FROM ENVIRONMENTAL AWARENESS TO A SMART AND RESILIENT COMMUNITY:THE CASE OF RAFINA

DOI: 10.26341/issn.2241-4010-2026-6a-6-L02085

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Abstract
This paper examines how education can act as a catalyst in supporting the transition of small towns into smart and resilient communities, using the case of Rafina in Greece. Rafina, a coastal town in Eastern Attica that experiences significant impacts of the climate crisis, has become a field of innovative actions carried out by the 1st Junior High School of Rafina. These actions combine environmental education, digital technologies, and local collaboration. Through the Erasmus+ projects "Protect Your Nature, Protect Your Future", "Create" and "E.A.R.T.H.", the school engages students, teachers, and citizens in activities that link scientific inquiry with practical implementation—such as studying local ecosystems, digitally monitoring environmental data, and co-developing community actions with the Municipality of Rafina.

The study investigates, through a structured questionnaire, the perceptions of students, educators, and citizens regarding the concepts of "smart city," green development, sustainable mobility, and participatory governance. Although Rafina does not yet exhibit the characteristics of a fully developed smart city, the preliminary findings suggest that the active involvement of the school community, the use of digital tools, and close cooperation with local authorities can serve as drivers of local awareness and civic engagement. These initiatives enhance environmental consciousness and lay the foundations for a more sustainable and resilient community.

Keywords: *smart city, resilience, environmental education, green development, participatory governance, Rafina, Erasmus+.*

1. INTRODUCTION

In recent years, small cities have been at the center of discussions on sustainable development and resilience in the face of the climate crisis (UN-Habitat, 2024). Although most of them lack the technological infrastructure or resources of large metropolitan centers, they constitute vital spaces where changes can be implemented directly and perceived immediately by citizens (Satterthwaite, 2013; Panagiotopoulou et al., n.d.). Within this context, education acquires particular importance: schools function as local hubs of learning, innovation, and social mobilization, creating the conditions for new ways of understanding and addressing contemporary environmental challenges (UNESCO, 2025).

Rafina, a coastal town in Eastern Attica, represents a characteristic example of an area directly affected by climate change (Monioudi et al., 2025). Its geographical location, continuous urban development, and the presence of sensitive ecosystems make it necessary to adopt practices that promote resilience and sustainability. At the same time, the area exhibits

intense social and educational activity, creating fertile ground for initiatives that connect schools with the local community.

Over recent years, the 1st Junior High School of Rafina has developed a comprehensive framework of actions that combine environmental awareness, digital tools, and participatory processes. Through the European Erasmus+ programmes *Protect Your Nature, Protect Your Future*, *Create*, and *E.A.R.T.H.*, the school actively engages students, educators, and local residents in activities that link scientific observation with practice. These activities include the collection of data on local ecosystems, the use of digital applications for environmental monitoring, collaborative actions with the Municipality and local stakeholders, as well as the implementation of community-based interventions with a focus on sustainable development.

The present study explores how participation in school-based and community activities influences the perceptions of students, educators, and citizens regarding smart cities, green development, sustainable mobility, and participatory governance. Through the analysis of questionnaires, the study seeks to document the level of awareness and environmental sensitivity within the local community, as well as to examine how the active role of the school can function as a driver of transformation toward a more resilient and collaborative community.

This paper aims to demonstrate that small cities, by leveraging educational processes and European collaborations, can lay the foundations for smart and sustainable forms of development, in which citizens actively participate in decision-making and in the management of the natural environment (UN-Habitat, 2024).

1.1 Aim of the Study

The aim of the present study is to investigate how the educational community can contribute to the transition of a small city toward a smarter and more resilient development model. More specifically, the research seeks to capture the perceptions of students, educators, and residents of Rafina regarding the concepts of the smart city, green development, sustainable mobility, and participatory governance.

Through the analysis of questionnaire data, the study examines how actions related to environmental education, digital literacy, and collaboration between the school and the Municipality can enhance citizen participation and function as drivers of local awareness and engagement. In addition, the role of European Erasmus+ programmes in shaping skills and attitudes associated with sustainable and smart urban development is explored.

The central objective is to highlight the extent to which the school community can act as an agent of change and promote a model of an active, informed, and environmentally aware local society, contributing to urban resilience and the long-term planning of the city (UN-Habitat, 2024).

1.2 Rafina as an Example of a Small Coastal City

Rafina constitutes a characteristic example of a small coastal city facing contemporary environmental challenges. Its geographical location in Eastern Attica, combined with the intense urban development of recent decades, renders it particularly vulnerable to phenomena such as coastal erosion, rising temperatures, extreme weather events, and an increased likelihood of flooding. Its proximity to the sea, local topography, and the presence of sensitive ecosystems creates a context that requires systematic monitoring, preventive planning, and actions aimed at strengthening local resilience.

Beyond environmental pressures, Rafina presents particular social and functional significance as a gateway city to the Cyclades islands, characterized by pronounced seasonality and a substantially increased population during the summer months. This seasonality places additional strain on infrastructure and reinforces the need for smart

solutions in the management of transportation, resources, and public services. At the same time, the presence of an active local administration and a dynamic educational community makes Rafina a favorable setting for the implementation of initiatives that combine environmental education, digital monitoring, and participatory governance.

Studies examining the vulnerability of Greek coastal cities confirm that areas such as Rafina face heightened risks from flooding, thermal extremes, and marine inundation, highlighting the necessity for adaptation measures and the strengthening of local resilience (Monioudi et al., 2025). Within this framework, the contribution of the school community becomes particularly significant, as it can enhance collective understanding of environmental risks and promote a culture of prevention and participation.

1.3 The Role of Education in Sustainability and Resilience

Education, in all its forms and levels, constitutes a fundamental pillar in the development of resilient and sustainable societies. It does not concern children alone; rather, it encompasses educators, parents, local stakeholders, and every citizen who participates in the collective effort to understand and address contemporary environmental challenges. Through both formal and informal learning processes, education enhances individuals' capacity to understand risks, manage natural resources effectively, adopt responsible practices, and participate actively in decision-making.

Within this framework, schools function not only as spaces of learning but also as communities of practice that influence the broader social fabric. Through environmental programmes, collaboration with local authorities, participation in research initiatives, the collection of environmental data, and the use of digital technologies, students, educators, families, and citizens are actively engaged. This participatory process contributes to the dissemination of knowledge, the cultivation of environmental awareness, and the strengthening of local preparedness in the face of extreme events.

Education for Sustainable Development (ESD) promotes skills such as systems thinking, responsibility, collaboration, and informed decision-making—competences required by both young people and adults to enhance community resilience. UNESCO emphasizes that the participation of all citizens in the learning process constitutes a critical factor in the transition of cities toward more sustainable and resilient models (UNESCO, 2025).

Consequently, the role of education is multi-layered: it supports students in developing environmental and social responsibility, equips educators with contemporary teaching tools, strengthens cooperation between schools and local actors, and mobilizes citizens in a collective effort to address the challenges posed by the climate crisis. As a result, education functions as a catalyst for transformation across the entire community.

2. THEORETICAL FRAMEWORK

2.1 Smart Cities and Green Development

Smart cities constitute contemporary urban models that make use of technological tools, monitoring systems, and data analysis to improve quality of life, energy efficiency, and environmental management. Green development is embedded within these models through practices such as smart mobility, emissions reduction, and the promotion of renewable energy sources. These policy approaches aim at the holistic transformation of cities based on principles of sustainability (Caragliu et al., 2009).

2.2 Environmental Education and Participatory Governance

Environmental education promotes the development of critical thinking, understanding of ecological processes, and active participation in environmental decision-making. Through

educational activities, participants become familiar with practices that enhance sustainability and strengthen collaboration with the community. Participatory governance encourages the co-creation of policies among citizens, schools, and local stakeholders, constituting a fundamental pillar of smart cities (UNESCO, 2025).

2.3 Resilience of Small Cities

Urban resilience refers to the capacity of cities to prepare for, adapt to, and recover from natural hazards, economic crises, and environmental pressures. Small cities can strengthen their resilience through local cooperation networks, awareness-raising programmes, and emergency response systems. Factors such as social cohesion, local knowledge, and active community engagement constitute critical parameters for successful adaptation to climatic and environmental changes (Schipper & Pelling, 2006).

2.4 The Role of Schools and Erasmus+ Programmes

Schools serve as central actors in fostering environmental awareness and social participation. Through educational programmes and international collaborations, they enhance skills such as observation, scientific inquiry, and digital literacy. Erasmus+ programmes promote knowledge exchange, innovation, and the connection between the educational community and local authorities, thereby contributing to the development of smart and resilient communities (Erasmus+ Programme Guide, 2023).

3. METHODOLOGY

3.1 Research Design

The study adopts a quantitative, descriptive research design aimed at capturing the perceptions of students and adults regarding the smart city, sustainable mobility, green development, and urban resilience. The quantitative approach was selected because it allows for the collection of structured data from a large sample of participants, facilitating the comparison of trends and the analysis of attitudes within the community of Rafina.

Within the framework of the research, two questionnaires were employed: one addressed to students and one to adults. Both questionnaires included closed-ended multiple-choice questions and Likert-scale items using a **five-point Likert scale** (Not at all–Very much). The design is descriptive, as it does not seek to investigate causal relationships but rather to document the existing situation and the views of two key groups within the local community.

The selection of students as a target group is justified by the central role they play in environmental awareness and school-based activities, while adults—primarily parents—represent active members of the community with direct knowledge of local challenges. This design enables a parallel examination of the attitudes of both groups, offering a comprehensive picture of Rafina's transition toward a smarter and more resilient urban model.

3.2 Participants

A total of 251 students from the 1st Junior High School of Rafina and 178 adults from the local community participated in the study. The student participants were drawn from the first and third grades of the school. The sample represents a significant proportion of the student population (approximately 60%) of the school. The student questionnaire was completed within the context of school activities.

In addition, 178 adults from the local community of Rafina participated in the research (97 women and 81 men). The adult questionnaire was distributed both electronically through parent groups of lower and upper secondary schools and in printed form to parents during

school meetings and activities. This strategy enabled access to active members of the school and local community, who constitute key social stakeholders in issues related to environmental awareness and local resilience. Participation was voluntary and anonymous, and no personal data were collected.

3.3 Data Collection Instruments

Data were collected using two questionnaires: one for students and one for adults. Both instruments were structured and consisted mainly of multiple-choice questions and Likert-scale items (ranging from "not at all" to "very much"). The questionnaires addressed topics such as the smart city, green development, sustainable mobility, and the role of education. This type of questioning was selected because it allows for the collection of clear and directly comparable responses.

3.4 Data Analysis Procedure

The data were analyzed using descriptive statistics, primarily frequencies and percentages for each question. Initially, the responses of students and adults were examined separately and subsequently compared in order to identify similarities and differences in their attitudes. Semi-open-ended responses were grouped into basic categories to capture the most frequently mentioned themes and suggestions. Data processing was conducted using a spreadsheet application, with the aim of ensuring clear and accurate presentation of the results.

4. RESULTS

4.1 Perceptions of the "Smart City"

The first group of questions examined the extent to which students and adults perceive Rafina as exhibiting characteristics of a "smart city" in its current form. Participants were asked to evaluate the city using a five-point scale ranging from "not at all" to "very much."

4.1.1 Students' Responses

According to the data collected from the 251 student respondents, the majority selected the lower categories of the scale. Specifically, 24 students stated that Rafina is "not at all" smart, 176 considered it "slightly" smart, 34 rated it as "moderately" smart, 14 as "quite" smart, and only 3 perceived it as "very" smart.

4.1.2 Adults' Responses

Similarly, among the 178 adults from the local community, 74 characterized Rafina as "not at all" smart, 60 as "slightly" smart, 28 as "moderately" smart, 9 as "quite" smart, and 7 as "very" smart.

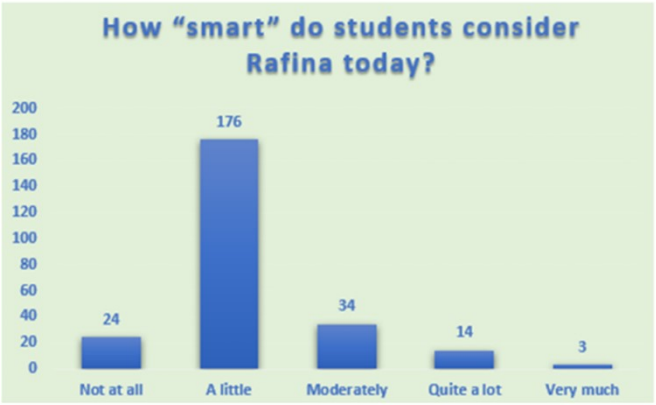

Figure 1. Students' evaluation of how "smart" they consider Rafina today, based on a five-point scale ranging from "Not at all" to "Very much".

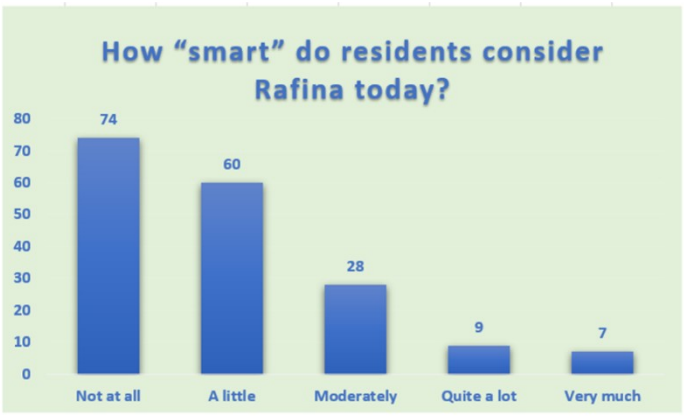

Figure 2. Residents' evaluation of how "smart" they consider Rafina today, based on a five-point scale ranging from "Not at all" to "Very much".

4.2 Views on Green Development and Sustainable Mobility

The second group of questions explored the attitudes of students and adults toward green development and the importance of environmental protection in Rafina. Participants were asked to assess how important they consider environmental protection, using a five-point scale ranging from "not at all" to "very much."

4.2.1 Students' Responses

Based on the responses of the 251 students, 12 respondents considered environmental protection to be "not at all" important, 12 rated it as "slightly" important, 24 as "moderately" important, 41 as "quite" important, and 162 as "very" important.

4.2.2 Adults' Responses

Among the 178 adult participants, 3 respondents stated that environmental protection is "not at all" important, 26 considered it "slightly" important, 33 rated it as "moderately" important, 64 as "quite" important, and 52 as "very" important.

4.2.3 Additional References to Sustainable Mobility

In the open-ended responses, participants also referred to issues related to sustainable mobility, such as the need to promote walking, the development of safer cycling lanes, and improvements in public transportation

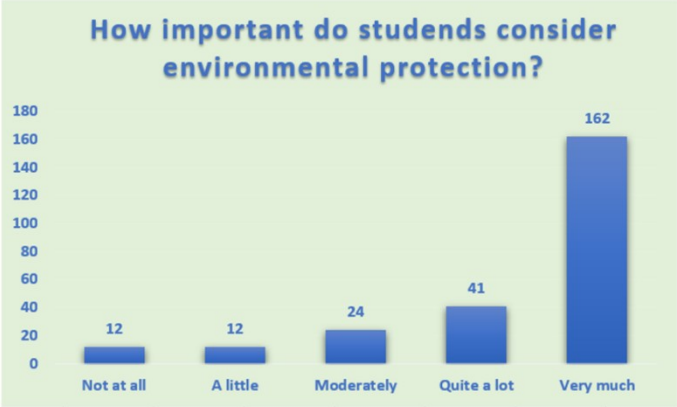

Figure 3. Students' evaluation of the importance they assign to environmental protection, based on a five-point scale ranging from "Not at all" to "Very much".

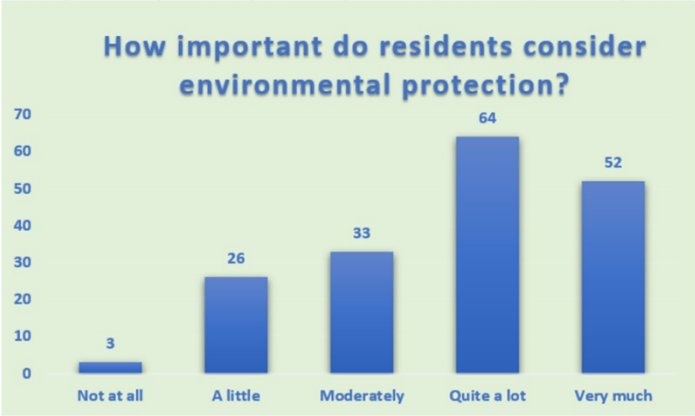

Figure 4. Residents' evaluation of the importance they assign to environmental protection, based on a five-point scale ranging from "Not at all" to "Very much".

4.3 Participatory Governance and Citizen Engagement

The third group of questions examined the extent to which students and adults express willingness to participate in actions related to the local community and the environment. Participants were asked to evaluate their willingness to engage in voluntary or community initiatives, using a five-point scale ranging from "not at all" to "very much."

4.3.1 Students' Responses

Out of the 251 student responses, 11 students stated that they were "not at all" willing to participate in community or environmental actions, 5 reported being "slightly" willing, 45 "moderately" willing, 71 "quite" willing, and 119 "very" willing to participate.

4.3.2 Adults' Responses

Among the 178 adults who participated in the study, 28 respondents indicated that they were "not at all" willing to participate in local or environmental initiatives, 30 reported being "slightly" willing, 57 "moderately" willing, 44 "quite" willing, and 19 "very" willing to participate.

4.3.3 Additional References

In the open-ended responses, several participants—both students and adults—referred to actions they would consider useful for enhancing citizen participation, such as awareness-

raising events, community-based interventions, and collaborative initiatives between schools and the municipality.

Figure 5. Students' willingness to participate in community or environmental actions, based on a five-point scale ranging from "Not at all" to "Very much".

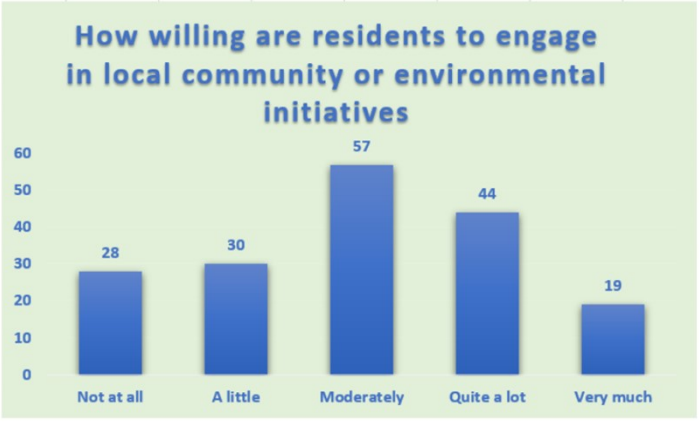

Figure 6. Residents' willingness to engage in local community or environmental initiatives, based on a five-point scale ranging from "Not at all" to "Very much".

4.4 The Role of the School and Educational Actions

The fourth group of questions explored how participants—students and adults—perceive the contribution of the school to environmental education, community resilience, and awareness of sustainability-related issues. Within this context, both the school's general educational function and the role of European programmes, such as Erasmus+ and participation in the European Blue Schools network, were examined.

4.4.1 Students' Views

Students were asked to evaluate the extent to which they consider the school to contribute to their environmental education. Out of the 251 responses, 40 students stated that the school does not contribute "not at all," 48 rated it as contributing "slightly," 59 as "moderately," 61 as "quite," and 43 as "very much."

In addition, students evaluated the school's contribution to strengthening community resilience. Overall, 38 respondents answered "not at all," 49 "slightly," 65 "moderately," 49 "quite," and 50 "very much."

These two sets of data reflect how the student community perceives the role of the school in both knowledge development and collective preparedness in relation to environmental challenges.

4.4.2 Adults' Views

Adult participants were asked to assess the role of teachers and school-based actions in shaping an informed and resilient community.

Regarding the importance of the role of teachers, 0 respondents answered "not at all," 13 "slightly," 49 "moderately," 47 "quite," and 69 "very much." In a separate question addressing the extent to which school activities helped adults become informed about environmental and sustainability-related issues, 2 respondents answered "not at all," 17 "slightly," 52 "moderately," 36 "quite," and 71 "very much."

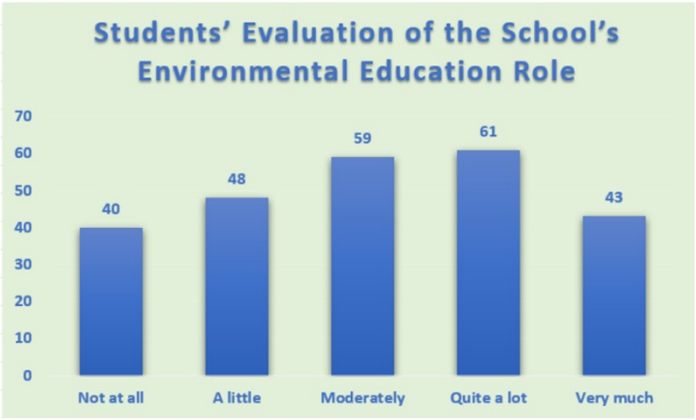

Figure 7. Students' evaluation of the school's contribution to environmental education, based on a five-point scale ranging from "Not at all" to "Very much".

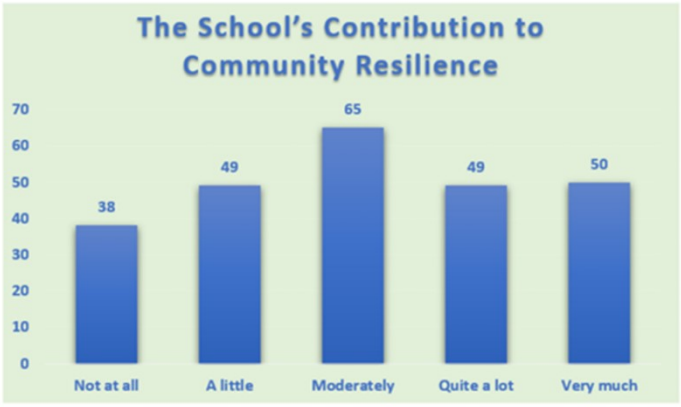

Figure 8. Students' perception of the school's contribution to community resilience, based on a five-point scale ranging from "Not at all" to "Very much".

Figure 9. Adults' evaluation of the importance of teachers' role in shaping a resilient community, based on a five-point scale ranging from "Not at all" to "Very much".

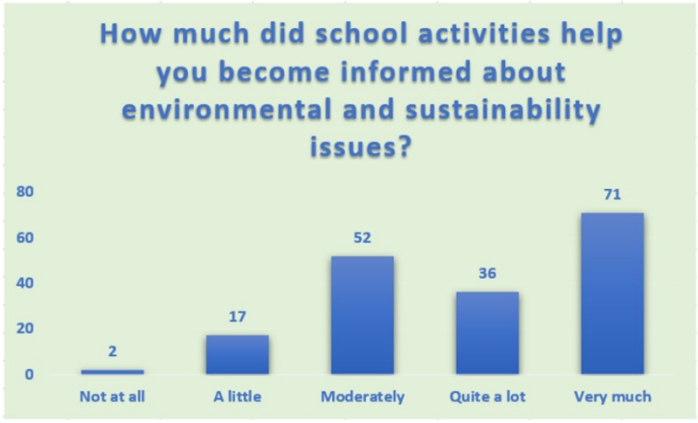

Figure 10. Adults' evaluation of the extent to which school activities helped them become informed about environmental and sustainability issues, based on a five-point scale ranging from "Not at all" to "Very much".

4.4.3 The Contribution of Erasmus+ and Blue Schools Programs

In the present study, adults' perceptions regarding the role played by European collaborations and school-based actions in strengthening environmental education within the local community were also examined. As the Erasmus+ programs and the Blue Schools initiative constitute core pillars of the environmental activities of the 1st Junior High School of Rafina, investigating their impact was considered essential.

According to the data, adult participants were asked to assess the extent to which Erasmus+ and Blue Schools activities contribute to the development of students' environmental awareness. In parallel, the degree to which school activities contributed to adults' personal awareness of environmental and sustainability-related issues was also examined.

Regarding the importance of the contribution of European programs to students' environmental awareness, 2 respondents answered "not at all," 12 "slightly," 13 "moderately," 39 "quite," and 112 "very much." With respect to whether European programs helped adults become informed about environmental and sustainability issues, 6 respondents answered "not at all," 6 "slightly," 25 "moderately," 48 "quite," and 93 "very much."

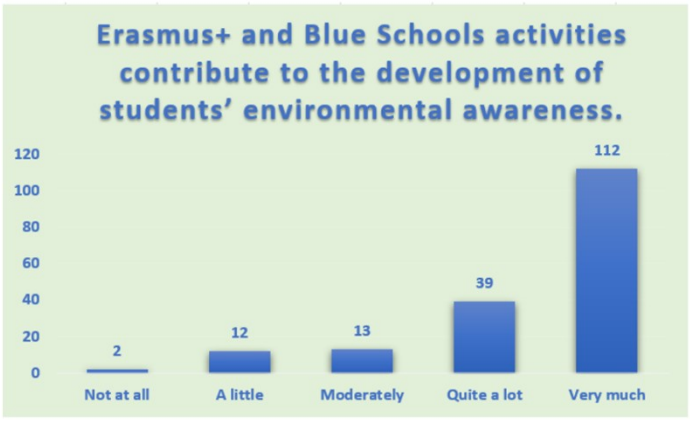

Figure 11. Adults' evaluation of the extent to which Erasmus+ and Blue Schools activities contribute to the development of students' environmental awareness, based on a five-point scale ranging from "Not at all" to "Very much".

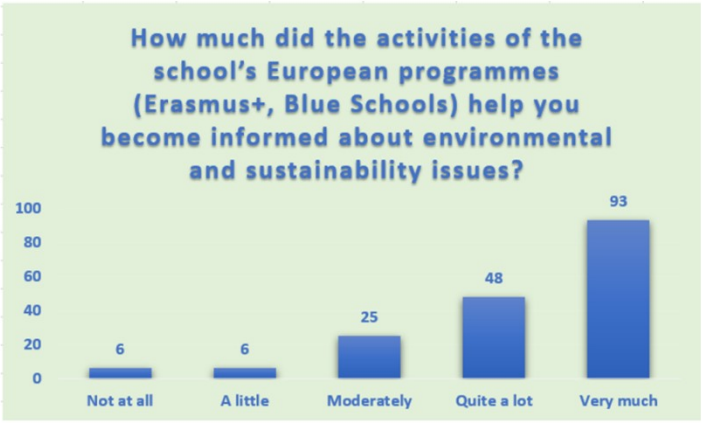

Figure 12. Adults' evaluation of the extent to which the school's European programmes (Erasmus+ and Blue Schools) helped them become informed about environmental and sustainability issues, based on a five-point scale ranging from "Not at all" to "Very much".

5. DISCUSSION

This chapter summarizes and interprets the findings of the study, linking the results to the theoretical framework and to contemporary approaches to smart and resilient cities. At the same time, it highlights the challenges faced by Rafina, as well as the role of the school community in shaping a participatory and sustainable model of local development.

5.1 Interpretation of the findings

The results indicate that both students and adults perceive Rafina as a city that is still at an early stage of transition towards the "smart city" model. The majority of participants selected low or moderate values when evaluating the level of the city's "smartness", suggesting that Rafina does not yet possess fully developed digital infrastructures, sustainable mobility systems, or integrated environmental solutions.

At the same time, a high level of environmental awareness emerges. Students, in particular, rate environmental protection as "very important", while adults also recognize the role of the environment in quality of life and urban sustainability. Willingness to participate in voluntary or community-based actions appears to be higher among students, indicating that younger generations are more inclined to engage actively in environmental and local development issues.

Perceptions regarding the role of the school are particularly positive. Students acknowledge that the school contributes to their environmental education and to strengthening community resilience, while adults confirm that teachers play a significant role in informing the community and shaping attitudes related to sustainability.

A key finding is the very high acceptance of Erasmus+ and Blue Schools programmes. A large proportion of adults consider that these initiatives contribute substantially to the development of students' environmental awareness and to the dissemination of environmental knowledge within the local community.

5.2 Connection with the theoretical framework

The findings confirm key points of the literature regarding the role of small cities as dynamic spaces for social and environmental innovation. Participants' perceptions align with the theoretical model of the smart city, which presupposes:

- informed and active citizens,
- cooperation among institutions and local stakeholders,
- the use of digital and environmental data,
- and participatory governance mechanisms.

Furthermore, the findings related to the school community support the literature on Education for Sustainable Development (ESD). UNESCO emphasizes that sustainability requires participatory learning processes and transformative education. The 1st Gymnasium of Rafina appears to function as such a learning hub, as participation in Erasmus+ programmes promotes collaborative learning, active inquiry, and strong links with the local community.

In addition, resilience literature highlights that small communities can adapt more effectively when they possess strong social networks and well-informed citizens. The findings of this study confirm that school-based actions contribute to the creation of such networks, enhancing both ecological and social awareness.

5.3 Challenges and opportunities for Rafina

Despite the high level of environmental awareness, the data indicate that Rafina faces significant challenges, including:

- limited digital solutions for transport, energy management, and environmental risk monitoring,
- insufficient planning for sustainable mobility,
- increased vulnerability to climate-related risks such as flooding and coastal erosion.

However, the strong willingness of students to participate and the positive attitudes of adults towards the role of the school create important opportunities. The active involvement of the educational community can act as a bridge between citizens and local authorities, contributing to more participatory and sustainable urban governance.

The utilization of European collaborations, such as Erasmus+ programmes, offers valuable opportunities for knowledge exchange, the development of digital skills, and the implementation of actions that strengthen the ecological culture of the local community.

5.4 The contribution of the school community to the transition towards a smart and resilient city

The school community emerges as a key agent of transformation. Through environmental programmes, civil protection activities, cooperation with the Municipality of Rafina, and participation in European networks, the school:

- strengthens environmental education,
- cultivates ecological awareness,
- promotes a culture of active participation,

- creates channels of cooperation among students, parents, and local stakeholders,
- and functions as a "local innovation laboratory" where new practices for sustainable cities are tested.

The data indicate that citizens recognize this contribution, while students experience the school as a space for learning and civic engagement. As a result, the 1st Gymnasium of Rafina appears to be a central element in the city's transformation towards a smarter, greener, and more resilient community.

6. CONCLUSIONS

6.1 Key findings of the study

This study explored how education can contribute to the transition of a small coastal city, such as Rafina, towards a smart and resilient community model. The results obtained from 251 students and 178 adults highlighted multiple dimensions related to environmental awareness, social participation, and the role of the school community.

- Both students and adults believe that Rafina has not yet sufficiently developed the characteristics of a "smart city." Despite technological and functional shortcomings, both groups demonstrate a high level of interest in green development, sustainable mobility, and the improvement of quality of life.
- The data reveal a strong willingness to participate—particularly among students—in environmental and community actions. This positive attitude indicates that the local community possesses significant social capital, which can be effectively mobilized in sustainable development strategies.
- The school community emerges as a critical agent of transformation. Both students and adults recognize the contribution of the 1st Gymnasium of Rafina to environmental education, the cultivation of ecological awareness, and the strengthening of local resilience. The school appears to function as a "knowledge hub" and a driving force for social awareness and civic engagement.
- European collaborations, such as the Erasmus+ and Blue Schools programmes, play a particularly important role. Adults evaluate these programmes as highly effective in enhancing students' ecological culture and informing the wider community. This finding confirms the strong potential of European networks in disseminating good practices and reinforcing local sustainability.

Overall, the conclusions indicate that Rafina has significant potential for a successful transition towards a smart and resilient city model, provided that opportunities for systematic cooperation between the school, local authorities, and citizens are fully utilized.

6.2 Recommendations for future research and practical applications

Based on the findings of this study, several directions emerge that could strengthen both theoretical knowledge and practical interventions in Rafina and in similar small cities.

1. **Investigation of digital infrastructure and smart technologies at the local level**
   The present study focused primarily on social perceptions of the "smart city." Future research could examine in greater depth the available infrastructure (e.g., sensors, open data platforms, environmental monitoring systems) and how these can be integrated into a comprehensive smart governance framework.
2. **Systematic evaluation of the impact of environmental actions**
   Although citizens and students evaluate school activities positively, structured evaluation tools are needed to assess their actual impact on behavior, knowledge acquisition, and active civic participation.

3. **Expansion of research to additional social stakeholders**
   Future studies could include professionals, members of local associations, older adults, or local government employees in order to capture more comprehensively the diversity of perceptions and needs within the community.
4. **Development of collaborative actions between the school and the municipality**
   The results suggest a strong willingness to participate. It is therefore recommended to design joint initiatives, such as volunteer networks, biodiversity monitoring systems, sustainable mobility actions, and adult education programmes.
5. **Strengthening European collaborations as a lever for local transition**
   Erasmus+ programmes were identified as particularly effective. It is recommended to expand international partnerships and to integrate the outcomes of these collaborations into local environmental and resilience policies.
6. **Development of educational material on "smart and resilient cities"**
   Rafina, as a real-life case study, can serve as a basis for the development of educational packages, STEM workshops, gamification activities, and project-based learning initiatives for schools in Greece and abroad.

7. POLICY RECOMMENDATIONS AND PRACTICAL INTERVENTIONS

Based on the findings of the study and the theoretical framework discussed, a set of policy recommendations and practical interventions emerges that can strengthen the sustainability, resilience, and "smartness" of Rafina. These recommendations are organized into four main pillars, which are directly linked to the needs and capacities of the local community.

7.1 Strengthening school–municipality collaboration

The data indicate that the school is recognized by both students and adults as a key actor in awareness-raising and environmental education. School–municipality collaboration can be strengthened through:

- **Co-design of environmental monitoring actions** (e.g., temperature, air quality, and humidity sensors).
- **Regular meetings** between the school, the Municipality of Rafina, and local stakeholders to identify needs and priorities.
- **Adoption of small-scale urban interventions** by classes or school groups, such as clean-up activities, tree planting, and the regeneration of small public spaces.
- **Integration of student research into municipal policies** (e.g., sustainable mobility maps, local risk assessments).

Citizen participation in school-led initiatives can enhance social cohesion and accelerate the transition towards a sustainable city.

7.2 Use of digital tools and environmental data

One of the key findings of the research is that Rafina has not yet developed advanced digital smart city solutions. For this reason, the following actions are proposed:

- **Creation of a local open data platform** including information on weather conditions, air quality, coastal erosion, and flood risk levels.
- **Utilization of school-generated data** (weather station measurements, student group observations, citizen science activities).
- **Installation of low-cost sensors** at strategic locations across the city, in collaboration with student STEM and robotics teams.
- **Digital awareness campaigns** using tools such as GIS maps, infographics, and mobility-related applications.

Such practices can enhance transparency, increase citizen participation, and serve as a foundation for evidence-based policymaking.

7.3 Citizen participation initiatives

The study revealed a high willingness to participate, especially among students. Therefore, the following initiatives are recommended:

- **Annual "Rafina Environmental Days"**, where students, citizens, and local organizations present activities and outcomes.
- **Activation of volunteer groups** for clean-up actions, biodiversity monitoring, and coastal erosion observation.
- **School–community co-creation labs** for the design of green urban interventions.
- **Youth participatory budgeting schemes**, allowing students to propose and vote on small-scale urban projects.
- **Strengthening civil protection actions** through educational scenarios and training activities addressing local risks (floods, wildfires, heatwaves).

Citizen engagement is crucial for building a sustainable and resilient city.

7.4 Educational interventions for Rafina as a resilient community

Based on the findings, the school can adapt and expand its activities to further enhance urban resilience:

- **Strengthening STEM and robotics programmes** with applications focused on environmental monitoring and risk management.
- **Development of thematic workshops** on smart cities, sustainability, circular economy, and climate adaptation.
- **Integration of student research projects** into environmental risk mapping and monitoring of local ecosystem changes.
- **Creation of a "Student City Observatory"**, collecting data, photographs, measurements, and student proposals.
- **Further utilization of Erasmus+ programmes** for the exchange of good practices with cities that have successfully developed resilience models.

The continuous enhancement of environmental education and collaborative practices is expected to empower Rafina to develop its own distinctive characteristics as a smart and resilient city.

EPILOGUE

In conclusion, the case of Rafina demonstrates that even small coastal cities can lay the foundations for a smart and resilient development pathway when the school community is meaningfully activated and cooperation with local stakeholders is strengthened. The findings of the study indicate that environmental awareness, social participation, and European collaborations constitute key elements in shaping a city that learns, adapts, and evolves. Through its systematic actions and openness to the wider community, the 1st Gymnasio Rafinas functions as a transformative agent, illustrating that the transition toward a sustainable and resilient Rafina can begin with education and extend across the entire community.

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