

## **Ecological Education Development Design for Middle School Students in Maintaining the Sustainability of Ujungpangkah Mangrove Essential Ecosystem Area (KEE MUP)**

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**Abstract:** The essential ecosystem of mangroves Ujungpangkah (KEE MUP) is protection and limited utilization area located on the coastal area in the north of Gresik Regency. This area has high biodiversity, especially various mangroves and waterbird species from different parts of the world due to their migration process. To protect this area, it is required to enhance the sensitivity of students as the young generation to react appropriately to keep the environment sustainable. In this case, education based environmental studies (Ecological Education) is used as a sustainable approach to answering this challenge. Various activities of community services are structured through a strategic plan for ecological education implementation. With this Ecological Education, students can increase their sense of love for the environment to keep the KEE MUP conservation zone inherited sustainably.

**Keywords:** Ecological Education; Mangrove Esentian Ecosystem; KEE MUP

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### **INTRODUCTION**

Environmental sensitivity is an action to react quickly and precisely in protecting and loving the environment (Pitoewas et al., 2020). In the younger generation, this sensitivity needs to be cultivated to understand the importance of preserving nature, analyzing and criticizing environmental destruction that occurs, and taking strategic steps for ecological restoration and conservation to keep the environment sustainable (Prasetyo, Santoso & Prasetyo, 2017) The younger generation has a massive role in the development of the environment because they will be the ones who will continue the leadership milestones in the future so that a high sensitivity to the environment must be embedded in the souls of today's young generation, namely students in elementary to middle schools.

To answer this challenge, Environmental Education (Ecological Education) is needed as a sustainable approach to increase students' sensitivity as young people to the environment. Some things that can be learned in Ecological Education are environmental education, knowledge of ecosystems, the existence of flora and fauna, and environmental sustainability according to ecological functions. The ecology education curriculum is expected to provide a positive view of students regarding ecosystems that need to be maintained.

Currently, the northern coastal area of Gresik Regency, especially Banyuurip Village, Pangkahkulon Village, and Pangkahwetan Village in Ujungpangkah District, has been designated as an area of the Ujungpangkah Essential Mangrove Ecosystem Area (KEE MUP), referring to the East Java Governor's Decree No. 188/309/KPTS/013/2020 on July 13, 2020. KEE is an essential ecosystem area designated as a protected area and managed based on conservation principles adopted to address conservation forest areas. The background for determining this area is preserving biodiversity, which is one of the goals of sustainable development, the change in the KEHATI management paradigm to encourage local governments and related parties to be involved in protecting biodiversity.

KEE Ujungpangkah Mangrove covers 1554.27 hectares, with 1143.71 hectares of mangrove vegetation and 410 hectares of water. Pangkahwetan (1029.16 ha area), Pangkahkulon (397.5 ha area), and Banyuurip (1029.16 ha area) are the three administrative areas of the village (127.61 ha area). A significant ecosystem that reflects wetlands is the mangrove forest (wetlands).

Various types of protected birds include the Sunda coucal, Milky stork, Lesser adjutant, Javan Plover, Osprey, Far Eastern curlew, Eurasian whimbrel, Malaysian pied fantail, and Crested honey buzzard, which come from various parts of the world (Australia, Madagascar, and Mongolia). In addition, 16 species of mangroves thrive to maintain the biological balance in marine waters and as a feeding ground for aquatic biota. Therefore, the KEE MUP area becomes a natural resource development area that needs to be protected and preserved.

KEE MUP has the vision to realize sustainable management of the Ujungpangkah Mangrove Essential Ecosystem (KEE) area by aligning the utilization of socio-cultural potential to support community welfare (Ariyanto, Ferdiansyah, 2020). Thus, there is a need for synergy from the University of Muhammadiyah Gresik as an academic institution that involves the management of KEE to develop the KEE into a form of ecological education development design. This is to foster a sense of love for the environment in the younger generation, especially in primary and secondary education, through the induction of an environment-based curriculum.

## APPROACH METHOD

The target group for this community service activity is students in primary and secondary education through FGD activities with teachers to get two-way interaction and understanding about the Ecology Education curriculum in the KEE MUP area. The selection of targets is based on the situation analysis results and the specificity of the team's expertise.

This study uses a CBR (Community Based Research) approach, which is carried out with a community-based approach with paradigmatic consequences based on the active participation of the community. In this case, a participatory approach is used so that the target group is expected to play an active role in voting and provide solutions that can be implemented effectively and efficiently.

In general, the stages of the approach implemented are described as follows:

1. Laying foundation (need analysis) to get to know the general picture of the community as a whole the condition of the young generation in the KEE MUP area, including problems, constraints, and development opportunities, especially in the study of Ecological Education for the younger generation.
2. Research planning, formulate problems, group them based on priority scales, and describe them into an ecological education development design.
3. Gathering and analyzing information by involving elementary (SD-SMP) and secondary (SMA) schools. In its implementation, depth interviews, observation, documentation, and FGD techniques are used.
4. Acting on finding produces a framework for a long-term and sustainable vision for environmental-based ecosystem management by the younger generation KEE MUP.

## **FINDINGS AND DISCUSSION**

Based on the objectives of the service program, the implementation of the community service activities is carried out through various stages. The first stage is exploration activities carried out in several schools in the KEE MUP area. This activity is the initial coordination stage carried out to develop the KEE MUP Ecological Education design. The activity was carried out in the form of semi-structured interviews in the form of depth interviews to collect data that the service team could use in preparing plans for implementing Ecological Education for the young generation of KEE MUP. Information was obtained that Ecological Education was not included in local subject and was spread out into material in other subjects. The school also strongly supports the socialization of Ecological Education by introducing students to the Ujungpangkah Essential Ecosystem Area, where they live as a conservation area that needs to be protected.

Besides visiting schools, observations were also made through river crossing activities to see firsthand the condition of the KEE Mangrove in Ujungpangkah Gresik.

Furthermore, problem formulation activities were carried out to determine the design for the development of Ecological Education for the younger generation in the Ujungpangkah KEE Mangrove area. In this activity, a roadmap for planning activities for the development of Ecological Education in the coming year is made. This is not only limited to its application as a local subject, but also simulation and direct practice in carrying out area protection activities. Ecological Education Development Design for the Sustainability of the Ujungpangkah Essential Mangrove Ecosystem Area (KEE MUP) is shown in Figure 1.

The design for the development of Ecological Education for students in the KEE MUP area has been carried out for five consecutive years, which has a different outcome every year.

In 2021, the results of the situation analysis and exploration studies that have been carried out previously showed that there are still people in the KEE MUP area who have no idea that the area where they live has now been designated as an essential area for the protection of mangrove ecosystems and migratory birds originating from various parts of the world. In addition, after field exploration and interviews with the community, it was found that there was a conversion of mangrove forest into a fishpond area so

that local and migratory birds were found less and less, both in number and species in the mangrove area. Referring to this fact, the solution offered is that the development of Ecological Education is prioritized to introduce the Banyuurip, Pangkahkulon, and Pangkahwetan Village areas as a conservation-based unitary area called the Ujungpangkah Essential Mangrove Ecosystem Area (KEE MUP) with students in the KEE area as the target. Its existence needs to be maintained and preserved by all parties, not only by the government as a policymaker but also by the private sector, academics, and the KEE MUP community.



Figure 1. Ecological Education Development Design for Middle School Students in the KEE MUP Area

The socialization activity was carried out to support the ecological education action plan in schools to introduce the Ujungpangkah Mangrove Essential Ecosystem Area (KEE MUP) to the elementary and middle school students through teachers in the environment (Suryani, Aje, & Tute, 2019). The activity began with an introduction from the KEE Ecological Education community service team and several essential points discussed from Ecological Education, including the introduction of crucial ecosystem areas (KEE), flora, and fauna in the KEE area, as well as education with an ecological perspective. Aside from being an essential wetland ecosystem as a habitat for animals and flora in coastal areas, the main speaker in this socialization activity also explained the critical value of KEE as an essential ecosystem as a coast guard, windbreak, preventing abrasion and seawater intrusion, supplier of organic matter, and carbon sink (Putra, Akbar & Habiburrahman, 2020).

KEE MUP is expected to become a center for environmental conservation amidst the onslaught of industrialization in an area, such as in Gresik Regency, after being designated as an Important Bird Area (IBA) by Birdlife International (2018). Although it occupies an area prone to conflict between humans and wildlife, KEE is a limited used zone that still prioritizes the wheels of the human economy so that synergy is needed in its management to achieve a balanced condition.

In implementing this socialization activity, it was also stated that environmentally-friendly education in the KEE MUP primary and secondary school areas is essential. This is because Ecological Education is a solution

that is considered absolute to be done in socializing and preventing ecological damage in an ecosystem. Therefore, schools are expected to significantly contribute to increasing students' sensitivity to environmental conditions, thus supporting the success of Ecological Education. Furthermore, Ecological Education can also apply an ecological character approach to improve people's ecologically minded attitudes, considering that the ecological crisis that has occurred so far is caused by maladaptive human attitudes in interacting with their environment (Lundquist, Carter, Hailes & Bulmer, 2017).

Based on the socialization results carried out in lectures, discussions, questions and answers, and FGDs, this activity can run in two directions without any boundaries between the service team and participants and positive reciprocal results from the socialization participants. Some of the points of note from the results of these discussions are as follows.

In Ecological Education, it is hoped that the Ecological Character Building program will become one of the main approaches to stimulate an individual's ecologically minded attitude, where this program contains various activities designed to touch the psychological side of students about nature. Furthermore, this ecological behavior can be carried out by engaging directly with the community to solve existing ecological problems and understand the importance of preserving the environment. In detail, the activities outlined in action are as follows:

1. Clean and healthy living behavior
2. Mangrove planting
3. Cleaning and waste processing
4. Distributing pamphlets and ecology movement in schools
5. Ecotourism

Furthermore, Ecological Education is expected to socialize the principles of environmental ethics in sustainable utilizing the aquatic environment (Anggraini, N., Marpaung S., Hartuti, M, 2017).

The second point discussed in socialization is the gradual environmental degradation of the KEE area due to overlapping interests between the economic, social, and ecological sectors. For example, the number of seabirds as exotic KEE biota has decreased drastically, and the opening of mangrove areas into fishponds.

The increase in population causes the human need for access to life to be higher. In addition to these social factors, residents will also need a strategic way to meet family needs. The KEE MUP area is very exotic and is rich in natural resources. Therefore, this is where the need for synergy in controlling the ecological system because this area is needed not only for humans but also for various types of animals and plants. The linkage between these three systems requires the control of each factor to achieve a sustainable ecosystem, which can be enjoyed economically for present and future generations (Nizar, Siswati, & Zargustin, 2019)

Several things have been done in realizing the balance of the system, including the government has legally established a policy regarding this location as an essential mangrove ecosystem area that needs to be protected. In addition, extensive mangrove nurseries and planting activities have been promoted to protect the sustainability of the ecosystem, which functions as a home for various biota with high economic value. There is also a mangrove ecotourism location as a tourist location and education

about nature conservation and fishing activities using environmentally friendly fishing gear (Taqiyudin & Santoso, 2019).

To increase the interdependence of these three systems to become more synergistic, Ecological Education is the right solution to overcome these problems, especially for the younger generation who will continue the leadership milestone in the future. With Ecological Education for elementary and secondary school students in the KEE MUP area, it is hoped that these students will increasingly realize the importance of the KEE area in their lives, conduct analysis, educate, and take the initiative to take strategic steps in sustainably protecting ecosystems.



Figure 2. Series of Community Service Activities in 2021 Regarding Ecological Education Socialization in the KEE MUP Area

In the second and third years, activities focused on action plans for ecological education activities in the KEE area were carried out. The first activity is the socialization of Ecological Education, which is expected to shape students' insight into environmental, ethical human beings who can appreciate both biotic and abiotic ecological systems according to ecological reality. The implementation of this activity is the existence of direct natural teaching activities to provide as many opportunities as possible for students to be active and be directly demonstrated to attract students' interest. In addition, to provide a solid and non-verbalizes intellectual apperception material and emotional apperception to students (Fahrudin & Santoso, 2019)

The next activity is legal socialization related to KEE to provide information on various regulations and collaborations carried out by the government as policymakers and associated stakeholders, including UMG as

academics, to protect the essential mangrove ecosystem area Ujungpangkah.

Other activities carried out are training activities for handling and processing natural materials, as a follow-up to the evaluation results of introducing KEE socialization activities. Here, students are invited to actively participate in groups with simulation methods and hands-on practice in processing waste and utilizing natural materials into products of commercial value (Santoso & Sutopo, 2019)

In the fourth year, ecological education activities focus on increasing literacy in Ecological Education by multiplying reading books on natural ecosystem studies and slogans related to protecting the surrounding environment for ecosystem sustainability for future generations. Other activities include training on mangrove nurseries and planting for three consecutive years to help restore coastal areas as important economic biota in the KEE MUP area.

In the last year, research was conducted to determine changes in student behavior towards Ecological Education. This activity was carried out in FGDs, two-way discussions, in-depth interviews, to the distribution of questionnaires and questionnaires, which were then adjusted to indicators of the achievement of environmental, ethical principles applied in everyday life.

Some of the principles emphasized in environmental ethics, according to Keraf (2005) in Setyowati (2014), are as follows:

1. Respecting nature, because human life depends on nature, so needs to be nurtured, cared for, guarded, protected, and preserved to be sustainable for future generations.
2. The principle of responsibility (moral responsibility for nature) which means the urge to protect nature individually and in groups.
3. Cosmic solidarity supports humans to save the environment and all life in nature.
4. The principle of compassion and caring for nature
5. The principle of not harming nature
6. The attitude of life is simple and in harmony with nature.
7. The principle of justice can synergize between economic and social fulfillment needs with existing ecosystem conditions to achieve sustainable requirements sustainably between generations.

With the implementation of this Ecological Education development design, it is hoped that it can foster a sense of love for the environment in students so that the conservation of the KEE MUP zone can be inherited sustainably.

## **CONCLUSION**

The community service activity regarding the socialization of the ecological education action plan for students in the KEE MUP area has been going smoothly and has received high enthusiasm. With the implementation of the design for the development of Ecological Education, it is expected to shape students' insight as the target of activities to become human beings who are environmentally ethical and can apply the principles of environmental ethics that are used in everyday life.

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