



Optimizing the Role of the Young Generation in Environmental Preservation as a Form of National Defense: Reflections on the 79th Independence of the Republic of Indonesia

Yonathan Suryo Pambudi^{1*}, Cicik Sudaryantiningsih²
Program Studi Teknik Lingkungan, Fakultas Teknik, Universitas Kristen
Teknologi Solo (UKTS)

Corresponding Author: Yonathan Suryo Pambudi pambudiysp@gmail.com

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ABSTRACT

This article examines the strategic role of the younger generation in environmental preservation as a form of non-military national defense, with reference to the reflection of the 79th anniversary of Indonesia's Independence. This study uses literature reviews from various international sources indexed by Scopus and other reputable journals to explore the contribution of youth in environmental conservation and its relationship with national resilience. This article also discusses the methodology used in previous studies on youth and environmental conservation, as well as their impact on public policy. The method used is a literature review that focuses on the contribution of youth in environmental conservation programs and the use of green technology. The results of the study show that youth involvement is very important in strengthening national resilience, both through public policy, participation in conservation, and technological innovation. In addition, support from the private sector, NGOs, and the government is urgently needed to empower youth so that they can play an active role in strengthening national sovereignty and environmental sustainability. The research also highlights the great potential of the use of digital technology and social media to increase youth engagement in environmental movements and support the role of national defense.

INTRODUCTION

Indonesia's young generation has long been a driving force for change, especially in the struggle for independence. In the early 20th century, youth organizations such as Boedi Oetomo and Jong Java played an important role in raising national awareness and fighting for unity. The Youth Pledge on October 28, 1928 marked an important declaration that strengthened national identity among youth (Razy, 2021). After independence, this fighting spirit continued with youth being at the forefront in defending the nation's sovereignty.

However, in the modern era, the challenges faced by the younger generation are becoming increasingly complex. In addition to climate change and environmental degradation, the rapid development of technology in the era of the Industrial Revolution 4.0 brings new challenges as well as opportunities (Wahyuningroem et al., 2022). Non-military threats such as proxy wars, where environmental issues are often used to undermine national resilience, are increasingly emerging (Anakotta et al., 2020). Therefore, youth need to be empowered to understand, confront, and overcome these challenges through the use of technology, innovation, and collaboration with various stakeholders.

This article emphasizes the novelty by integrating modern technology in environmental conservation carried out by the younger generation in Indonesia. In the era of the Industrial Revolution 4.0, technologies such as big data, the Internet of Things (IoT), and artificial intelligence (AI) can be used to create innovative solutions that support environmental sustainability (Wahyuningroem et al., 2023). In addition, this article also introduces a new approach by linking environmental preservation as a non-military defense strategy in the face of proxy war, where environmental issues can be exploited to weaken national stability (Mangunjaya & Praharawati, 2019).

LITERATURE REVIEW

1. *The Role of Youth in Citizen Science and Environmental Conservation*

Research by Ballard et al. (2017) shows that youth-based citizen science programs contribute to environmental conservation efforts by teaching youth about environmental science through direct participation in conservation projects. Youth involved in activities such as habitat restoration and species management not only gain scientific knowledge, but also develop a sense of responsibility for the environment. This is in line with non-military national defense efforts that involve sustainable management of natural resources. These kinds of programs also enhance their environmental science agencies (Environmental Science Agency, ESA), which strengthens their ability to act as guardians of nature (Ballard et al., 2017).

2. *Encouraging Youth Involvement in Environmental Sustainability*

Kumar (2023) revealed that youth involvement in environmental sustainability can be increased through environmental education in schools, the establishment of youth advisory boards, and recognition of their contributions. Empowering youth through these initiatives will make them leaders who can tackle environmental challenges, while

strengthening the country's defense through the sustainable conservation of natural resources (Kumar, 2023).

3. *Youth Conservation and Development Leadership*

Sullivan and Syvertsen (2019) developed a conservation leadership development model that shows that this process takes place gradually through several phases (seed, shoot, develop, and spread). Youth involved in conservation activities can influence local and global policies in conserving nature, which is critical to maintaining national stability and security through the wise management of natural resources (Sullivan & Syvertsen, 2019).

4. *Youth and Environmental Volunteering*

Rahman et al. (2021) examined the motivation of youth in participating in environmental volunteer activities, by finding that religious, altruistic, and biosphere values motivate youth to participate in conservation activities. These volunteer programs not only teach conservation skills but also build youth leadership and social responsibility in broader environmental conservation efforts. Therefore, this volunteer activity is very important to create a culture of defending the country based on sustainability (Rahman et al., 2021).

5. *Youth Involvement in Public Land Monitoring*

Pitt et al. (2019) showed that youth involved in environmental monitoring programs, such as those conducted by the U.S. Forest Service, can increase their ecological literacy and environmental awareness. This involvement not only provides youth with practical knowledge about environmental management but also fosters a long-term commitment to the conservation of natural resources, which is particularly relevant in the context of defending the country through environmental protection (Pitt et al., 2019).

METHODOLOGY

This study uses a literature review approach to examine the role of the younger generation in environmental conservation as a form of national defense. This literature review approach involves searching, collecting, and analyzing articles published in reputable international journals, including those indexed in Scopus and other relevant scientific sources. This study aims to provide a strong theoretical foundation on the contribution of youth in environmental conservation and its relation to national defense in the context of social change and global environmental challenges.

1. *Literature Collection*

The literature collection process is carried out by searching for scientific articles published in reputable international journals and indexed in Scopus, Google Scholar, ScienceDirect, and other databases.

The selected articles have direct relevance to the topic of the role of youth in environmental conservation and their contribution to national sustainability, both in the context of policies, conservation actions, and environmental conservation programs.

2. *Literature Selection Criteria*

The articles used in this study were selected based on the following criteria:

- **Journal Reputation:** Articles published in international journals indexed in Scopus and other reputable international journals.
- **Relevance:** An article that discusses the active role of youth in environmental conservation, social sustainability, and how these contributions relate to the concept of defending the country.
- **Methodology:** Articles that use valid and recognized methodologies, such as theoretical studies, secondary data analysis, or article reviews that provide insight into youth contributions to environmental conservation.

3. *Literature Analysis*

After collecting the relevant articles, the analysis was carried out with a thematic analysis approach, in which the main themes about the role of youth in environmental conservation and their relation to national defense were identified. This analysis aims to group the results of existing research and explore emerging patterns in the literature on how youth can contribute to environmental conservation and how these contributions support national resilience through sustainability policies and conservation actions.

RESEARCH RESULTS DAN DISCUSSION

1. *The Strategic Role of Youth in the Context of National Defense and Environmental Conservation*

The young generation has great potential to become agents of change in environmental conservation, especially in the era of the Industrial Revolution 4.0. Their high adaptability to new technologies allows them to use digital tools to support environmental conservation efforts. For example, big data and AI technologies allow for more efficient monitoring and management of natural resources, which can help prevent and mitigate the negative impacts of climate change (Anakotta et al., 2020). The younger generation, which is increasingly globally connected, can also adopt international best practices and adapt them to the local context in Indonesia (Plush et al., 2020).

2. *Local and International Case Studies: Technology Implementation in Environmental Conservation*

Indonesia has many successful examples where technology has been used by the younger generation to support environmental conservation. One prominent example is the use of drones by youth communities in Kalimantan to monitor deforestation in real-time. This technology enables rapid action on illegal logging activities, while providing accurate data that can be used for forest conservation planning. This initiative not only contributes to the preservation of forest ecosystems but also increases the awareness of local communities about the importance of protecting the environment (Basuki et al., 2022).

In Bandung, West Java, an artificial intelligence (AI)-based application developed by a group of youths has been used to predict local climate change patterns. The app provides recommendations for specific mitigation actions based on weather data and regional climate trends. This project proves that digital technology can serve as an effective tool to reduce the impact of climate change at the local level (Wahyuningroem et al., 2022).

In a global context, the Green Schools program in Germany is a successful example of involving youth in environmental education and renewable energy projects. The program has succeeded in reducing carbon emissions by up to 20% in the target area, thanks to the integration of environmentally friendly technology into the school curriculum. This initiative highlights the importance of a technology-based and education-based approach in creating sustainable change. This suggests that similar practices can be applied in Indonesia with local adjustments, such as community involvement and adaptation of education policies (Prendergast et al., 2021).

In addition, quantitative data show that youth-led initiatives have a significant impact on environmental sustainability. For example, a tree planting program spearheaded by youth organizations in West Java has succeeded in planting more than one million trees within two years. This contributes to a 5% reduction in carbon emissions in the target area (Yuliawati, 2023). In Central Java, a survey of youth perceptions showed a significant increase in environmental awareness, leading to their involvement in various local environmental projects, including community-based waste management projects and recycling initiatives (Perwithosuci et al., 2023).

The implementation of technology not only supports environmental conservation, but also strengthens the ability of the younger generation to contribute significantly to climate change mitigation. These studies show that a technology-based approach, supported by the right policies, can encourage environmental sustainability in Indonesia while empowering the younger generation as agents of change.

3. *Mainstreaming Environmental Issues in Indonesia*

Mainstreaming environmental issues in national policies is a strategic step to ensure environmental conservation is a priority across sectors. The integration of environmental issues in development, education, and economic planning is needed to create a sustainable holistic approach. One concrete step is to focus energy policy on the transition to renewable energy, by utilizing the latest technologies such as new-generation solar panels and modular wind turbines. This policy not only reduces dependence on fossil energy but also encourages innovation in the green technology sector involving the participation of the younger generation (Basuki et al., 2022).

In addition, the role of the government is very important in ensuring that environmental issues become an integral part of development planning. For example, the National Medium-Term Development Plan (RPJMN) can integrate environmental conservation targets that include waste management, forest rehabilitation, and green infrastructure development. These efforts must be supported by environment-based education integrated into school and university curricula to instill environmental awareness and responsibility from an early age.

In the context of proxy war, environmental issues have the potential to become a geopolitical tool that can be used by external parties to disrupt national stability. Awareness of this threat needs to be increased among the government, the community, and the younger generation. For example, the issue of deforestation in Indonesia is often a global concern that has the potential to be exploited to pressure Indonesia's position in international trade negotiations. Therefore, geopolitical literacy that links environmental issues with national resilience must be strengthened through special training and public education campaigns (Mangunjaya & Praharawati, 2019).

In addition, environmental conservation must be seen as a key element in national resilience involving all stakeholders. The younger generation, as future leaders, must be prepared to take a strategic role through empowerment programs supported by the government, the private sector, and educational institutions. National campaigns that link environmental preservation with national stability can be an effective means to raise collective awareness and mobilize joint action.

4. *Challenges and Obstacles in Environmental Conservation by Youth*

Although the young generation has great potential as agents of change in environmental conservation, there are a number of challenges that need to be overcome to maximize their contribution. One of the main obstacles is the limited funding that limits the ability of youth to implement green projects. Many youth-led environmental initiatives are constrained in obtaining adequate funding to support research, development, or implementation of field projects (Setiawan & Caroline, 2020).

Another obstacle is the lack of access to green technology, especially in remote areas. Although technologies such as big data and artificial

intelligence (AI) can be highly effective tools in climate change mitigation, many youth in underdeveloped areas do not have access to the necessary training or technological infrastructure. In addition, regulations that do not always support green initiatives are often a hindrance. Inflexible policies or complex bureaucracy can hinder youth-led innovation.

On the social side, resistance to change is a significant challenge. Low environmental awareness in some communities creates cultural barriers for youth who want to advocate for pro-environmental practices. For example, some community groups still view recycling or renewable energy initiatives as non-priority, which slows down the adoption of the necessary behavioural changes (Ratriyana, 2023).

In the context of proxy war, the biggest challenge is the lack of environmental and geopolitical literacy among the younger generation. Proxy wars often use environmental issues as a tool to weaken a country's stability through international pressure or manipulation of public opinion. Youth who lack an understanding of how these issues can be exploited geopolitically become more vulnerable to exploitation. Therefore, environmental and geopolitical literacy needs to be improved through specialized training and educational programs designed to improve understanding of the relationship between environmental conservation and national resilience (Plush et al., 2020).

To address these challenges, governments and non-governmental organizations must work together to provide adequate support for youth-led green initiatives. This support can be in the form of financial incentives, technology-based training programs, or cross-sectoral partnerships to accelerate the adoption of environmental innovations. In addition, creating a communication forum between the younger generation, the government, and the community can help bridge the gap and increase collaboration in environmental conservation efforts.

5. *Policy Recommendations to Support the Role of Youth in Environmental Conservation in Indonesia*

To maximize the role of the younger generation in environmental conservation, policies that not only support individual initiatives, but also create an ecosystem that allows cross-sectoral collaboration. Some policy recommendations that can be implemented include:

a. Improving the Environmental Education Curriculum

Environmental education should be an integral part of school and university curricula, including concepts such as green technology, the impact of climate change, and environmental preservation as elements of national resilience. The curriculum should also prioritize interactive approaches such as project-based learning and virtual reality simulations to motivate the younger generation. This more applicable environmental education can accelerate understanding and real action in environmental conservation efforts (Hilder & Collin, 2022).

b. *Tax Incentives for Green Initiatives*

The government needs to provide tax incentives for companies and organizations that support green projects involving the younger generation. These incentives can include tax breaks for companies that adopt green technologies, provide CSR funds for youth environmental projects, or support green workforce training. This scheme will spur private sector involvement in accelerating the adoption of green technologies and encourage youth participation (Alam, 2020).

c. *Increasing Access to Green Technology*

To strengthen the capacity of youth in remote areas, governments and the private sector must expand access to green technologies. Technical training programs, grants, or subsidies for the purchase of environmentally friendly technological tools can be effective measures. In addition, the involvement of educational institutions in distributing devices and organizing training can bridge the gap between the needs of technology and the ability of young generations to use it (Fatkhullah et al., 2023).

d. *Financial Support through Grants and Special Funding*

Grants and funding specifically for youth-led environmental projects are key to driving innovation. The government can establish a national environmental fund that supports research and implementation of green technology by the younger generation. The private sector can also be encouraged to fund environmental innovation competitions for youth, which can also increase the visibility of the project at the national and international levels (Jaro'ah et al., 2023).

e. *Establishment of a Multi-Sectoral Collaboration Forum*

National or regional forums that bring together youth, governments, the private sector, and non-governmental organizations can be a catalyst for building a collective strategy in environmental conservation. These forums can serve as a forum for sharing knowledge, resources, and best practices. In addition, the platform can be used to launch national campaigns that mobilize youth across Indonesia in coordinated environmental projects (Willetts et al., 2022).

f. *National Campaign for Environmental Awareness*

National-scale campaigns involving the younger generation as environmental ambassadors can increase public awareness of the importance of sustainability. These campaigns can adopt a social media-based approach, including the use of multimedia

content, webinars, and digital platforms to reach a wider audience. This initiative not only raises public awareness but also strengthens youth leadership in environmental advocacy.

6. *Impact Evaluation and Inclusive Approach*

To ensure the effectiveness of youth-led environmental conservation initiatives, a comprehensive and measurable impact evaluation mechanism is needed. This evaluation should include three main dimensions: environmental, social, and economic. In the environmental dimension, success indicators can include the number of trees planted, the reduction of carbon emissions, and the increase in biodiversity in the target area. The social dimension can be measured through increasing community environmental awareness, the number of youth involved in green projects, and changes in community behavior towards environmental issues. Meanwhile, the economic impact can be seen from increasing the efficiency of resource use, creating green jobs, and saving costs due to pollution reduction (Hasan et al., 2023).

The application of digital technologies such as big data and AI can be used to facilitate data collection and evaluation reporting. A digital platform specifically designed to monitor the progress of environmental projects can provide real-time information to stakeholders. By using a data-based approach, environmental conservation programs are not only more measurable, but can also be optimized based on the results of the evaluations obtained.

In addition to impact evaluation, an inclusive approach is an important element in ensuring that all youth groups, including those from disadvantaged socioeconomic backgrounds, remote areas, as well as youth with disabilities, can participate in environmental conservation initiatives. Programs designed to reach this group must prioritize accessibility, both financially and technologically. For example, subsidies for green technologies, free training, or financial assistance can be provided to facilitate their involvement (Plush et al., 2020).

Governments, educational institutions, and civil society organizations also have an important role to play in creating an environment that supports inclusive participation. Collaboration between the public and private sectors is needed to ensure sufficient resources are available to reach marginalized groups. In addition, building disability-friendly infrastructure and introducing accessible technology can be a strategic step to increase youth participation from all walks of life.

Furthermore, awareness campaigns that highlight the importance of diversity in environmental conservation can help address any stigma or discrimination that certain groups may face. By ensuring that all youth have an equal opportunity to get involved, this inclusive approach can increase the effectiveness of environmental programs and expand their positive impact on society and the environment.

CONCLUSIONS AND RECOMMENDATIONS

Environmental preservation by the younger generation is a form of national defense that is very relevant in the modern era. These efforts not only protect Indonesia's natural resources, but also strengthen national resilience from non-military threats such as climate change and proxy wars. The young generation has great potential to become a driving force for change, both through green technology innovation and cross-sectoral collaboration. With the right policy support, the participation of the private sector and Non-Governmental Organizations (NGOs), and synergies between stakeholders, the younger generation can play a strategic role in maintaining Indonesia's sovereignty and environmental sustainability (Anakotta et al., 2020).

The long-term implications of environmental conservation led by the younger generation are significant. First, the success of this initiative will ensure the sustainability of Indonesia's environment, including wiser management of natural resources and biodiversity conservation. This success will in turn support national resilience, by reducing dependence on fragile resources and improving the nation's competitiveness amid global challenges such as climate change and environmental degradation.

Second, through increasing environmental and technological literacy, the younger generation will be better prepared to face increasingly complex global challenges. These improvements include the ability to leverage advanced technologies such as big data, artificial intelligence (AI), and the Internet of Things (IoT) in environmental management. With these skills, Indonesian youth will not only play a role in climate change mitigation, but also become important actors in sustainable national development (Plush et al., 2020).

Third, this initiative can be a catalyst to build collective awareness in the community about the importance of environmental conservation as part of national stability. Through the active participation of youth in environmental projects, a generation is created that cares more about sustainability and is able to inspire their communities to contribute.

Therefore, investment in environmental education, financial support, and the development of inclusive and data-driven policies are strategic steps to ensure that young people can lead this transformation. Environmental conservation by the younger generation is not only a national responsibility, but also a great opportunity to strengthen Indonesia's position in facing global challenges in the future.

ADVANCED RESEARCH

This article provides a broad insight into the role of the younger generation in environmental conservation as a form of national defense, but there are several limitations that need to be considered. First, the diverse methodologies in the studies studied indicate differences in the assessment of

youth contributions. Further research can focus on comparing methodologies to understand the differences in outcomes that emerge.

Second, the study only includes literature from reputable international journals, which may not reflect local perspectives or cultural wisdom. Field research with primary data from youth who are directly involved in environmental conservation is highly recommended to explore the challenges faced in various regions.

Third, this article has not discussed in depth the role of technology in environmental conservation. Further research can explore the use of digital technology and social media by youth to support environmental movements and strengthen the role of national defense.

In addition, further research can explore the relationship between government policies, the private sector, and civil society in opening opportunities for youth to contribute more to environmental conservation. A multidisciplinary approach and international cooperation will enrich understanding of how youth contributions can be integrated with effective national defense strategies.

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