Protecting the Environment Through Education for Sustainable Development: A Field Study Exploration in Sacred Mount, East Java, Indonesia

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Abstract. More than 130 ancient sites were found around the slopes of Mount Penanggungan. In the past, this mountain was sacred by the Hindu-Buddhist community because it was considered part of Mount Mahameru in India. This mountain was the center of the Hindu-Buddhist royal civilization in Java until the early 16th century. Currently, the community seeks to benefit and support the preservation of natural resources through local wisdom. This article aims to uncover the potential of environmental conservation through education for sustainable development. This research uses a qualitative approach. The focus of this research is on the exploration of geographical phenomena and local values in the sacred Mount Penanggungan. The subjects of this study are site managers, caretakers, culturalists, researchers, and local communities who utilize the resources of Mount Penanggungan. Triangulation is done by confirming field informants, documents, and experts. The results of this study show that Mount Penanggungan has the potential of geography, geo-history and mythology as educational resources for sustainable development. Mount Penanggungan can therefore be used as an ESD tool to understand sustainability values for the next generation.

Keywords: Education for Sustainable Development, Mount Penanggungan, Protection Environment.

1 Introduction

Mount Penanggungan was one of the mountains consecrated by Hindu-Buddhist adherents on the island of Java in the past. It became the center of spiritual civilization in the heyday of the Hindu-Buddhist kingdoms in eastern Java. The sacredness of this mountain is still felt today, with more than 130 historical sites around it. The site consists of temples, springs, meditation caves, and ancient hiking trails that reinforce the image of the sanctity of this mountain. Its greatness in the past has left its mark on its current state. The locals also perform rituals and traditions to conserve the mountain's resources. In addition, the government's role in the conservation of this sacred mountain is strengthened by its designation as a provincial heritage site.

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Environmental conservation on Mount Penanggungan is inseparable from spiritual aspects or beliefs that impact preserving existing resources, especially consecrated water resources. Religious teachings in which some guidelines or fatwas are used as the basis for changing human behavior in caring for the environment show that religious or belief approaches are important in providing public awareness of environmental sustainability [1].

Mount Penanggungan has excellent water resources. As well as its wealth of historic sites, it also has a heritage of clean water. There are nine springs, most of which have drinking water quality [2]. The springs at the foot of this mountain also help the people of Surabaya, Sidoarjo and Gresik to meet their needs for clean water (for drinking and cooking). Around Mount Penanggungan there are also several bottled water factories. Therefore, there is a need for real efforts to protect the environmental sustainability around the mountain in support of the achievement of one of the pillars of the Sustainable Development Goals (SDGs) in Indonesia.

The SDGs are a sustainable development program with 17 goals, 169 measurable targets, and a set deadline. The SDGs are a global development agenda that aims at development that maintains the continuous improvement of people's welfare, development that maintains the sustainability of people's people lives, development that maintains the quality of the environment, and development that ensures justice and the implementation of governance that can maintain the improvement of the quality of life from one generation to the next.

These SDGs were published on October 21, 2015, replacing the previous program, the MDGs (Millennium Development Goals), as a common development goal until 2030, agreed upon by many countries in the United Nations (UN) resolution forum. The SDGs result from a participatory, transparent, and inclusive process that included all stakeholders and community voices for three years. The SDGs will represent an unprecedented agreement on sustainable development priorities among the 193 Member States. Sustainable Development Goals (SDGs) are universal in the sense that they jointly realize the vision of global progress toward a global space that is safe, just, and sustainable for all human beings. Reflecting moral principles as a form of participating in sustainable development as a form of shared responsibility for every developed and developing country[3]

The goals and targets of the SDGs cannot stand alone because there is a need for integrated implementation. Efforts to achieve the SDG target are a national development priority, which requires a synergy of planning policies at the national level and provincial, district, and city levels. The SDGs are more comprehensive in that they involve more developed and developing countries, expand funding sources, emphasize human rights, and are inclusive, involving civil society organizations (CSOs), the media, philanthropy, business actors, and academics. One strategy for achieving the SDGs is an educational approach, known as Education for Sustainable Development (ESD).

ESD equips students with knowledge, skills, values and attitudes to process information, make decisions and act responsibly towards environmental, economic and just societies for present and future generations. ESD is key to achiev the SDGs by providing broad and futuristic insights into the global environment as well as forming

understandings, attitudes, and values relevant to social, economic, and environmental life. [4].

ESD about the future and strategic planning will provide opportunities for students to contribute to the development of a sustainable economy [5]. As an economic resource, nature is a material that must continuously exist to sustain human life. There is no human need that does not come from natural products; in other words, human existence is influenced by the existence of natural materials. Through nature conservation activities, people can obtain benefits for their well-being. Genuine efforts must be made to promote intergenerational sustainable development so that environmental damage can be minimized or even eliminated in the future. Efforts to educate people to preserve nature, one of which is through education in schools through ESD.

The government, through the Environmentally Cultured School Program and the Adiwiyata School, has been implementing ESD in the school environment for several decades. This program has resulted in environmentally conscious schools with curricular and extra-curricular programs based on environmental issues. When preparing curricula and school programs, even when constructing facilities, environmental aspects must be given priority. Office supplies and building furnishings are procured as efficiently and cheaply as possible, using resources saved through savings programs.

The implementation of ESD is carried out through different platforms. The aim is to create a mentality of students concerned about the environment and sustainable development. Learning should be carried out in the classroom and the natural environment, which should be introduced directly to students. Learning should take place in the classroom and in the natural environment, which should be presented directly to the students. Learning th rough field visits is expected to influence students' attitudes and behavior towards the environment and to increase students' spatial and naturalistic intelligence. ESD can stimulate learners' naturalistic intelligence. Through field trip activities, students' naturalistic intelligence will be further enhanced. Naturalistic intelligence has a positive influence on students' participation in environmental protection[6]

Students must understand the current environmental conditions in real life to see and feel firsthand that their existence is a form of responsibility for environmental sustainability and that they can realize sustainable development. Students can understand categorization in the embodiment of environmental conditions with all their diversity that affects each other between components so that the existence of environmental components is bound to each other through naturalist intelligence.

Previous studies conducted around Mount Penanggungan have not touched on the educational aspect. This mountain has great potential as a means of introducing how environmental protection is carried out in an integrated manner between the government and local communities. Based on the rich potential of historical sites, values, and local culture that Mount Penanggungan possesses, it is very important to utilize the mountain for ESD with a focus on environmental protection and the achievement of the SDGs. This article focuses on displaying the results of the analysis

of the potential in Mount Penanggungan. It is used as a means of environmental protection through education for sustainable development, especially in schools.

2 Method

This study took a qualitative research approach. This study aims to identify geographical phenomena and local values in the environment of Mount Penanggungan. We then went on to analyses how it relates to working towards environmental sustainability. The study subjects are site maintainers, caretakers, culturalists, researchers, and local communities on the slopes of the Penanggungan Mountain. This research was limited to the administrative areas of Seloliman Village and Kedungudi Village, Trawas, Mojokerto Regency, Wonosuryo Village, Gempol, and Pasuruan Regency. Data was collected through literature reviews, field observations and in-depth interviews. The literature review was conducted at the BPCB East Java library, which searched for articles related to research on Mount Penanggungan. Field observations were carried out to ensure that what was found in the literature review matched the actual conditions. In-depth interviews were conducted to obtain the validity of data related to local values contained in a phenomenon and historical sites in Mount Penanggungan. The data analysis used in this study is a qualitative-verifiable data analysis strategy. This strategy is an inductive analysis effort of research data, which is carried out throughout the research process [7]

3 Result and Discussion

This section presents the results of the analysis of the potentials that have been identified from the results of the literature studies and field surveys. This potential study is associated with the education for sustainable development approach, which boils down to achieving the SDGs. Not all the potentials identified in Mount Penanggungan are directly related to the 17 SDGs. Several SDGs may be by utilizing the potential of Mount Penanggungan as a vehicle for education. ESD pushes through five approaches.

Education for sustainable development equips learners with knowledge, skills, and values for the social, environmental, and economic challenges of the 21st century.

Transforming Education. Education for sustainable development uses innovative ways of learning, student-centered teaching, and various learning styles. Empowering students and making them agents in the educational process from early childhood to old age can increase learning beyond the limits of education.

Increase a sense of justice and mutual respect. Education for sustainable development helps learners understand the situations, views, and needs of people living elsewhere or belonging to another (next) generation.

Helping to tackle climate change. A child can be affected by disasters related to climate change. Sustainable development education prepares students to adapt to the impacts of climate change and empowers them to address its causes.

Building an environmentally friendly society Education for sustainable development equips students with skills to be environmentally friendly to help reduce pollution, restore environmental quality, and improve human well-being and social justice. It motivates learners to choose a sustainable lifestyle.

The first study concerns the relationship between geographical potential and ESD. Table 1 describes the potential of Mount Penanggungan and its relevance to the concept of ESD. Geological potential, topography, vegetation, land use, and hydrological conditions exist. Each of these potentials may not be thoroughly relevant to the achievement of the SDGs. Nevertheless they can be utilized for the benefit of ESD practice.

Table 1. Relevance Geographical Potential with ESD

Types and Potency Description	ESD Relevancy
Geology It is an example of an ancient strato-type volcano with an almost perfect volcanic cone. There is also an example of a mountain child resulting from volcanic impulses due to the summit crater. Extrusive lava deposits are chunks of large andesite rocks along the river flow on the mountain slopes.	Education is based on contextual experience. Students can directly observe the geological formations of the earth's search and see their impact on human life.
Topography Mount Penanggungan has a very high topographical / elevation/slope variation. So that on the map, it has a density on the mountain's contours. Human activities are quite diverse based on environmental conditions, especially the height that affects vegetation formations.	Education is based on contextual experience. Students can observe the earth's shape vertically and relate it to environmental characteristics and human activities.
Vegetation and land use Have several examples of types of vegetation formations that can be used as examples of learning. In addition, there is sustainable forest management. There is solid forest management between the government and the community.	Education is system-based. An example of a complex problem in sustainable environmental development. Learners can get the case from sustainable environmental management or not.

Hydrology Mount Penanggungan has excellent clean water potential. Examples of water use by communities that are sustainable and maintained by certain local traditions.	Education that promotes local culture. Understand how local communities maintain the sustainability of water sources.

Through ESD, it is hoped that future generations will be able to deal with complex problems due to the development of life and that the problems they will face will be more complex. ESD can be incorporated into the curriculum at all levels. All levels of education, including primary and secondary, can contribute to an educational process that enables the younger generation to become a responsible society and advance sustainable development in their environment, locally and globally. ESD can also develop specific competencies and learning outcomes for achieving the SDGs. So, ESD provides knowledge to understand the SDGs and competencies to be involved as knowledgeable citizens in advancing change toward a more sustainable society.

Local wisdom is identified in Jolotundo Temple as an effort to preserve water resources [8]. Several myths and rituals emphasize the sanctity and efficacy of Jolotundo springs. The potential of this local wisdom can be studied from a sustainable perspective [9].

Table 2. Relevance of the socio-cultural potency of ESD

Types and Potency Description	ESD Relevancy
Mythology The emergence of amrita/amerta from the Mahameru Displacement process and turning into the holy water of true life (*tatwa amreta siwamba*). Its impacts the belief that the water in Mount Suci Penanggungan or Mount Semeru is holy water that has various properties for humans.	Prepare learners to adapt to the impacts of climate change and empower them to address the causes. One of them is in treating water in daily activities. As well as building an environmentally friendly society and preserving nature amid its use.
Geo-history Kedungudi Temple Complex. Several temples must be preserved. The making of the temple is also strongly influenced by geographical elements. Good maintenance and management of the temple.	Increase a sense of justice and mutual respect. Education for sustainable development helps learners understand the situations, views, and needs of people living elsewhere. Invite students to be sensitive to geographical conditions to carry out their activities safely from natural disasters.

Geo-history	
Hemisphere Temple is a water source guarded by traditions and myths as local wisdom.	Preparing students to adapt to the impacts of climate change, especially studying the local community to maintain and utilize water sources.

Strengthening learning as an implementation of ESD is certainly carried out through good and directed curriculum management. In the learning curriculum, each subject must work in synergy toward the same goal: sustainable development-based learning. The most appropriate approach to achieve harmony between subject areas is interdisciplinary. Learning with an interdisciplinary approach is used in sustainable development education. Learning is designed through the preparation of learning objectives that must contain knowledge from various disciplines [10]

In addition to the interdisciplinary approach as a core platform for learning, strengthening the learning method or model must also be a concern because it will greatly determine the direction of the learning objectives that have been prepared previously. The application of conventional learning models is no longer relevant and must shift to a transformative educational style for 21st-century education emphasizing sustainable sustainability aspect[5]. The learning approach needs to be changed, emphasizing student activity in discussion and problem-solving. This approach can encourage students to think critically about the surrounding environment with all problems so that they can contribute ideas and ideas as a form of their responsibility as part of the environment. Therefore, active learning is more effective in facilitating environmental education for sustainable development among school children.

ESD in schools is indeed the main platform, but strengthening the curriculum and learning model implemented in schools is inseparable from the efforts and strong commitment of the person in charge of the school, namely the principal. As a policymaker in a school institution, the principal has the authority to direct where sustainable development is carried out in the school efforts and the strong commitment of the person in charge of the school. Further, the principal has the authority to direct where sustainable development is carried out. A strong commitment is manifested through various environment-based programs with targeted and integrated implementation standards, starting from the school's mission, strategic plans, and graduation standards. Interventions through the curriculum, determination of savings policies, and maintenance of environmentally sound facilities for treating school waste are part of the principal, the institution's leader. Seeing this phenomenon, leadership greatly influences the institution's commitment to sustainable development [11]

ESD uses the school platform as a succession of sustainable programs and involves community participation. People must be educated to be part of communities with attitudes and behaviors that care about the environment because they are part of it. Community participation and involvement in developing local planning programs for utilizing and conserving natural resources is an important part of the program [12]. Community participation in several places has different ways or approaches in efforts to conserve the environment. Making ecotourism a method of environmental conservation involves the community in its management and serves as a source of

community income. Community involvement in ecotourism is a form of economic independence where the community benefits from economic activities from tourism and supports the conservation of local natural and cultural resources through various ecotourism planning and management [13]

Society has a vital role to play in protecting the environment as a diverse entity. The composition of the society, such as by gender, age, education, employment, and income, is a demographic and socioeconomic factor with diverse potential in its contribution to environmental conservation. Demographic and socioeconomic factors influence people's environmental conservation behavior [14]. Environmental conservation behavior in traditional communities is carried out through local wisdom, which guides relations with nature for generations. Local wisdom is being passed down through generations as a form of responsibility for environmental sustainability as a living space. In the modern era, awareness of environmental sustainability has begun to emerge through environmental education platforms implemented at the school level.

Initially, environmental education was a response to the declining state of the quality of the surrounding environment so that there was awareness from the surrounding community to try to prevent widespread damage and improve the situation. Still, the decline in environmental quality was felt not only in one place but also in another so that previously local environmental issues would become wider and even global scale because it is a world problem. Environmental education programs that describe direct impact include a focus on local issues or broader relevant dimensions and should collaborate with scientists, resource managers, and community organizations [15]. The global environmental issue today is the energy and food crisis that causes various severe economic impacts felt by various countries.

Environmental education should increase commitment to ecological campaigns and emphasize the actualization of norms on expected environmental behavior [16]. In the aspect of learning, EDS through environmental education is considered necessary to strive for various learning strategies and community learning experiences to achieve the learning objectives of environmental conservation more effectively and be able to contribute and answer to the changing conditions of the times. In its application, the environmental school program designed in such a way has positive results regarding environmental knowledge and the formation of attitudes and skills [17], [18].

4 Conclusion

Environmental protection around the slopes of Mount Penanggungan can be done through education for sustainable development. The potential on the slopes of Mount Penanggungan is related to the physical aspects of geology, hydrology, topography, vegetation, and land use. There is also geohistorical, mythological, and socio-cultural potential. The results of the potential analysis can be used to protect the environment through education for sustainable development.

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