EXPLORING GREEN GROWTH IN THE WESTERN BALKAN COUNTRIES: A DESCRIPTIVE OVERVIEW

Amir Imeri[1], Margarita Matlievska[1], Liljana Pushova Stamenkova[1], Elena Matlievska[2]
[1] MIT University Skopje, Blvd. Treta Makedonska Brigada 66a, 1000 Skopje, North Macedonia; [2] MBA Candidate, University American College Skopje, Blvd. Treta Makedonska Brigada 60, 1000 Skopje, North Macedonia;
e-mail: amirimeri@yahoo.com; mmatlievska@yahoo.com; liljanapusova@yahoo.com matlievskaelena@gmail.com

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Abstract

This paper investigates the progress of green growth performance in five non-EU Balkan countries—Albania, Bosnia and Herzegovina, Montenegro, North Macedonia, and Serbia—during the period 2010–2023, employing the Green Growth Index (GGI) as one of the major composite indicators that provides a direct, multidimensional, and measurable assessment. To evaluate regional convergence towards European sustainability standards, the analysis includes Croatia as a benchmark. The study applies a descriptive approach, focusing on annual index scores to identify long-term trajectories and relative performance. Results indicate gradual but uneven improvement across the Western Balkans, with some countries showing consistent upward trends while others remain stagnant or volatile. Compared to Croatia, the five non-EU countries continue to lag in overall GGI scores, although slight narrowing of the gap is observed in selected years. These findings underline the importance of sustained policy efforts in resource efficiency, natural capital protection, green economic opportunities, and social inclusion to accelerate alignment with EU member states. By providing the first longitudinal comparison of Balkan countries with an EU benchmark, this study contributes to a deeper understanding of the dynamics of green growth in the region and its implications for EU integration.

Keywords*: Green Growth Index, Western Balkans, sustainable development, EU integration.*
JEL classification : *Q01, Q56, O44*

INTRODUCTION

Green growth has emerged as a key pathway to sustainable development, aiming to balance economic progress with environmental protection and social inclusion. It recognizes that long-term development requires not only economic expansion but also efficient use of resources, resilient ecosystems, and equitable social outcomes. For transition economies, this approach represents both an opportunity and a policy challenge. The Western Balkans provides a relevant context for examining green growth. These small, open economies face similar constraints—limited diversification, reliance on energy-intensive sectors, and institutional weaknesses—while simultaneously aligning with EU sustainability objectives under the European Green Deal and the Energy Community Treaty. Understanding their progress is essential for assessing EU integration readiness and identifying areas for policy improvement. Composite sustainability indices have become increasingly important for tracking such progress. The Green Growth Index (GGI), developed by the Global Green Growth Institute (GGGI), measures four dimensions: efficient and sustainable resource use, natural capital protection, green economic opportunities, and social inclusion. This study is offering the first longitudinal analysis of GGI scores for five non-EU Western Balkan countries—Albania, Bosnia and Herzegovina, Montenegro, North Macedonia, and Serbia—from 2010 to 2023. Croatia is included as an EU benchmark due to its post-2013 alignment with European green transition priorities. Using a descriptive approach, the study traces long-term trajectories, compares performance across countries, and assesses regional convergence with EU sustainability levels. The contribution of this paper is threefold. First, it extends the temporal scope of earlier studies by providing a comprehensive overview of green growth dynamics across more than a decade. Second, by including Croatia as a benchmark, it introduces a comparative EU reference point that allows assessment of convergence or divergence in sustainability performance. Third, the study enhances the understanding of how non-EU Balkan economies are progressing in the four dimensions of the GGI framework, thereby offering empirically grounded insights that can support national strategies and regional cooperation for sustainable development and EU integration. The following sections present the data and methodology, report descriptive results and the benchmarking analysis, discuss policy implications for EU integration and the green transition, and conclude with key insights and directions for future research.

1. LITERATURE REVIEW, RESEARCH GAPS, AND THE NEED FOR A LONGITUDINAL APPROACH

Research on green growth in the region has expanded alongside rising interest in EU integration and environmental reforms, One early application of the GGI (Matlievska, Pushova Stamenkova, & Matlievska, 2020) examined five non-EU Balkan countries for a two year period (2019–2020) and found moderate performance with substantial disparities across GGI dimensions, particularly in natural capital protection and green economic opportunities. More recent work focuses on drivers of green economic performance rather than multidimensional sustainability. Plakaj Vërbovci, Gara, and Abazi Alili (2024) found that innovation, R&D, and institutional quality significantly shape green economic outcomes, emphasizing the role of knowledge-based development. Other regional studies, such as Filipović and Ignjatović (2022), have emphasized the policy dimension of the green transition. Their work on the economic development of the Western Balkans highlighted both the opportunities and constraints facing these economies in their efforts to decarbonize and modernize energy systems.

Similarly, Vučković and Čučković (2024) explored green practices among small and medium-sized enterprises (SMEs) and found that firm-level adoption of green measures depends heavily on financial incentives, institutional support, and public awareness.

Existing research offers useful insights into specific drivers and barriers of green growth, but it remains limited in scope. One group of studies examines determinants of green economic performance—such as innovation, R&D, and institutional quality—typically relying on macroeconomic indicators. Another group applies the Green Growth Index (GGI), yet generally over short periods, providing only initial snapshots rather than long-term trends.

As a result, the literature is still fragmented and lacks an integrated framework for comparing sustainability performance across countries and through time. Three main gaps persist: (1) most analyses are short-term and do not capture how sustainability performance evolves; (2) multidimensional composite indicators like the GGI are seldom used; and (3) benchmarking against EU member states is limited, despite the importance of assessing convergence toward EU sustainability standards.

This study addresses these gaps by providing a longitudinal descriptive analysis of GGI scores for five Western Balkan countries from 2010 to 2023, using Croatia as an EU benchmark. By examining long-term trends and cross-country differences, it offers new evidence on regional sustainability trajectories and contributes to a more comprehensive understanding of the green transition in Southeast Europe.

2. DATA AND METHODOLOGY

2.1. RATIONALE FOR USING THE GREEN GROWTH INDEX (GGI)

The decision to employ the Green Growth Index as the primary data source in this study is based on its conceptual comprehensiveness, methodological transparency, and policy relevance. Compared to other composite sustainability indicators —such as the Inclusive Wealth Index (IWI)[7] or Global Green Economy Index (GGEI)[8], the GGI uniquely integrates economic, social, and environmental dimensions under a single, coherent framework specifically designed to measure green growth. Unlike the IWI, which focuses primarily on country's wealth based on natural, human, and produced capital, or the GGEI which evaluates Leadership and climate change, Efficiency sectors (energy, transport, buildings, etc.), Markets and investment and Environment and natural capital, the GGI centers explicitly on the growth–sustainability nexus.

Moreover, the GGI's four-dimension structure—covering efficient and sustainable resource use, natural capital protection, green economic opportunities, and social inclusion—makes it especially well-suited for evaluating the multidimensional nature of green transition in emerging and transition economies. Its transparent methodology, cross-country comparability, transparent and replicable quantitative methodology, and annual updates also make it ideal for longitudinal analysis, which is central to this study's objective of assessing regional progress over time. Empirical applications of the GGI have been conducted at global, regional, and national levels, illustrating its versatility in tracking progress toward the Sustainable Development Goals (SDGs) and the Paris Agreement (Acosta et al., 2019; GGGI, 2021).

Finally, the GGI is recognized by major policy institutions and aligns closely with the United Nations Sustainable Development Goals and the OECD Green Growth Measurement Framework, ensuring that its indicators are internationally relevant and methodologically consistent. These characteristics make the GGI particularly appropriate for analyzing the green growth trajectories of the Western Balkan countries in the context of their EU integration processes.

[7] Developed *by UNEP and UNU-IHDP.*
[8] Developed by Dual Citizen LLC.

2.2. DATA SOURCE AND COVERAGE

This study employs secondary data obtained from the Green Growth Index developed by the Global Green Growth Institute (GGGI). The GGI is a composite indicator that evaluates the performance of countries in achieving sustainable, inclusive, and resource-efficient economic growth. The dataset used in this paper covers the period 2010–2023 and includes five non-EU Western Balkan countries—Albania, Bosnia and Herzegovina, Montenegro, North Macedonia, and Serbia. In addition, Croatia is incorporated as a benchmark country to represent an EU member state from the same geographic region. Croatia serves as a useful reference point for assessing convergence toward EU-level sustainability standards, given its accession to the European Union in 2013.

All data were collected directly from the official GGGI Green Growth Index database and its accompanying country datasets (available at https://greengrowthindex.gggi.org). For each country, the analysis uses the Index Score - a normalized value ranging from 0 to 100, where higher scores indicate stronger green growth performance. Because the GGI methodology already includes data standardization and weighting, no further transformation was required beyond filtering by country, aggregation level ("Index"), and year.

2.3 METHODOLOGICAL APPROACH

The study adopts a descriptive analytical approach. Rather than employing econometric or causal modeling, the analysis focuses on identifying long-term trends, cross-country comparisons, and relative performance patterns in the GGI scores over time. This approach is particularly suitable for revealing the trajectories of green growth and the pace of convergence or divergence among Western Balkan countries relative to Croatia.

The descriptive analysis proceeds in three stages:

Temporal Analysis. Annual GGI Index scores from 2010 to 2023 are plotted for each country to visualize changes in overall green growth performance. The analysis captures both short-term fluctuations and long-term trajectories.

Comparative Analysis. The study computes average GGI Index values for each country over the full period, as well as the total change between 2010 and 2023. This allows for ranking countries by their relative improvement and identifying persistent leaders and laggards within the region.

Benchmarking Against Croatia. Croatia's GGI scores are used as a regional benchmark to assess whether non-EU Balkan countries are converging toward EU sustainability standards. A gap analysis is performed by calculating the annual difference between each country's GGI and that of Croatia. This provides insight into how closely each country's trajectory aligns with the EU reference point and whether the performance gap has narrowed or widened over time.

The results of these analyses are presented in both tabular and graphical form, including time-series line charts and comparative bar plots. This visual approach enhances interpretability and enables policymakers to identify the areas where progress has been most pronounced or stagnant.

2.4. LIMITATIONS

While the Green Growth Index offers a comprehensive measure of green growth, it has several limitations. First, it is a composite index, which may mask disparities among its four dimensions. Second, as this study employs a purely descriptive approach, it does not establish causal relationships between policy measures and green growth outcomes.

Third, data availability and revisions in indicator methodologies over time may affect cross-year comparability. Despite these limitations, this Index remains one of the most consistent and transparent datasets for tracking green growth performance globally and regionally.

3. RESULTS AND DISCUSSION

3.1. OVERALL GREEN GROWTH PERFORMANCE (2010–2023)

Table 1: Overall GG performance for Albania (2010-2023)

Source: *Green Growth Index 2025: Measuring green growth performance, potential, and pathways.* https://greengrowthindex.gggi.org/

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Score	61.60	60.94	60.19	58.96	59.95	59.56	61.79	62.43	63.01	63.54	64.60	65.39	65.48	65.45

Results for Albania: Mean: 62.17; Minimum: 58.96 in 2013; Maximum: 65.48 in 2022; Standard Deviation: 2.19. Interpretation: The values exhibit a gradual increase over time, with moderate variability (standard deviation ≈ 2.2), indicating a stable and steady growth after 2015. The largest improvement is +2.23 points (from 2015 to 2016), representing by far the most pronounced increase across the entire period—no other year shows a comparable rise.

Table 2: Overall GG performance for Bosnia and Herzegovina (2010-2023)

Source: *Green Growth Index 2025: Measuring green growth performance, potential, and pathways.* https://greengrowthindex.gggi.org/

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Score	56.29	57.20	58.03	59.20	58.96	58.94	56.79	58.65	60.03	60.21	61.00	61.35	61.79	61.48

Results for Bosnia and Herzegovina: Mean: 59.28; Minimum: 56.29 in 2010; Maximum: 61.79 in 2022; Standard Deviation: 1.79. Interpretation: The values exhibit a stable, gradual increase over the years with moderate variability (standard deviation ≈ 1.8), indicating a relatively consistent trend with slow growth. The largest annual improvement is +1.86 points (from 2016 to 2017), representing the most pronounced yearly increase for Bosnia and Herzegovina over the entire period 2010–2023.

Table 3: Overall GG performance for Montenegro (2010-2023)

Source: *Green Growth Index 2025: Measuring green growth performance, potential, and pathways.* https://greengrowthindex.gggi.org/

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Score	45.8	45.73	45.36	46.78	46.32	46.31	45.71	46.10	47.10	48.23	47.94	48.93	49.10	49.15

Results for Montenegro: Mean: 46.97; Minimum: 45.36 in 2012; Maximum: 49.15 in 2023; Standard Deviation: 1.20. Interpretation: The values show a gradual, stable increase after 2016, with low variability (standard deviation ≈ 1.2), indicating a consistent positive trend over the years. The largest annual improvement is +1.42 points (from 2012 to 2013), representing the most pronounced yearly increase for Montenegro over the entire period 2010–2023.

Table 4: Overall GG performance for North Macedonia (2010-2023)

Source: *Green Growth Index 2025: Measuring green growth performance, potential, and pathways.* https://greengrowthindex.gggi.org/

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Score	57.82	57.85	57.67	59.06	59.35	59.57	59.81	59.28	60.11	60.14	60.41	61.28	61.51	61.24

Results for North Macedonia: Mean: 59.67; Minimum: 57.67 in 2012; Maximum: 61.51 in 2022; Standard Deviation: 1.20. Interpretation: The values exhibit a stable increase over the years with low variability (standard deviation ≈ 1.2), indicating gradual and continuous improvement during the analyzed period. The largest annual improvement occurred in 2013, with an increase of +1.39 points.

Table 5: Overall GG performance for Serbia (2010-2023)

Source: *Green Growth Index 2025: Measuring green growth performance, potential, and pathways.* https://greengrowthindex.gggi.org/

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Score	59.52	58.92	58.05	58.64	59.03	59.74	59.97	60.07	60.33	60.30	60.76	61.27	61.26	61.14

Results for Serbia: Mean: 59.96; Minimum: 58.05 in 2012; Maximum: 61.27 in 2021; Standard Deviation: 0.98. Interpretation: The values are very stable, with a low degree of variation (standard deviation ≈ 1.0), indicating continuous and gradual growth without significant fluctuations over the analyzed period. The largest annual improvement occurred in 2015, with an increase of +0.71 points.

3.2 COMPARATIVE ANALYSIS AND REGIONAL RANKING

The comparative overview of the Western Balkan countries—identifying the country with the highest and lowest annual scores, as well as the overall dynamics of change—is presented in the two tables below. A concise analytical commentary follows each table.

Table 6: Comparative Overview of Highest Achieved Scores

Source: Authors research

Year	Albania	B&H	Montenegro	N. Macedonia	Serbia	Best Score
2010	61.6	56.29	45.83	57.82	59.52	Albania
2011	60.94	57.20	45.73	57.85	58.92	Albania
2012	60.19	58.03	45.36	57.67	58.05	Albania
2013	58.96	59.20	46.78	59.06	58.64	B&H
2014	59.95	58.96	46.32	59.35	59.03	Albania
2015	59.56	58.94	46.31	59.57	59.74	Serbia
2016	61.79	56.79	45.71	59.81	59.97	Albania
2017	62.43	58.65	46.10	59.28	60.07	Albania
2018	63.01	60.03	47.10	60.11	60.33	Albania
2019	63.54	60.21	48.23	60.14	60.30	Albania
2020	64.60	61.00	47.94	60.41	60.76	Albania
2021	65.39	61.35	48.93	61.28	61.27	Albania
2022	65.48	61.79	49.10	61.51	61.26	Albania
2023	65.45	61.48	49.15	61.24	61.14	Albania

Albania achieved the highest score in 12 out of 14 years (2010–2012, 2014, 2016–2023).

Bosnia and Herzegovina was the leading country in 2013.

Serbia recorded the highest score in 2015.

North Macedonia and Montenegro were not leading in any year, although Macedonia has remained consistently close to Serbia after 2015.

Overall trend (2010–2023): Albania assumed the leading position after 2016 and maintained consistent growth, reaching the highest values among all countries in 2020–2023.

Table 7: Comparative Overview of Lowest Achieved Scores

Source: Authors research

Year	Albania	Б&Н	Montenegro	N. Macedonia	Serbia	Lowest Score
2010	61.6	56.29	45.83	57.82	59.52	Montenegro
2011	60.94	57.20	45.73	57.85	58.92	Montenegro
2012	60.19	58.03	45.36	57.67	58.05	Montenegro
2013	58.96	59.20	46.78	59.06	58.64	Montenegro
2014	59.95	58.96	46.32	59.35	59.03	Montenegro
2015	59.56	58.94	46.31	59.57	59.74	Montenegro
2016	61.79	56.79	45.71	59.81	59.97	Montenegro
2017	62.43	58.65	46.10	59.28	60.07	Montenegro
2018	63.01	60.03	47.10	60.11	60.33	Montenegro
2019	63.54	60.21	48.23	60.14	60.30	Montenegro
2020	64.60	61.00	47.94	60.41	60.76	Montenegro
2021	65.39	61.35	48.93	61.28	61.27	Montenegro
2022	65.48	61.79	49.10	61.51	61.26	Montenegro
2023	65.45	61.48	49.15	61.24	61.14	Montenegro

Montenegro has the lowest performance in all 14 years (2010–2023).

The difference is significant: its values in the early years are around 45–46, and although they increase over time, they remain considerably lower than all other countries.

The largest gap between Montenegro and the others is observed in the period 2010–2016, after which it gradually decreases.

Overall trend (2010–2023): Montenegro shows consistent growth but remains in last place throughout the period, indicating either a lower starting point or a slower pace of progress compared to neighboring countries.

The subsequent analysis examines the dynamics of change to identify which country has achieved the greatest overall progress, based on the calculation of absolute change.

Absolute change (2023 – 2010):

Albania: 65.45 − 61.6 = +3.85

Bosnia and Herzegovina: 61.48 − 56.29 = +5.19

Montenegro: 49.15 − 45.83 = +3.32

N. Macedonia: 61.24 − 57.82 = +3.42

Serbia: 61.14 − 59.52 = +1.62

Ranking by the greatest absolute change:

Bosnia and Herzegovina – +5.19

Albania – +3.85

N. Macedonia – +3.42

Montenegro – +3.32

Serbia – +1.62

Conclusion:

Greatest progress: Bosnia and Herzegovina

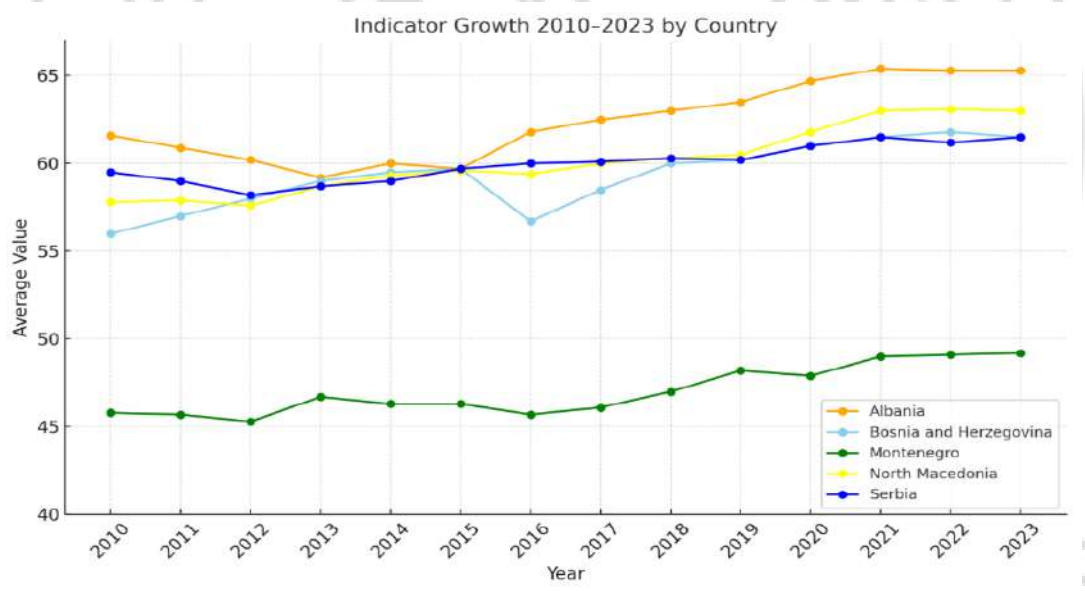
Second: Albania

Third: North Macedonia

Fourth: Montenegro

Last: Serbia (least progress)

This is illustrated in the figure below.



Graph 1: Indicator Growth by Country (2010-2023)

Source: Authors research

3.3. YEAR-TO-YEAR GAINS IN WESTERN BALKANS: CROATIA AS BENCHMARK

Table 8: Overall GG performance for Croatia (2010-2023)

Source: *Green Growth Index 2025: Measuring green growth performance, potential, and pathways.* https://greengrowthindex.gggi.org/

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Croatia	61.78	63.67	63.80	65.73	64.76	65.67	64.47	64.06	63.85	64.14	65.18	66.70	66.71	66.72

Results for Croatia: Mean**:** 64.80; Minimum: 61.78 in 2010; Maximum**:** 66.72 in 2023; Standard deviation: 1.37. Interpretation: Croatia demonstrates a consistent upward trajectory over the period 2010–2023, with scores gradually increasing from 61.78 to 66.72. The standard deviation of 1.37 indicates moderate variability, suggesting that, despite minor annual fluctuations, the overall trend reflects steady and progressive improvement in green performance.

An assessment of peak annual progress, measured as the absolute year-to-year change, is presented for selected Western Balkan countries relative to Croatia.

3.3.1. Comparison of Greatest Annual Progress: Albania vs. Croatia

An examination of the greatest annual progress (measured as absolute year-to-year change) reveals notable differences between Albania and Croatia. Albania records its strongest improvement between 2015 and 2016, achieving a significant increase of +2.23 points. This represents not only Albania's highest single-year advancement but also one of the most pronounced jumps observed in the region. Croatia's most substantial annual increase occurs between 2012 and 2013, when its score rises by +1.93 points. Although this marks Croatia's peak year-to-year progress, the magnitude of change is still lower than that of Albania.

Conclusion: When comparing the two countries, Albania demonstrates a stronger maximum annual improvement, with its +2.23-point increase exceeding Croatia's +1.93-point rise. Moreover, Croatia's overall trajectory is comparatively stable, characterized by moderate post-2019 increases. Albania, in contrast, exhibits greater variability across years, yet it also achieves the most notable single-year jump among all Western Balkan countries.

3.3.2. Comparison of Greatest Annual Progress: Bosnia and Herzegovina vs. Croatia

For Bosnia and Herzegovina, the most pronounced annual rise amounts to +2.24 points, recorded between 2016 and 2017. This represents the country's most substantial year-to-year increase within the observed timeframe. In the case of Croatia, the highest annual improvement is +1.93 points, occurring between 2012 and 2013, marking its most significant single-year advancement.

Conclusion: When the two are compared, Bosnia and Herzegovina exhibits a more pronounced maximum annual gain than Croatia, as reflected in the difference between their respective jumps (+2.24 versus +1.93).

Croatia's performance is more consistent overall, showing steady and moderate increases after 2013. By contrast, Bosnia and Herzegovina displays greater variability over the years but also attains the most notable single-year rise between the two countries.

3.3.3.Comparison of Greatest Annual Progress: Montenegro vs. Croatia

Montenegro records its highest annual advancement between 2018 and 2019, with an absolute increase of +1.13 points, representing the most substantial rise within the observed period for this country. In contrast, Croatia achieves its peak annual improvement between 2012 and 2013, reaching +1.93 points, which stands as its most significant single-year increase.

Conclusion: When comparing the magnitude of these maximum improvements, Croatia clearly exhibits a stronger upward shift, as its peak rise of +1.93 surpasses Montenegro's maximum increase of +1.13. Croatia demonstrates a more pronounced annual progression than Montenegro. While Montenegro registers a moderate yet meaningful upswing in 2019—likely reflecting the influence of Euro-Atlantic reform processes—Croatia displays a more consistent overall trajectory and a notably higher maximum year-to-year gain. Montenegro's improvement is comparatively smaller, but it remains a relevant indicator of positive movement within its broader reform dynamics.

3.3.4. Comparison of Greatest Annual Progress: North Macedonia vs. Croatia

North Macedonia recorded its most substantial annual increase between 2012 and 2013, when its score rose by 1.39 points.

This represents the highest single-year advancement within the examined period. In comparison, Croatia achieved its strongest annual improvement in the same interval, with a more pronounced rise of 1.93 points, marking the peak of its own performance trajectory.

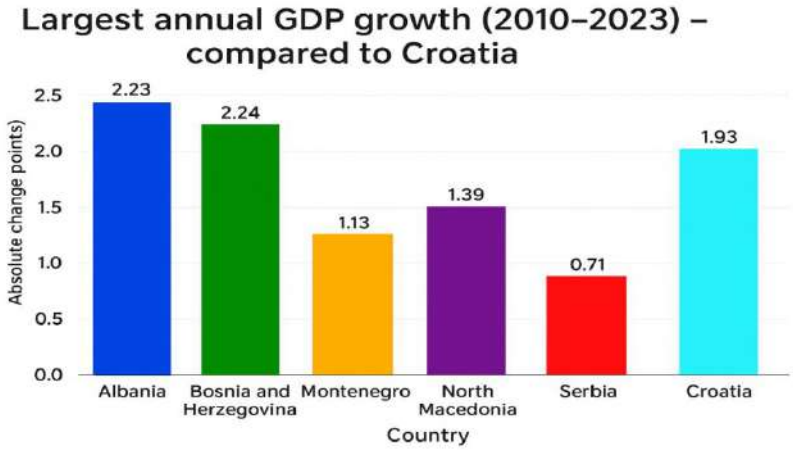
Conclusion: When the two countries are considered together, Croatia demonstrates a more pronounced maximum annual gain than North Macedonia, as reflected in the difference between their respective jumps (+1.93 versus +1.39). Croatia exhibits a stronger year-to-year improvement at its peak. North Macedonia, however, also shows meaningful progress in 2013, a development that aligns with the intensification of its EU-integration efforts during that time. While Croatia maintains a more consistent upward pattern coupled with a higher maximum increase, North Macedonia's performance reflects a moderately strong yet still notable advancement.

3.3.5. Comparison of Greatest Annual Progress: Serbia vs. Croatia

The data indicate that Serbia's most pronounced annual improvement occurred between 2014 and 2015, when its score rose by 0.71 points. In comparison, Croatia reached its strongest annual increase much earlier, between 2012 and 2013, recording a rise of 1.93 points, which represents its peak advancement in the observed period.

Conclusion: When the two countries are compared, Croatia clearly demonstrates a substantially larger maximum single-year improvement than Serbia (1.93 versus 0.71). Serbia's trajectory reflects modest progress with occasional upward movements, yet none of these match Croatia's highest annual gain. Croatia, by contrast, maintains a steadier pattern of development and achieves its strongest growth during the phase associated with its EU-accession process.

The figure below shows the greatest annual progress of the Western Balkan countries compared to Croatia.



Graph 2: Largest annual GDP growth compared to Croatia (2010-2023)

Source: Authors research

On the graph above, the maximum annual jumps of all six countries are visually compared, showing that Bosnia and Herzegovina and Albania lead the dynamics, while Serbia exhibits the smallest fluctuation.

Alternatively, the table below presents a comparison of all six countries based on their greatest annual progress (absolute change in points) for the period 2010–2023.

Table 9: Largest Annual Jump by Country

Source: Authors research

Country	Greatest Annual Progress (points)
Albania	2.23
B&H	2.24
Montenegro	1.13
N. Macedonia	1.39
Serbia	0.71
Croatia	1.93

From the brief analysis of the previous table, the following conclusions can be drawn:

Bosnia and Herzegovina exhibits the strongest maximum increase among all countries (+2.24), slightly above Albania (+2.23).

Croatia shows a stable and high increase (+1.93), associated with its EU accession.

North Macedonia and Montenegro display moderate but notable increases (+1.39 and +1.13, respectively).

Serbia has the smallest maximum increase (+0.71), reflecting a more moderate annual growth dynamic.

4. CONCLUSIONS AND RECOMMENDATIONS

4.1 KEY FINDINGS

The findings indicate that all Western Balkan countries have experienced gradual, albeit uneven, advancements in their green growth performance. Over the 14-year period, a clear upward trajectory emerges, reflecting increasing alignment with sustainability objectives, even as notable disparities in performance levels persist. Comparative analysis with Croatia highlights a continuing, yet gradually narrowing, gap between EU and non-EU Balkan countries. This convergence trend suggests that the Western Balkans are progressively moving toward meaningful alignment with European sustainability standards. Nevertheless, the pace and magnitude of these improvements remain modest, falling short of achieving full parity with EU member states.

4.2 POLICY IMPLICATIONS

The findings underscore several key policy implications for governments and regional institutions. First, strengthening institutional capacity and governance frameworks is essential, as an effective green transition requires not only robust environmental legislation but also the administrative ability to enforce it. Prioritizing institutional reforms that ensure policy continuity, transparency, and inter-ministerial coordination is therefore critical. Second, enhancing investment in green infrastructure and innovation—through renewable energy projects, circular economy initiatives, and support for green entrepreneurship—can accelerate progress, particularly in the "green economic opportunities" dimension of the GGI. Strategic use of EU pre-accession and cohesion funds can facilitate these investments. Third, improving natural capital protection and climate resilience remains vital. Despite gains in social inclusion and resource efficiency, biodiversity loss and unsustainable land use continue to pose challenges. Expanding protected areas, promoting sustainable agriculture, and enforcing environmental impact assessments can help safeguard natural resources. Fourth, deepening regional and EU integration is pivotal. Croatia's performance illustrates the benefits of EU alignment, highlighting the value of participation in programs such as Horizon Europe, LIFE, and the Green Deal Investment Plan, while regional cooperation through the Energy Community can support policy harmonization and joint climate action. Finally, developing data transparency and long-term monitoring mechanisms is crucial. Reliable and comparable environmental data are necessary to track progress and guide policy, and collaboration with organizations such as the GGGI and the European Environment Agency can ensure standardized systems that inform future GGI updates.

4.3 CONTRIBUTIONS AND FUTURE RESEARCH

This paper makes three primary contributions to the literature. First, it provides the first longitudinal descriptive analysis of GGI scores in the Western Balkans, filling a gap left by previous short-term or cross-sectional studies (e.g., Matlievska et al., 2020).

Second, it introduces Croatia as a regional benchmark, offering an EU-aligned perspective on convergence and sustainability performance. Third, it demonstrates the analytical potential of the Green Growth Index for tracking long-term progress in small, transition economies.

Future research could expand this study by decomposing the GGI into its four sub-dimensions to identify the specific drivers of improvement or stagnation. Combining the descriptive analysis with econometric methods could also provide insights into causal relationships between institutional quality, innovation, and green growth outcomes. Additionally, qualitative studies on governance practices and stakeholder engagement could complement quantitative findings, offering a more holistic understanding of the regional green transition.

4.4 FINAL REMARKS

Overall, the evidence from this study suggests that the Western Balkans are moving in the right direction but not yet at the right speed. Green growth is gradually taking root, but achieving full convergence with EU sustainability standards will require stronger institutions, deeper policy integration, and sustained financial and technical support. The long-term challenge lies in transforming incremental progress into structural change—ensuring that green growth becomes not just a policy agenda but a foundational element of regional economic development.

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