



BUILDING ENVIRONMENTAL AWARENESS BASED ON RELIGIOUS MODERATION THROUGH LOW-SMOKE WASTE INCINERATION

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Abstract:

This Community Service activity aims to raise environmental awareness through a framework of religious moderation in Pagarbata Hamlet, Sidorejo Village, Kotaanyar District, Probolinggo Regency. The main focus of this program is to minimize air pollution through the development of low-emission waste incineration facilities. This project is not only technical, but also touches on spiritual aspects rooted in the values of tawazzun (balance) and hifzhul bi'ah (nature conservation). Through the Participatory Action Research (PAR) method in the KKN program, students work with residents starting from socialization, designing incinerators based on local materials, to operational training. Data was collected directly from the field through observation, casual discussions with 25 residents, and environmental impact assessments. The result, in addition to reduced smoke pollution, residents' understanding of environmental ethics in Islam jumped from 45% to 85%. Now, residents are starting to get used to sorting waste independently. This initiative is proof that religious moderation is not just a theory, but a practical solution in maintaining harmony between humans and nature as a real manifestation of rahmatan lil alamin.

Keywords: Environmental Awareness, Religious Moderation, Low-Smoke Waste Burning

INTRODUCTION

In rural areas, waste management often seems like a minor issue, but its impacts are far-reaching. Almost every day, people deal with household waste: kitchen scraps, dry leaves, plastics, food packaging, and various other items. The problem is that not every village has a well-organized waste collection system – sometimes the dumpsite is far away, pickup schedules are irregular, or proper sorting facilities are simply unavailable. As a result, many residents opt for the quickest and easiest solution: burning it.

Casual, open burning of waste typically produces thick smoke, strong odors, and breathing difficulties. Children, the elderly, or people with asthma and respiratory infections are usually the most affected. Beyond that, the smoke often drifts into neighbors' homes, clings to drying laundry, or disrupts daily activities. What starts as a waste issue can quickly turn into a social one, leading to warnings, sarcastic remarks, or even disputes between villagers. For a long time, burning waste in one's yard has been seen as a normal shortcut, even though the dense smoke harms respiratory health and pollutes the village air (Umayyah, 2023). Data shows that open burning of waste significantly contributes to carbon emissions and harmful particulate matter (PM2.5) pollution, which poses serious risks especially to vulnerable groups like the elderly and children (Artikel Penelitian, n.d.).

In fact, if we look closely, our society already has a strong foundation: religious values. We often hear teachings about cleanliness, not disturbing others, rejecting

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harm (*mudarat*), and humanity's responsibility to care for the earth. Yet in reality, these values sometimes remain just words. Religious rituals and activities are lively and well-attended, but when it comes to environmental matters—including waste—many people still act individually, without connecting the dots. As a result, there's a gap: strong religiosity in rituals, but it doesn't always translate into everyday ecological behavior.

If the environment is clean, waste is managed properly, residents get used to sorting it, reducing plastic use, and avoiding indiscriminate burning, then ideally environmental awareness becomes a shared culture, not just a temporary program. And from the perspective of religious moderation (*moderasi beragama*), healthy religiosity isn't only about right and wrong according to texts—it's also about justice, balance, and bringing benefit (*kemaslahatan*). In other words, a religious person should maintain good relationships: not just with God, but also with fellow humans and with nature.

However, in some places—including Dusun Pagarbata in Sidorejo Village, Kotaanyar Subdistrict, Probolinggo Regency—open waste burning still happens due to practical limitations. What's needed isn't just prohibitions, but a middle path that people can actually follow. One such approach is low-smoke waste burning: a transitional method that's safer, more considerate toward neighbors, and more responsible overall. The goal isn't to justify burning as ideal, but to lessen its negative effects while gradually building better waste management habits.

This community service effort centers on fostering environmental awareness through an approach that resonates deeply with local people—namely, religious moderation (*moderasi beragama*)—then translating it into concrete, immediately doable steps like low-smoke waste incineration. It goes beyond simply providing tools; the real aim is to shift residents' mindset from destructive waste practices toward ones that align with preserving nature (Fahriana et al., n.d.-a), while reconnecting those spiritual values so they become the driving force for behavioral change through a community-based method (Nurcahyoadi et al., 2024). In this way, being religious stops being just theoretical discussion and turns into real action to maintain ecological balance right at the grassroots level (Umayyah, 2023b).

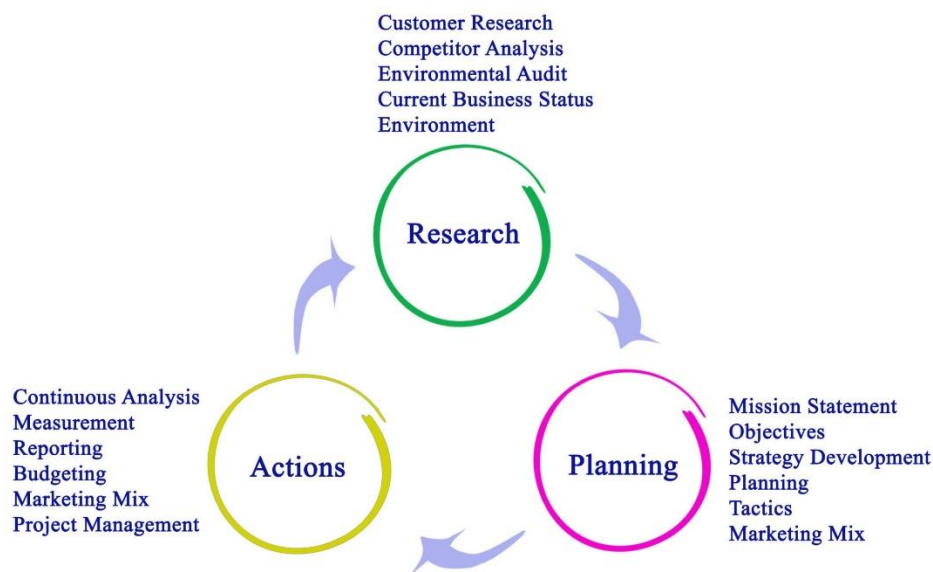
The hope is that ecological awareness no longer feels like some distant grand theory, but becomes consistent small daily behaviors whose benefits are felt right away: cleaner air, more comfortable neighbors, a more harmonious environment, and greater self-reliance among residents in sorting and processing waste in healthy ways—without harming one another through open burning smoke. Qualitatively, religious-based ecological literacy in Dusun Pagarbata, Sidorejo Village, Kotaanyar Subdistrict, Probolinggo Regency is expected to improve significantly, reshaping how people view proper waste disposal as an expression of faith on par with other acts of worship. Quantitatively, success will be measured by fewer illegal burning spots and better use of incinerators that substantially reduce pollution emissions. Ultimately, this initiative is a modest effort to ground the concept of *rahmatan lil alamin*—making human presence a true blessing for fellow people and the surrounding environment.

RESEARCH METHODS

This community service initiative employs the Participatory Action Research (PAR) method, integrated into a thematic Community Service Program (KKN) to organically drive behavioral transformation in waste management. This emancipatory approach positions the residents of Dusun Pagar Bata as active subjects rather than mere objects, grounded in the values of religious moderation—particularly the principles of *tawazun* (balance) and *hifzhul bi'ah* (environmental preservation)—in order to realize a living embodiment of *rahmatan lil alamin*. The core focus of the activities is mitigating air pollution through the implementation of low-emission incinerators in Dusun Pagar Bata, Sidorejo Village, Paiton Subdistrict, Probolinggo Regency—a community known for its high level of religiosity yet still constrained by the entrenched tradition of open waste burning.

The program targets 25 purposively selected participants representing religious figures, village officials, and mosque youth, who in turn stand in for 150–200 households. Primary data are gathered through participatory observation, in-depth interviews, and Focus Group Discussions (FGD), supported by evaluative questionnaires and community mapping tools.

The action unfolds according to the classic spiral cycle of PAR: problem diagnosis, collaborative planning for incinerator design, transformative action through facility construction and education, and reflective evaluation of impacts to ensure the program's long-term sustainability and self-reliance by the community.



Gambar 1.
Method Cycle Participatory Action Research (PAR).
(source: adapted by the author)

Data analysis was conducted using a qualitative-descriptive approach based on the Miles and Huberman model (data reduction, data display, and verification), supplemented by simple quantitative elements to measure the effectiveness of the intervention. The results of this community service program recorded a significant increase in residents' ecological literacy, rising from 45% to 85% after the program ended. These findings were then cross-referenced and dialogued with normative

Islamic values to ensure that the outcomes went beyond physical infrastructure alone. The emphasis was on the genuine growth of spiritual awareness among the community in preserving ecological harmony right at the grassroots level.

RESULTS AND DISCUSSION

The action planning process was carried out through several participatory stages, including:

- a. Field observation and initial interviews to map out the environmental issues. This activity took place from January 8–12, 2026. Based on the preliminary observations, it was found that the environment in Dusun Pagarbata had a lot of scattered waste, leading residents to burn garbage at various spots around the hamlet. As a result, thick smoke and remnants from these burnings were left behind, disrupting people's daily activities.
- b. Focused group discussions with community leaders, youth, and family representatives. During the discussions held with community figures in Dusun Pagarbata, the group agreed to designate specific burning points to reduce the amount of waste previously left scattered and to replace haphazard open burning. From this, the construction of waste incinerators emerged as a practical solution to prevent further environmental pollution.
- c. Development of strategies for building the incinerator in Dusun Pagarbata. The agreed strategy began with organizing a community work day (*kerja bakti*) as the initial step for construction, along with deciding on the exact placement of the incinerator as the foundational element. The purpose of installing the incinerator is to stop irregular open burning and scattered waste, ultimately empowering the local community to manage waste through a mini incinerator system in a healthier and more controlled way.

In its implementation, the mini incinerator can be constructed using lightweight bricks (*hebel/brick ringan*). Its main components consist of a primary combustion chamber, bottom air ventilation, and a chimney for releasing smoke. High-temperature burning is achieved by properly regulating the airflow.



Pembuatan Insinerator Sederhana

The simple steps for making the incinerator can be explained as follows:

- a. Preparing the foundation: Choose an open area far from any flammable materials. Then create a level base using a cement mixture so the structure stands firmly and stably.
- b. Constructing the main combustion chamber by stacking lightweight bricks (batako) to form a box or cylindrical shape. At the bottom, leave small openings as air inlet holes (draft holes) and an access door for ash removal.
- c. Installing iron grates about 15–20 cm above the base. These grates support the waste, allowing maximum oxygen supply from below to feed the fire effectively.
- d. Lining the inner walls with fire-resistant bricks to protect the structure from prolonged high temperatures and ensure its durability.
- e. Fitting the chimney and door: Cover the top with an iron plate connected to the chimney pipe. Install a loading door – either on the side or top – that can be tightly opened and closed.
- f. Conducting a trial run by burning a small amount of dry waste first. This checks whether the airflow (draft) works properly and that smoke exits through the chimney instead of leaking from wall gaps or other openings.



Ujicoba Insinerator Sederhana Hasil Karya Mahasiswa dan Warga

The collaboration between students and residents of Dusun Pagarbata in building the low-emission incinerator took place through gotong royong (communal mutual help) right after the morning Focus Group Discussion (FGD). This activity was not merely about constructing a physical facility to cut down on smoke from waste burning; it also strengthened social bonds rooted in the value of *tawazun* (balance). Through this process, the villagers came to see caring for the environment as a trusted responsibility (*amanah*) and as an integral part of their everyday worship.



Sosialisasi Program Sadar Lingkungan Berbasis Moderasi Beragama

After the low-emission incinerator was completed, the next step focused on strengthening the values of religious moderation to build environmental awareness centered on low-smoke waste burning. The session began with a brief orientation for the participants. The facilitator explained the purpose of the activity in straightforward terms: to reduce the practice of thick-smoke open burning, to cultivate a culture of sorting and processing waste, and to preserve shared comfort in the community. In this part, the principles of religious moderation were presented as the ethical foundation: caring for the environment is part of one's moral and spiritual responsibility, while refraining from disturbing others is a concrete expression of faith

that brings benefit (*kemaslahatan*) to all. Participants were also reminded that burning is not the primary solution, but rather a last-resort step that should only be applied to certain residues and must always follow safety principles.

After the briefing, participants were guided into the waste sorting stage. The waste was separated into three main categories: organic, valuable inorganic, and residue. Organic waste—such as kitchen scraps and leaves—was collected to be directed toward processing methods like composting or biopore holes. Valuable inorganic waste, including thick plastic bottles, cardboard, and metal items, was set aside to be channeled to the waste bank or scrap collectors. The primary focus of this sorting process was to minimize the volume of residue, since residue represents the type of waste that is hardest to manage and is often the main reason people resort to burning.

Once sorting was completed, the session continued with a brief demonstration on processing organic waste. In this hands-on part, participants were shown simple, practical ways to handle organic waste so it doesn't pile up and doesn't end up being burned along with other trash. The aim was to give residents realistic, easy-to-copy alternatives they could apply at home. The team stressed that the more organic waste gets properly processed, the smaller the amount of residue left behind—and the less need there is to burn anything at all.

Next, in situations where burning residue truly cannot be avoided due to limited facilities, the team implemented smoke mitigation procedures. At this stage, the core principle was to minimize negative impacts. The residue to be burned was ensured to be completely dry to reduce smoke production, and it was confirmed to contain no hazardous materials when combusted. The team strictly prohibited burning thin plastics, styrofoam, rubber, diapers, or chemicals, as these can release toxic smoke. If burning had to take place, it was restricted to a designated safe area, supervised by a safety officer, and stopped immediately if smoke became thick, wind direction shifted, or nearby residents felt disturbed. In case of any complaints or issues, the top priority was to safely extinguish the fire.

The session concluded with guidance on the cooling and cleanup stages. It was emphasized that no embers should remain and the area must be fully safe before leaving it unattended. Burn residues were allowed to cool completely first, then disposed of according to local environmental regulations—never dumped carelessly into rivers or drainage channels. Once the site was tidy, the team gathered all participants for a short reflection: what they had learned that day, what changes they planned to make starting from their own homes, and simple commitments they could uphold together as a community.

As the final part of the activity, the team carried out documentation and evaluation. The evaluation involved recording the number of participants, the results of waste sorting, the reduction in residue volume, and residents' feedback regarding smoke disturbances. From this evaluation, the team developed realistic follow-up actions, such as activating a waste bank, establishing a household waste sorting schedule, or forming small groups for composting. Through this kind of flow, the activity did not end as a mere ceremonial event but continued into gradual habit changes that slowly shaped a cleaner, healthier, and more harmonious environmental culture—one that aligns with the spirit of religious moderation.

The results of the activity demonstrate that ecological awareness in Dusun Pagarbata rose noticeably when approached through the lens of religious moderation. Here, the values of *tawazun* (balance) and *hifzhul bi'ah* (environmental preservation) no longer remained mere doctrines; they evolved into an ethical standard that underpinned real changes in the community's way of life (Dia Andhika et al., 2025). The role of the low-smoke incinerator proved especially vital: it served as a tangible embodiment that bridged spiritual commitment with concrete steps toward nature conservation (Maulana et al., 2025). The significant jump in ecological literacy – from 45% to 85% – provided clear empirical evidence that a purely technical approach is not enough on its own. We found that infusing religious values into community efforts created far more organic acceptance among residents (Fahriana et al., n.d.). The power of religious narratives showed itself capable of taking deep root in people's hearts, so the resulting environmental awareness was not just a passing trend but a lasting commitment that endures over time.

CONCLUSION

The entire community service program demonstrates that household waste problems can be addressed effectively when appropriate technology is combined with local cultural and religious values. It began with field observations revealing that the habit of indiscriminate open burning was disrupting residents' comfort and daily life. As a practical way forward, through close-knit discussions with community leaders and youth, everyone agreed to build a low-emission mini incinerator unit. This facility is far more than just a physical tool to organize burning spots; it stands as a tangible symbol of the hard work and genuine collaboration between KKN students, supervising lecturers, and the villagers themselves in creating a cleaner village environment. The program's success is clearly visible in the sharp rise of residents' ecological literacy – from an initial 45% to 85%. These figures prove that a purely technical intervention falls short without parallel strengthening of underlying beliefs and values. By weaving in messages of religious moderation – such as *tawazun* (balance) and *hifzhul bi'ah* (preservation of nature) – the community's earlier focus on ritual worship has gradually shifted toward a broader social-ecological righteousness. Keeping the environment clean is no longer viewed as a burden, but as part of the daily trust (*amanah*) and worship entrusted to humans as stewards (*khalifah*) on earth. This experience reaffirms that religious narratives carry tremendous power to inspire sincere, deep-rooted, and long-lasting environmental awareness in rural communities.

To ensure the sustainability of these outcomes, it is strongly hoped that the village government will take an active role in guiding and supporting residents to maintain and care for the incinerator unit properly. Looking ahead, it is important for future researchers or community service teams to begin educating households on direct waste sorting at the source. This will make the incineration process far more efficient by reducing the volume and improving the quality of what goes into the unit. What has been started in Dusun Pagarbata should not end here. Instead, it is hoped that this effort will serve as an inspiration for other areas – showing how spiritual values and concrete actions can come together to protect the environment through genuine community empowerment.

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