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University Engagement and Students' Perspectives in a UNESCO Biosphere Reserve: A Case Study from Camili (Macahel), Türkiye

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Abstract

This study explores the role of regional universities in promoting sustainable development within UNESCO Biosphere Reserves (BRs), focusing on the case of Artvin Çoruh University (AÇÜ) and Camili (Macahel) BR in northeastern Türkiye. Despite Camili BR's ecological and cultural significance, challenges such as depopulation, limited accessibility, and low public awareness hinder its potential as a model site for Education for Sustainable Development (ESD). Using a mixed-methods approach, the study surveyed and interviewed AÇÜ students to assess their awareness of the BR, engagement with sustainability issues, and perceptions of university-community collaboration. Results revealed low awareness among undergraduate students, while graduate students and those in relevant disciplines (e.g., forestry) demonstrated higher engagement. Interviews highlighted the dual nature of Camili BR's isolation –supporting conservation but limiting educational and economic opportunities– and emphasized the importance of preserving cultural heritage and fostering youth involvement. The findings suggest that regional universities can act as catalysts for sustainability by integrating BR-related content into curricula, facilitating community-based learning, and collaborating with NGOs or foundations such as TEMA. The study also identifies the need for improved infrastructure, digital outreach, and interdisciplinary initiatives to enhance BR visibility and impact. Methodological reflections highlight limitations in sample size and stakeholder representation, suggesting directions for future research. This case offers a replicable model for university-BR partnerships in other regions and contributes to the broader discourse on the role of higher education in UNESCO-designated sites.

Keywords: UNESCO Biosphere Reserve, Regional Sustainable Development, Turkey (Türkiye), Camili (Macahel) Biosphere Reserve, Higher Education Institution (HEI), Sustainable Development Goals (SDGs)

1. Introduction

1.1 Background and Significance

Sustainable development seeks to balance environmental, economic, and social dimensions to meet present needs without compromising the ability of future generations to meet their own. This concept has gained global recognition through key initiatives such as Our Common Future (1987) and Agenda 21 (1992), which emphasize intergenerational equity and a holistic approach to sustainability. Integral to these efforts is Education for Sustainable Development (ESD), a transformative educational framework that addresses interconnected global challenges, such as poverty, inequality, and environmental degradation. According to the UN Decade of Education for Sustainable Development (DESD) (2005), ESD promotes interdisciplinary learning, cultural relevance, and life-long education. UNESCO (2012) further expanded this framework by introducing a fifth pillar of education – learning to transform society – in addition to the traditional four; learning to know, to do, to be, and live together. In this context, higher education institutions (HEI) play a pivotal role in advancing ESD through their core missions: research, education, and community engagement (UNESCO, 2020; UNESCO, 2022).

1.2 UNESCO Biosphere Reserves and the Role of Universities

UNESCO's Man and the Biosphere (MAB) Programme, established in 1971, provides a global framework for integrating biodiversity conservation with sustainable development. Unlike UNESCO World Heritage Sites, Biosphere Reserves (BRs) serve as living laboratories for testing and demonstrating sustainable practices. The Seville Strategy (1996) outlines three core functions of BRs;

- Conservation: Preserving genetic resources, species, ecosystems and landscapes
- Development: Fostering sustainable economic and human development
- Logistical support: Facilitating projects for environmental education and training, monitoring related to local, national and global issues of conservation and sustainable development

The Lima Action Plan (2016), further emphasizes the role of universities in implementing the MAB Programme. Universities are expected to;

- Establish partnerships with universities/research institutions to undertake research (A.4.1.)
- Identify and disseminate good practices for sustainable development, and identify and eliminate unsustainable practices in BRs (A.4.4.)
- Organize regional education, capacity building and training programmes (B1.2.)

Along with these expectations, Mammadova (2019) reported that an international study program in a BR enhanced intercultural competence even in a short-term of stay at the site. However, on the other hand, the level of university engagement varies significantly across countries and individual BRs. While successful collaborations are reported in countries like Japan (e.g., Mount Hakusan BR and Kanazawa University) and Germany (Eberswalde University for Sustainable Development), such leading initiatives are less common or underreported in most BRs.

1.3 The Case of Camili Biosphere Reserve and Artvin Çoruh University

This study focuses on Camili (Macahel) BR, Türkiye's only UNESCO-designated BR, located in Artvin Province. Designated in 2005, Camili BR faces several challenges including depopulation, limited economic opportunities, and hard accessibility due to its mountainous geography (T.C. Çevre ve Orman Bakanlığı, 2007). These factors have hindered its development and visibility, both nationally and internationally.

Located in the same province, Artvin Çoruh University (AÇÜ) is a regional national university established in 2008. Given its geographical proximity and academic mission to support regional development, AÇÜ is well-positioned to act as a bridge between Camili BR and external stakeholders. Through its research capacity, community engagement, and international collaborations, AÇÜ has the potential to contribute meaningfully to the BR's sustainable development goals.

Türkiye's cautious stance on climate policy -highlighted by its 2021 ratification of the Paris Agreement with a reservation to protect its right to economic development (Batmaz, 2025) –further underscores the need for localized, context-sensitive approach to sustainability. In this setting, the synergy between a relatively inactive BR

and a newly established university offers a unique model for exploring the role of HEIs in promoting sustainability in underrepresented regions.

1.4 Research Objectives and Questions

This study aims to investigate how a regional university can contribute to sustainable development in a less-active BR through ESD initiatives. In this context, the term “less-active BR” refers to BRs that exhibit limited engagement in educational, scientific, and community-based activities, as well as insufficient collaboration with higher education institutions and minimal integration in international networks. Camili BR, designated in 2005 and still operating under a draft management plan (T.C. Çevre ve Orman Bakanlığı, 2007) as of 2025, exemplifies such characteristics of a less-active BR.

To investigate this potential, the study addresses the following research questions:

1. How do university students perceive the MAB Programme, BRs, and local issues such as depopulation, limited accessibility, low employment opportunities?
2. What actions can AÇÜ students take to address these issues and contribute to regional sustainability?
3. How do ESD and SDGs-oriented activities within the Camili BR influence:
 - Students’ decision-making and behavior?
 - The impact of student-led initiatives on the local community?

A mixed-methods approach combining questionnaires and interviews with AÇÜ students and local youth was adopted to answer these questions. This methodology allows for a comprehensive understanding of the educational, social, and institutional dynamics shaping sustainability efforts in Camili BR.

2. Method

This study employed a mixed-methods approach to investigate university students’ awareness of the Camili BR, their attitudes toward regional sustainability, and their potential roles in addressing local challenges. The methodology combined a structured questionnaire survey with semi-structured interviews to provide both quantitative and qualitative insights.

2.1 Questionnaire Survey

The questionnaire was structured to assess students’ awareness of UNESCO BRs, their perceptions of Camili BR and AÇÜ, and their involvement in community-based sustainability efforts. The survey was adapted from previous studies by Mammadova (2021) and Gower (2022), which explored the relationship between educational practices, community engagement, and BR-university collaboration.

The questionnaire consisted of 18 items divided into three thematic sections;

1. Awareness of UNESCO BRs in general
2. Perceptions of AÇÜ and Camili BR
3. Community involvement and local engagement inside Camili BR

A total of 46 students from AÇÜ participated in the survey, all responding to the Turkish version of the questionnaire (Figure 1). The average age of respondents was 23.6 years. In terms of gender distribution, 60.9% identified as female (28/46), 37.0% as male (17/46), and 2.2% did not specify their gender (1/46). Participants represented a range of academic levels, from vocational school (*Artvin Meslek Yüksekokulu*) to doctoral programs (*Doktora*), and were affiliated with various faculties: 41.3% were from the Faculty of Forestry, 26.1% from the Faculty of Education, and 8.7% from the Faculty of Health Sciences (n=46). Regarding their place of origin, 34.8% were born in Artvin Province (16/46), while 45.7% came from the broader East Black Sea Region—defined by the DOKAP mandate area (2024)—including Artvin (21/46). Notably, only 10.9% of respondents (5/46) had personally visited the Camili BR.



Figure 1: Demographic Profile of Survey Respondents (n = 46)

Note. Includes gender distribution, academic affiliation, faculty affiliation, and place of origin. Based on responses to the Turkish version of the questionnaire administered at AÇÜ between January and May 2024.

2.2 Interview Survey

To better understand the context behind the survey responses, semi-structured interviews were conducted with three individuals in the Table 1;

Table 1: Overview of Interview Participants

Interviewees	Gender	Affiliation	Date of interview
A	F	Faculty of Education, Doctoral Course, TEMA Youth senior member	September, 2024
B	M	Faculty of Forestry, Masters Course	September, 2024
C	M	Employee at a tourist pension inside of Camili, TEMA Youth senior member	October, 2024

Note. Summarizes the gender, affiliation, and interview dates of three semi-structured interviewees. One participant (C) is a local youth not affiliated with AÇÜ.

Although the interviewee C was not affiliated with AÇÜ, his perspective as a local youth was considered valuable for understanding community-level insights. Interviews were conducted online via Zoom in Turkish, recorded, transcribed, translated into English, and manually coded for semantic analysis.

The interview questions were derived from a pre-distributed Turkish questionnaire sheet (Table 2), which was provided to participants prior to the interviews. The original questions were written in Turkish and later translated into English for analysis. This approach ensured consistency across interviews and allowed participants to prepare their responses in advance.

Table 2: Semi-Structured Interview Questions

To be asked	Questions
A,B,C	What do you think is the reason for the low awareness of Camili BR?

A,B	Do you have any ideas for the promotion of Camili BR?
A,B,C	What do you think about the activities of Macahel Education, Culture and Solidarity Foundation and Café Macahel in Istanbul?
A,B,C	What are your thoughts about the future vision of Macahel in 10 years (2034)?
A	What are the activities of Young TEMA and Alumni TEMA? Is there a specific program related to Camili BR, regional sustainable development or global networking?
A,B,C	What do you think about the idea of creating a new Biosphere Reserve in Türkiye? Would this cause Camili BR to lose its value as “the only Biosphere Reserve in Türkiye”?
A,B,C	How would you like to promote Camili BR on the global stage?
C	How much do you think the influence of Georgia is felt in Macahel?
C	How do you evaluate the use of the name “Camili” as the name of the BR?

Note. Lists the questions provided in advance to interview participants A, B, and C. Designed to explore perceptions of Camili BR, regional sustainability, and youth engagement.

These interviews provided deeper insights into students’ motivations, behavioral contexts, and the potential role of universities in regional development.

3. Results

3.1 Survey Results

A total of 46 valid responses were obtained from AÇÜ students between January and May 2024. Despite the proximity of Camili BR, only 10.9%(5/46) of respondents had ever visited the site. Awareness levels were also low;

- 41.3% (19/46) had heard of UNESCO BR
- 30.4% (14/46) knew Camili BR was designated as a UNESCO BR
- 50.0% (23/46) reported no knowledge of Camili BR at all

When asked to describe Camili BR, the most frequently mentioned features were;

- “Rich biodiversity” (34/46)
- “Abundant forest resources” (17/46)
- “Eco-tourism” (15/46)

Regarding environmental and social concerns, the decline of rare species was the most serious issue. Only 13.0% (6/46) had learned about Camili BR during their studies, and just 10.9% (5/46) believed their academic major was related to SDG-oriented activities in the region.

In terms of behavior:

- 10.9% (5/46) had participated in local sustainability activities(e.g., field research, conservation)
- 63.0% (29/46) considered community contribution is important for sustainable development
- 67.3% (31/46) agreed that BR designation helped protect the natural environment
- 54.3% agreed it improved local skills and job training

However, only 2.2% (1/46) were aware of SDG-related projects in Camili BR. When asked about future engagement;

- 13.0% (6/46) expressed interest in living and working in the region after graduation
- 43.5% (20/46) were unsure
- 43.5% (20/46) were unwilling

Finally, only 10.9% (5/46) believed they could participate in Camili BR projects remotely(e.g., online), while 39.1% (18/46) disagreed.

3.2 Interview Results

Three semi-structured interviews conducted with the individuals listed in the Table 1. Key themes that emerged from the interviews are summarized in the Table 2 and following opinions were obtained and categorized by topic.

3.2.1 Infrastructure and Accessibility

- All participants noted severe winter road closures and lack of public transport
- Electricity outages were common in winter, affecting year-round residency

3.2.2 Policy and Governance

- Forest laws were described as strong but poorly enforced
- Participants called for stricter environmental regulations

3.2.3 Demographic Trend

- A reversal of out-migration was observed, partly due to economic hardship, COVID-19 pandemic, and the 2023 earthquake
- Role of NGOs and Foundations
- TEMA was praised for promotion youth engagement, environmental education, and disaster response
- The passing of TEMA's founder, Ali Nihat Gökyiğit, was seen as a turning point in local conservation efforts

3.2.4 Tourism and Promotion-

- Eco-tourism was seen as promising but underdeveloped
- Café Macahel and the Macahel Foundation were viewed as effective promotional bodies
- Social media was considered useful for outreach, especially to urban audiences

3.2.5 Cultural Identity

- Georgian heritage (language, cuisine, village names such as Mahahel) was seen as a valuable cultural asset
- Participants stressed the importance of preserving both natural and cultural heritage

3.2.6 Education and Research

- Participants supported more academic collaboration and ecological literacy programs
- Suggestions included student-led surveys, workshops, and international exchanges

4. Discussion

4.1 Enhancing ESD through Regional Engagement

The survey revealed a significant gap in awareness of Camili BR among undergraduate students of AÇÜ, despite its geographical proximity. This suggests a missed opportunity for integrating regional sustainability into higher education. Graduate students and those in the Faculty of Forestry showed higher levels of awareness and engagement, indicating that disciplinary relevance and academic maturity influence students' connection to local sustainability issues (Table 3, Table 4).

Table 3: Awareness Levels by Academic Status

Group	Visited Camili BR	Heard of UNESCO BR	Aware of Protected Area
Graduate (n=7)	71.4 %	100 %	100 %
Undergraduate/ Vocational (n=39)	0 %	30.8 %	23.1 %

Note. Compares knowledge of Camili BR and UNESCO designations between graduate and undergraduate/vocational students. Shows higher awareness among graduate-level respondents.

Table 4: Awareness and Engagement by Faculty Affiliation

Group	Visited Camili BR	Heard of UNESCO BR	Aware of Camili as a BR	Importance of Community Engagement
Forestry (n=19)	21.1 %	47.4%	36.8%	73.7%
Others (n=27)	3.7%	37.0%	25.9%	55.4%

Note. Details differences in BR visitation, awareness, and perceived importance of community engagement between students from the Faculty of Forestry and other faculties.

To address this gap, incorporating BR-related content in undergraduate curricula -such as the MAB framework, regional development challenges, and local biodiversity- could foster broader understanding and engagement. Moreover, educational programs that include dialogue with local residents may help overcome misconceptions and promote reciprocal learning, aligning with UNESCO's emphasis on intergenerational and community-based education.

4.2 Youth Engagement and the Role of Foundations

Interviews highlighted the active role of TEMA Youth in environmental protection and community development. This contrasts with the low awareness levels found in the broader student population, suggesting that external organizations like TEMA (Turkish Foundation for Combating Soil Erosion; *Türkiye Erozyonla Mücadele Ağaçlandırma ve Doğal Varlıkları Koruma Vakfı*). Foundation (*vakfı*) can serve as effective intermediaries between BRs and youth. In the context of Türkiye, a *vakfı* refers to a traditional Islamic institution that supports public welfare through charitable activities. Unlike general usage of the word “foundation”, *vakfı* are deeply rooted in cultural and religious practices, often providing long-term support to communities without expecting immediate returns. As highlighted by Maruyama (2008), *vakfı* plays a bridging role in society, connecting diverse groups and fostering social capital. In the realm of ESD, *vakfı* contributes significantly by organizing environmental education programs and supporting local initiatives, thereby enhancing community resilience and sustainability.

Given its proximity and institutional mission, AÇÜ is well-positioned to collaborate with TEMA and similar foundations to co-develop capacity-building programs, field-based learning, and volunteer initiatives. These partnerships could enhance social capital and bridge the gap between academic institutions and local communities, reinforcing the MAB Programme's emphasis on youth participation.

4.3 Infrastructure and Accessibility Challenges

Camili BR's inaccessibility -particularly during snow season- was identified as both a barrier and a protective factor. While it limits educational and tourism activities, it also preserves the region's ecological integrity. Survey responses suggest that small, discipline-specific groups (e.g., forestry or graduate students) may be more suitable for field-based programs in such remote areas.

To mitigate seasonal isolation, infrastructure improvements (e.g., tunnel construction, reopening of historic passes) and digital engagement strategies (e.g., online workshops, virtual exchanges) could be explored. These approaches align with UNESCO's transboundary cooperation principles (2021) and offer scalable solutions for other isolated BRs.

4.4 University-Community Collaboration and Economic Development

AÇÜ existing research centers and regional specialization in medical and aromatic plants demonstrate its potential to contribute to local economic development. Successful commercialization of products like herbal creams illustrates how university-led initiative can generate tangible benefits for the region.

Expanding such efforts to Camili BR -through branding, certification, and interdisciplinary research- could enhance the BR's visibility and economic resilience. Moreover, AÇÜ's involvement in policy development and tourism planning could support more inclusive and sustainable regional strategies.

4.5 Cultural Heritage and Educational Innovation

Camili BR's location on the Türkiye–Georgia border presents unique opportunities for cultural preservation and cross-border collaboration. Interviews emphasized the importance of safeguarding local traditions, such as village name, language, cuisine, grape (wine) production, which are integral to the region's identity.

4.6 Strategic Positioning and Global Integration

As Türkiye's only UNESCO BR, Camili BR carries the unique responsibility of representing the MAB Programme in the country, yet it faces challenges in networking and visibility. The lack of domestic counterparts and limits opportunities for knowledge exchange and benchmarking. AÇÜ could help bridge this gap by facilitating regular dialogue with the Turkish National Commission for UNESCO and international partners. Establishing a UNITWIN/UNESCO Chair Programme at AÇÜ would formalize its role in advancing sustainability and education. This would align with global precedents and position the university as a leader in BR-based research and learning.

5. Conclusion

5.1 Summary and Contributions

This study explored the relationship between a regional university (AÇÜ) and Türkiye's only UNESCO Biosphere Reserve, Camili (Macahel) BR, to assess how such partnership can foster sustainable regional development. Through a mixed-methods approach involving surveys and interviews with local youth, mainly university students, the research revealed a significant gap in awareness and engagement with the BR, particularly among undergraduate students. However, it also identified promoting opportunities for collaboration, especially through targeted educational programs, youth engagement, and interdisciplinary initiatives.

The findings underscore the potential of regional universities to act as catalysts for sustainability by integrating ESD into their curricula, facilitating community-based learning, and collaboration with local stakeholders such as NGOs and foundations. AÇÜ's proximity to Camili BR and its institutional mission position it as a strategic partner in advancing the goal of the MAB Programme.

5.2 Policy and Practice Implications

To strengthen the impact of Camili BR, several practical steps are recommended;

- Curriculum Integration: Incorporate BR-related content and ESD principals into university programs, especially at the undergraduate level.
- Community Engagement: Facilitate dialogue between students and local residents to promote mutual understanding and co-learning.

- Digital Outreach: Develop online platforms for remote participation in BR activities, addressing accessibility challenges.
- Institutional Collaboration: Establish formal partnerships between local educational bodies such as AÇÜ, local organizations, and the Turkish National Commission for UNESCO to improve governance and visibility

5.3 Broader Relevance and Future Directions

The Camili-AÇÜ case offers a replicable model for other regions seeking to balance conservation and development. It highlights the importance of interdisciplinary collaboration, youth involvement, and culturally sensitive approaches to sustainability. Moreover, the study contributes to the broader discourse on the role of higher education institutions in UNESCO-designated sites, including Global Geoparks and World Heritage areas. Future research should expand the scope to include perspectives from local residents, explore cross-border cooperation with Georgia such as transboundary BR, and examine pedagogical strategies for embedding BRs into higher education. Establishing a UNESCO Chair/ UNITWIN programme at AÇÜ could further institutionalize its role in regional and global sustainability efforts.

5.4 Reflections on Methodology

This study employed a mixed-methods approach to explore the relationship between a regional university and a UNESCO BR. While this design allowed for a comprehensive understanding of student perceptions and institutional roles, several methodological considerations and limitations should be acknowledged.

First, the sample size was relatively small, with 46 valid responses from AÇÜ students. Although the findings revealed meaningful trends, the limited number of participants – particularly in the graduate student group – restricts the generalizability of the results. Future studies should aim to include a larger and more diverse sample to enable statistical significance and broader applicability.

Second, the study primarily focused on university's perspective, without incorporating direct input from Camili BR residents or local stakeholders. While student voices offer valuable insights, a more balanced view would require triangulation with community perspectives, especially regarding the effectiveness of ESD initiatives and local engagement.

Third, the geographical and cultural context of Camili BR, as a border region with historical ties to Georgia, emerged as a significant factor during interviews. However, this dimension was not fully captured in the survey design. Future research should consider cross-border dynamics and cultural heritages as integral components of sustainability discourse.

Finally, while the study identified promising educational strategies and institutional roles, it did not deeply examine pedagogical frameworks or curriculum design. Further investigation into how BR-related content can be systematically embedded into higher education programs would enhance the practical relevance of the findings. Despite these limitations, the study provides a valuable foundation for understanding university-BR collaboration and offers a model that can be adapted to other regions and institutions. The methodological insights gained here can inform future research designs and contribute to the evolving field of sustainability education.

Ethical Considerations:

This study received no external funding, and the authors declare no conflict of interest.

Ethical approval was granted by the Ethics Committee of the Institute of Human and Social Sciences at Kanazawa University (Approval No. 05-64). Additional permission to conduct the research, including the distribution of questionnaires and the implementation of interviews on campus, was granted by the Board of Directors at Artvin Çoruh University (Approval No. E-12475423-605-133412).

All participants were fully informed of the study's objectives and procedures and provided informed consent prior to participation. This article draws upon survey data originally collected for the author's master's thesis, entitled "*The Role of the Relationship Between a Regional University and a UNESCO Biosphere Reserve (BR) in Promoting Sustainable Regional Development: A Case Study Based on a Student Survey at Artvin Çoruh University and the Camili (Macahel) UNESCO BR in Türkiye*," submitted to Kanazawa University in January 2025. A sample of the survey questionnaire is available from the author upon reasonable request.

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