%20Revised%20NDC.pdf

17 Harlan , C., Kranish, M., & Stanley-Becker, I. (2024, 08 17). Jared Kushner wants to turn a wild stretch of Albania into a luxury resort. Retrieved from Washington Post:

https://www.washingtonpost.com/politics/2024/08/17/jared-kushner-resort-albania-environment/

18 Ministry of Tourism and Environment. (2023). Albania's National Adaptation Plan: First progress report. NAP Global Network. Retrieved from https://napglobalnetwork.org/resource/albania-nap-progress-report/

19 OECD (2024), "State-of-play of the circular economy in Albania", in A Roadmap towards Circular Economy of Albania, OECD Publishing, Paris. Retrieved from:

https://www.oecd-ilibrary.org/state-of-play-of-the-circular-economy-in-albania_0985783f-en.pdf?itemId=%2Fcontent% 2Fcomponent%2F0985783f-en&mimeType=pdf#:~:text=Waste%2Drelated%20trends&text=Municipal%20waste%20dropped%20from%201.4,%2C%202021%5B70%5D).

20 https://www.oficina-hub.al/

21 Kemp, S. (2024, 02 23). Digital 2024: Albania. Retrieved from Datareportal:

https://datareportal.com/reports/digital-2024-albania#:~:text=There%20were%202.43%20million%20internet%20user s%20in%20Albania%20in%20January,January%202023%20and%20January%202024

22 Republic of North Macedonia State Statistical Office. Statistical Atlas (2021). Retrieved from https://www.stat.gov.mk/publikacii/2022/Statistichki-atlas-mk-en-web.pdf

23 Westminster Foundation for Democracy in North Macedonia. Youth and Census (2022). Retrieved from https://www.wfd.org/what-we-do/resources/insufficient-funds-youth-policies-amidst-decrease-youth-population-north

24 Youth Progress Index. Environmental Quality. Retrieved from https://youthprogressindex.org./ranking

25 Unicef. Knowledge, attitudes and practices study on climate change and the environment (2021). Retrieved from https://www.unicef.org/northmacedonia/media/9566/file/mkd-kap-citizens-climatechange-2022.pdf

26 European Commission. North Macedonia Report (2023). Retrieved from https://neighbourhood-enlargement.ec.europa.eu/north-macedonia-report-2023_en

27 Center Science and Innovation for Development (SCiDEV) in Albania, the Youth Education Forum (YEF) in North Macedonia, and the Youth Initiative for Human Rights (YIHR) in Serbia. Retrieved from https://scidevcenter.org/2023/11/30/regional-youth-leadership-mobility-programme-2023-2024/

28 Westminster Foundation for Democracy in North Macedonia. Youth and Census (2022). Retrieved from https://www.wfd.org/what-we-do/resources/insufficient-funds-youth-policies-amidst-decrease-youth-population-north

29 Republic of North Macedonia State Statistical Office. Statistical Atlas (2021). Retrieved from https://www.stat.gov.mk/publikacii/2022/Statistichki-atlas-mk-en-web.pdf

30 Ministry of Environment and Physical Planning of the Republic of North Macedonia. Perception of climate change and level of awareness: Online survey of the citizens of the Republic of North Macedonia (2021). Retrieved from https://anketa2021.klimatskipromeni.mk/dokumenti/PerceptionofClimateChange-2021.pdf

31 Climate Integration Support Facility Blanket Purchase Agreement AID-OAA-E-17-0008, Order Number AID-OAA-BC-17-00042 (2018). Retrieved from https://www.climatelinks.org/sites/default/files/asset/document/2019_USAID_Macedonia_CRP.pdf

32 Analysis of the progress of the transposition and implementation of national legislation on environment and climate change with EU legislation. Shadow report for Chapter 27 (2022). Retrieved from

https://fosm.mk/wp-content/uploads/2023/01/second-shadow-report-eng-15.12-2.pdf

33 United Nations Economic Commission for Europe. 3rd Environmental Performance Review of North Macedonia (2019). Retrieved from https://unece.org/sites/default/files/2021-12/ECE.CEP_.186.Eng_.pdf

34 European Commission. North Macedonia Report (2023). Retrieved from https://neighbourhood-enlargement.ec.europa.eu/north-macedonia-report-2023_en

35 Ministry of Environment and Physical Planning of the Republic of North Macedonia. Macedonian Third Biennial Update Report on Climate Change (2021). Retrieved from https://unfccc.int/sites/default/files/resource/1%20TBUR_EN_f.pdf

36 Central Register of the Republic of North Macedonia. Retrieved from https://www.crm.com.mk/en

37 Government of the Republic of North Macedonia. Department for cooperation with NGOs. Retrieved from https://www.nvosorabotka.gov.mk/?q=node/43

38 Ministry of Environment and Physical Planning of the Republic of North Macedonia. Climate Budget Tagging in the Republic of North Macedonia (2021). Retrieved from https://api.klimatskipromeni.mk/data/rest/file/download/b7237187fb7ace50cb566904daffebe2a3e6050aefde6e246ae1 d9b1985a8d59.pdf

39 Ministry of Environment and Physical Planning of the Republic of North Macedonia. Macedonian Third Biennial Update Report on Climate Change (2021). Retrieved fromhttps://unfccc.int/sites/default/files/resource/1%20TBUR_EN_f.pdf

40 Government of the Republic of North Macedonia. Structure of the 20th Government (2024). Retrieved from https://vlada.mk/node/18031?ln=en-gb

41 European Commission. North Macedonia Report (2023). Retrieved from https://neighbourhood-enlargement.ec.europa.eu/north-macedonia-report-2023_en

42 European Commission. North Macedonia Report (2023). Retrieved from https://neighbourhood-enlargement.ec.europa.eu/north-macedonia-report-2023_en

43 UNDP. Digital Digital Readiness Assessment North Macedonia (2023). Retrieved from https://www.undp.org/sites/g/files/zskgke326/files/2024-01/dra_mk_06.pdf

44 The Ocean Cleanup Technologies B.V. (2024). The largest cleanup in history. Получено

из The Ocean Cleanup: https://theoceancleanup.com/

45 https://theoceancleanup.com/media-gallery/interceptor-021-in-guatemala/

46 Kiril, I. (2019). Impact of Values on Strategic Decision-Making with Respect to Business Model Design The Case of Ecosia. 4th International Conference on New Business Models. Berlin.

47 Earth Hour. (2024). The Biggest Hour for Earth. Получено из Earth Hour: https://www.earthhour.org/about/the-biggest-hour-for-earth

48 https://storage.googleapis.com/gweb-mobius-cdn/eie/uploads/3ae68f0543779fc6f6e276dea21e05fd8c26433c/08c33d 2d-47ae-491e-9ec5-67091e6013fa.pdf

49 Google. (2024). Build a resilient, sustainable future for your city or region. Получено из Environmental Insights Explorer: https://insights.sustainability.google/

ANNEX I - Survey Questions

PART 1: DEMOGRAPHIC INFORMATION

Country of residence:

- Albania
- North Macedonia
- Serbia

Age:

- Below 18
- 18-22
- 22-25
- 25-29
- 29-35

Gender:

- Male (M)
- Female (F)
- Non-Binary (NB)

Level of education:

- High school
- Bachelor (BA)
- Master (MA)
- Doctorate (PhD)

Place/area of residence:

- Rural
- Urban

PART 2: GENERAL KNOWLEDGE

How strong an issue do you think is climate change?

1 2 3 4 5

Do you think your country is affected by climate change?

1 2 3 4 5

To what extent do you think your life and everyday activities are affected by climate change?

1 2 3 4 5

Have you heard about the Green Transition?

- Yes
- No

What do you think the term stands for?

PART 3: EU & WB KNOWLEDGE

Have you heard of the European Green Deal?

- Yes
- No
- I am not sure

Have you heard about the Green Agenda for the Western Balkans?

- Yes
- No
- I am not sure

From 1 to 5 how familiar are you with the EU membership negotiations?

1 2 3 4 5

Do you believe that progress in EU accession negotiations could positively impact the Dual Transition challenges?

- Yes
- No

Do you believe that the EU Dual Transition policies can benefit your country?

- Yes
- No

PART 4: AWARENESS ON CLIMATE POLICIES

How would you rate your awareness on climate policies in your country?

1 2 3 4 5

Do you think that your government has done a good job in implementing the Dual Transition in your country?

- Yes
- No

Do you know which government institutions in your country are in charge of the implementation of the Green Transition?

- Yes
- No

Can you briefly list the institutions?

How important do you believe the NGO sector is in the Green Transition?

1 2 3 4 5

Do you know of any NGOs doing activities related to the Green Transition?

How much do you believe digitalization and technology can help the Green Transition?

1 2 3 4 5

How do you usually get informed on environmental and climate topics?

- Social media
- News
- Other people
- Family
- I don't

PART 5: YOUTH ACTION AND PARTICIPATION

Do you feel like young people are taking climate action in your country?

- Yes
- No
- I am not sure

Do you think young people can contribute to the implementation of environmental and climate policies?

- Yes
- No

Do you think there are any reasons why young people might not join in the Green Transition

- They don't have enough information
- They don't have opportunities to get involved.
- They don't get enough help from the government and institutions.
- They can't afford it.
- Other (please specify)

Do you want to take part in the Green Transition?

- Yes
- No
- I am not sure

What would make you want to join the Green Transition?

- More information and awareness
- Money or rewards
- Education programmes and workshops
- Support from community and friends
- Job opportunities
- Other (please specify)

2024.