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Optimization of Household Waste Processing Based on 3R (Reduce, Reuse, Recycle) to Improve Environmental Awareness in Rural Communities

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Artikel Information

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Abstract

Household waste management remains a significant environmental issue in rural areas of Indonesia, particularly due to low public awareness and limited waste processing infrastructure. This community service program aims to optimize household waste processing based on the 3R (Reduce, Reuse, Recycle) concept to improve environmental awareness among residents of Karang Bayan Village, West Lombok. The program employed participatory methods including environmental education, waste sorting training, establishment of waste segregation facilities, and community mentoring. Data collection was conducted through observation, interviews, and questionnaires before and after program implementation. The results showed a positive increase in community participation in waste segregation and utilization of recyclable materials. The program also contributed to reducing unmanaged household waste and strengthening community awareness toward environmental sustainability. However, challenges such as behavioral resistance and limited local waste infrastructure were identified. The sustainability of the program requires continuous collaboration between local government, educational institutions, and community groups.

Introduction

Waste management has become a global environmental concern due to rapid population growth, urbanization, and increasing consumption patterns. In developing countries, improper waste management practices often lead to environmental pollution, health risks, and ecosystem degradation. Indonesia faces similar challenges, particularly in rural communities where waste management systems are still limited. Household waste contributes significantly to total waste production in rural areas. The majority of household waste consists of organic waste such as food scraps and agricultural residues, as well as inorganic waste including plastic packaging and disposable products.

Improper waste disposal methods, such as open burning and dumping, continue to be widely practiced in many rural communities. Karang Bayan Village, located in West Lombok Regency, represents one of the rural areas experiencing waste management challenges. The village is characterized by dense residential areas and growing household consumption activities. Limited access to formal waste management services has resulted in increasing environmental pollution.

The 3R approach (Reduce, Reuse, Recycle) is widely recognized as an effective strategy for reducing waste volume and promoting sustainable environmental practices. This concept encourages communities to minimize waste generation, reuse materials, and recycle waste into valuable products. Implementation of the 3R approach requires community participation and environmental awareness. Community service programs conducted by university students play a crucial role in introducing sustainable waste management practices. Through educational

activities and practical training, students can contribute to increasing environmental awareness and empowering local communities to manage waste independently.

Problem Identification

Based on preliminary observation in Karang Bayan Village, several problems were identified:

1. Lack of community awareness regarding proper waste management.
2. Absence of systematic waste segregation practices at household level.
3. Limited knowledge about waste utilization and recycling techniques.
4. Insufficient waste management facilities within the village.

Objectives of the Program

This community service program aims to:

1. Increase community awareness regarding environmental cleanliness.
2. Introduce and implement 3R-based household waste management practices.
3. Encourage community participation in waste segregation and recycling.
4. Reduce unmanaged household waste in the village environment.

Benefits of the Program

The implementation of this program provides several benefits, including improving environmental quality, strengthening community environmental awareness, and supporting sustainable village development.

1. Literature Review
    1. Concept of Household Waste Management

        Household waste management refers to systematic activities involving waste generation, collection, sorting, processing, and final disposal. Effective waste management plays a critical role in maintaining environmental quality and public health. According to environmental management theory, household waste can be classified into organic and inorganic waste. Organic waste generally decomposes naturally and can be processed into compost, while inorganic waste requires recycling or reuse to reduce environmental pollution.

    2. The 3R (Reduce, Reuse, Recycle) Approach in Waste Processing

        The 3R concept is a waste management strategy that prioritizes waste reduction at the source. Reduce focuses on minimizing waste production through responsible consumption behavior. Reuse encourages the repeated use of materials without significant processing. Recycle involves converting waste materials into new products. Implementation of the 3R approach has been proven to significantly reduce waste volume and improve environmental sustainability. Studies indicate that community-based 3R programs contribute to reducing landfill dependency and promoting circular economy practices.

    3. Community Participation in Environmental Sustainability

        Community participation is essential for the success of environmental management programs. Participatory development theory emphasizes the importance of community involvement in planning, implementation, and evaluation processes. Active community participation increases program effectiveness and sustainability.

    4. The Role of Education and Socialization in Waste Awareness

        Environmental education plays a vital role in shaping community behavior. Awareness campaigns, training programs, and demonstration activities are effective strategies to introduce sustainable waste management practices.

Methodology

1. Program Location and Participants

   The program was conducted in Karang Bayan Village, West Lombok Regency. Participants included local households, community leaders, and youth organizations. A total of 45 households participated in the program.

   a. Program Implementation Design

   The program was conducted through four stages:

   1) Preliminary observation and problem identification
   2) Community education and training
   3) Implementation of 3R waste processing practices
   4) Monitoring and evaluation

2. Methods of Data Collection

   Data were collected through:

   1) Field observation
   2) Interviews with community members
   3) Questionnaire surveys
   4) Documentation of program activities

3. Program Evaluation Techniques

   Program evaluation was conducted by comparing community knowledge and behavior before and after program implementation. Qualitative and quantitative analysis methods were used.

Results and Discussion

1. Initial Condition of Household Waste Management in Rural Communities

   Prior to program implementation, most households disposed of waste through burning or open dumping. Waste segregation practices were rarely conducted. Community knowledge regarding recycling was limited. Survey results showed that only 22% of households practiced basic waste sorting. Environmental awareness regarding waste impact was relatively low.

   Field observations also revealed that waste disposal behavior was strongly influenced by traditional habits passed down through generations. Many residents considered burning waste as the most practical and cost-efficient disposal method. This perception was reinforced by the absence of structured waste collection services within the village. As a result, waste management was treated as an individual household responsibility rather than a collective environmental issue.

   Furthermore, the lack of access to environmental education contributed to limited community understanding of the long-term impact of improper waste disposal. Several households were unaware that open burning could release harmful pollutants affecting air quality and public health. The absence of information regarding alternative waste processing methods also discouraged residents from adopting more environmentally friendly practices.

2. Implementation of 3R-Based Waste Processing Program

   The program introduced waste segregation by providing separate waste bins for organic and inorganic waste. Training sessions were conducted to demonstrate compost production from organic waste and recycling techniques for plastic waste. Community members were also trained to produce handicraft products using recyclable materials such as plastic packaging

and bottles. These activities not only reduced waste but also provided additional economic opportunities.

In addition to technical training, awareness campaigns were conducted through community meetings and educational posters placed in strategic village locations. These campaigns aimed to reinforce the importance of sustainable waste management and encourage behavioral change among residents. The involvement of local leaders and community organizations played a significant role in increasing program acceptance.

Practical demonstrations were designed to ensure that participants could directly apply the knowledge gained during training sessions. Residents were guided step-by-step in compost production using simple household materials. This hands-on approach increased participants' confidence and willingness to adopt 3R practices. The availability of simple and low-cost waste processing techniques proved essential in ensuring community participation.

3. Community Participation and Behavioral Changes

Community participation increased significantly during program implementation. Residents actively participated in training activities and environmental campaigns. Post-program survey results indicated that 68% of households practiced waste segregation. Behavioral changes were also observed in daily consumption patterns, with residents reducing the use of single-use plastic products. The increase in community participation was also influenced by the collaborative nature of program implementation. The involvement of youth groups and women's community organizations contributed significantly to spreading environmental awareness. These groups acted as local agents of change by promoting waste sorting practices within their neighborhoods.

Social interactions among community members further supported behavioral transformation. Residents who successfully implemented waste segregation became role models for others. Informal discussions and peer learning played an important role in strengthening collective environmental responsibility. Over time, waste management began to be perceived not only as an individual obligation but also as a shared community commitment.

4. Environmental and Socio-Economic Impact

The program contributed to reducing waste accumulation in residential areas. Organic waste processing into compost supported local agricultural activities. Recycling activities generated small- scale economic benefits for participating households. Environmental improvements were observed in the form of cleaner residential areas and reduced unpleasant odors caused by unmanaged waste accumulation. The reduction of waste burning activities also contributed to improved air quality within the village environment. These environmental improvements indirectly enhanced community comfort and public health conditions.

From a socio-economic perspective, the production of recycled handicrafts provided additional income opportunities for several households. Community members began to recognize waste as a potential economic resource rather than a useless byproduct. This shift in perception encouraged residents to maintain waste segregation practices consistently, as they were able to gain both environmental and financial benefits.

5. Challenges and Sustainability Strategy

Despite positive results, several challenges were identified, including limited community consistency and lack of permanent waste management facilities. Sustainability strategies include collaboration with village government and continuous community mentoring. Another challenge identified during program implementation was the variation in community motivation

levels. While some households showed strong commitment to adopting 3R practices, others required continuous assistance and encouragement. Behavioral change in environmental management often requires long-term educational efforts and reinforcement strategies.

To ensure program sustainability, it is essential to establish local environmental management groups responsible for monitoring and maintaining waste processing activities. Strengthening cooperation between village authorities, educational institutions, and environmental organizations can support program continuity. Providing regular training and developing local waste management regulations may further strengthen community commitment toward sustainable environmental practices.

Conclusion and Recommendations

The implementation of the 3R-based household waste management program in Karang Bayan Village successfully improved community environmental awareness and waste management practices. The program demonstrated that community empowerment through education and practical training can significantly reduce unmanaged household waste. Future programs should focus on strengthening institutional support and expanding waste processing facilities to ensure long-term sustainability.

The success of the program implementation also indicates that environmental awareness can be effectively developed through community-based approaches. The experience gained during the program in Karang Bayan Village demonstrates that participatory learning methods enable residents to better understand the environmental consequences of improper waste disposal. When communities are directly involved in environmental activities, they tend to develop stronger responsibility toward maintaining environmental cleanliness and sustainability.

Moreover, the integration of environmental education into daily community activities plays a crucial role in sustaining behavioral changes. Continuous environmental campaigns, community discussions, and practical demonstrations can reinforce knowledge and encourage consistent waste management practices. Long-term environmental awareness requires repetitive exposure to educational initiatives and the establishment of social norms that support environmentally responsible behavior.

The program also highlights the importance of collaboration between academic institutions and local communities in addressing environmental challenges. University-based community service programs serve as effective platforms for transferring knowledge and introducing innovative environmental management techniques. Strengthening partnerships between universities, local governments, and community organizations can create sustainable environmental programs that extend beyond short-term intervention periods.

Additionally, expanding the scope of household waste utilization may further enhance program sustainability. Future initiatives could focus on developing small-scale recycling-based enterprises managed by community groups. Such initiatives not only reduce environmental pollution but also contribute to improving household income and local economic development. The development of environmentally based micro-enterprises has the potential to create a circular economy system within rural communities.

Finally, policy support from village authorities is essential to ensure program continuity. The establishment of local regulations related to waste segregation and environmental cleanliness can strengthen community commitment. Providing incentives for households actively participating in waste management programs may also encourage broader community involvement. Sustainable waste management requires not only community participation but also

institutional and regulatory reinforcement.

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