



## Planning the Implementation of a 3R (Reduce, Reuse, and Recycle) Waste Management Facility for the Prevention of Waste-Related Diseases in Sukawening Village, Bandung Regency

Allan Darma Putra Pramudita<sup>1,\*</sup>, Melbi Tanjung<sup>2</sup>, Sri Ratna Wulan<sup>3</sup>, Muhammad Anang Hadiat<sup>4</sup>, Riska Septiana<sup>5</sup>, Dita Septiani<sup>6</sup>

<sup>1,2,3,4,5</sup> Program Studi Ilmu Lingkungan, Universitas Persatuan Islam

<sup>6</sup> Program Studi Kedokteran, Universitas Pasundan

✉ [allanpramudita@unipi.ac.id](mailto:allanpramudita@unipi.ac.id)

### ARTICLE INFO

#### Article history

Received : 12-4-2026

Revised : 18-5-2026

Accepted : 19-5-2026

#### Keywords

community empowerment;  
composting;  
environmental health;  
TPS 3R; waste management

### ABSTRACT

*Waste generation in Sukawening Village has exceeded the capacity of the existing 3R (Reduce, Reuse, and Recycle) temporary waste management facility (TPS 3R), while current waste treatment practices still rely on open burning. Therefore, it is necessary to develop a plan for a TPS 3R facility capable of accommodating all household waste and reducing waste generation without the use of burning in Sukawening Village. The community service methodology employed in this study includes educational seminars on waste management, the promotion of a healthy environmental culture, and practical training on household-scale composting. In addition, a quantitative approach was applied to develop a feasible TPS 3R planning framework for Sukawening Village. The outcomes of this community service activity are expected to promote more environmentally friendly behavior among the community, enable households to reduce waste generation through composting practices, and provide a viable plan for the development of a TPS 3R facility in Sukawening Village.*

*Timbulan sampah di Desa Sukawening telah melebihi kapasitas tempat penampungan sampah TPS 3R yang tersedia dan pengolahan sampah yang ada masih menggunakan pembakaran. Diperlukan perencanaan TPS 3R agar dapat menampung seluruh sampah rumah tangga dan mengurangi jumlah sampah rumah tangga tanpa menggunakan pembakaran di Desa Sukawening. Metode pengabdian masyarakat yang digunakan adalah sosialisasi seminar edukasi pengelolaan sampah, budaya lingkungan sehat, praktek pembomposan skala rumah tangga dan hasil perhitungan rencana TPS 3R yang feasible di Desa Sukawening dengan pendekatan kuantitatif. Hasil dari pengabdian masyarakat ini diharapkan dapat merubah pola hidup masyarakat lebih ramah lingkungan, masyarakat dapat melakukan pengurangan timbulan limbah dengan pengomposan skala rumah tangga dan terdapat rencana untuk pembangunan pengelolaan TPS 3R di Desa Sukawening*

This is an open access article under the [CC-BY-SA](https://creativecommons.org/licenses/by-sa/4.0/) license.



## **A. INTRODUCTION**

The population of Sukawening Village is 10,875 inhabitants, distributed across 22 neighborhood units (RW) and 66 community units (RT). However, the village is currently served by only two temporary waste disposal sites, each equipped with an incinerator and covering an area of 6 × 8 meters. Existing waste management practices primarily involve incineration and the collection of inorganic waste for resale as recyclable materials, such as plastic bottles, cardboard, metals, and glass bottles. At present, the limited capacity of these temporary waste disposal sites has become a major issue, as they are unable to accommodate the total volume of waste generated by the community. This condition is not aligned with the vision of Sukawening Village, which emphasizes strengthening development through community participation to achieve a culturally rooted, religious, and environmentally oriented excellence. It also contradicts one of the village's missions, namely the realization of equitable, environmentally based development and sustainable governance. Furthermore, the use of incinerators requires environmental permits in accordance with Government Regulation No. 22 of 2021. Based on Law No. 18 of 2008, incinerator operations must comply with environmentally friendly technological standards to prevent adverse health impacts resulting from gas emissions and fly ash. In addition, the residues from the incineration process are classified as hazardous and toxic waste (B3) under the same regulatory framework.



Figure 1. Condition of the Waste Disposal Site in Sukawening Village (Source: Author's Documentation)

In addition to compromising aesthetics, the accumulation of unmanaged household waste poses significant health risks. These include an increased incidence of infectious diseases such as diarrhea, typhoid, and cholera; respiratory disorders caused by air pollution from waste burning; as well as potential hormonal disruptions and cancer risks due to exposure to hazardous chemicals from plastic waste. Furthermore, accumulated waste can serve as a breeding ground for disease vectors such as mosquitoes and rodents, and may lead to soil and water contamination, ultimately resulting in the degradation of environmental quality and public health (Ompusunggu, A. R. I., et al., 2025). An increase in proper waste disposal practices is directly associated with improved community health. One of the key efforts to reduce waste accumulation in the environment is through waste reduction at the source. Communities should be encouraged to actively engage in waste reduction practices



and adopt more efficient lifestyles that generate less waste. Therefore, this community service initiative proposes the planning of a temporary waste management facility capable of accommodating the total household waste generated by residents of Sukawening Village. The proposed facility is designed to reduce the volume of waste prior to its transportation to the final disposal site (TPA), while ensuring that waste management processes do not involve burning or the use of incinerators. Previous studies have focused on household behavior in waste management as a disease vector (Wulandari S., 2025), but have not addressed the aspect of temporary waste disposal facilities (TPS). Other previous studies focused only on the institutional aspects of waste management at a TPS located in one neighborhood unit (RW) in Ciwidey Village (Sidik T., 2025). The present study differs from previous studies because it covers all neighborhood units (RW) in Ciwidey Village. In addition, previous studies related to waste management, particularly TPS management in Ciwidey Village, have not applied a quantitative approach.

## **B. METHODS**

The method employed in this study was implemented through a community outreach seminar using a quantitative approach. The community service activities were conducted at the Sukawening Village Hall on August 2, 2025. The implementation of the community service program consisted of several stages, as follows:

### **1. Site Observation**

This activity was conducted to identify the existing conditions and problems reported by the community and the local village government, ensuring that the proposed solutions were aligned with the actual issues faced in Sukawening Village.

### **2. Data Collection**

The data required in this study consisted of both primary and secondary data. Primary data included waste composition obtained through field surveys. Secondary data included population data of Sukawening Village obtained from the village government. Additional secondary data included the household waste generation rate based on SNI 3242:2008 and dimensional criteria for composting using the open windrow method based on Minister of Public Works Regulation No. 3 of 2013.

The research instruments used in this study included observation sheets to identify the existing conditions of TPS and waste management in Sukawening Village, as well as secondary data collection consisting of population data and waste generation standards based on SNI 3242:2008.

### **3. Data Analysis**

Waste generation with waste generation rate 2.5 L/person/day was calculated using below formula.

$$Q = q \times P$$

Where:

Q = total waste generation,

q = waste generation rate,

P = population.

The required area for the waste reception and inorganic waste storage units, assuming a waste height of 0.5 m, was calculated using below formula.

$$A = \frac{V}{T}$$

Where:



A = required area,

V = volume of waste generated,

T = stacking height

The total volume of waste that can be composted per bamboo aerator unit was calculated as below.

$$V_u = V_t - V_a$$

Where:

V<sub>u</sub> = total volume of compostable waste per bamboo aerator unit,

V<sub>t</sub> = total waste volume (before processing),

V<sub>a</sub> = volume of the bamboo aerator.

The number of required units was calculated using formula below.

$$N = \frac{V_s}{V_u}$$

Where:

N = number of required units,

V<sub>s</sub> = volume of compostable waste,

V<sub>u</sub> = total volume of compostable waste per bamboo aerator unit.

The total area required for organic waste recycling using windrow aerator units (2 m<sup>2</sup> per unit) was calculated as below.

$$A = N \times A_n$$

Keterangan

A = required area for organic waste recycling,

N = total number of bamboo aerator units,

A<sub>n</sub> = area required per windrow aerator unit

#### 4. Community Dissemination

The results of the analysis were subsequently presented in a seminar to the community and the local village government. This seminar aimed to provide solutions for addressing waste generation that exceeds the capacity of the existing temporary waste disposal facilities in Sukawening Village.

### C. RESULTS AND DISCUSSION

#### 1.1. Community Engagement Activities

The planned TPS 3R facility demonstrates the importance of integrated waste management systems at the community level. According to SNI 3242:2008, waste reduction should prioritize source-based management through segregation, recycling, and composting activities before waste is transported to the final disposal site. The provision of separate areas for organic and inorganic waste management in the proposed TPS 3R plan reflects the implementation of sustainable waste management principles and supports environmentally friendly village development. The event was attended by community members and neighborhood unit (RW) leaders of Sukawening Village. The seminar on the presentation of research results was officially opened by the Deputy Head of Sukawening Village. In the first session, educational materials were delivered on the basic principles of household waste management, including healthy community behavior and the segregation of organic and inorganic waste. The following session involved practical training on household-scale composting, enabling community members to independently process organic waste prior to its disposal at the TPS 3R facility, thereby reducing the overall waste generation burden. Both the community and the village government actively participated in these activities. This was followed by the presentation of the analysis results regarding the spatial requirements for the

planned TPS 3R waste management facility. The final session consisted of a question-and-answer discussion related to the previously delivered materials. During this session, both community members and village officials actively engaged by asking questions, demonstrating enthusiasm and a positive response to the program. The event concluded with the presentation of a commemorative plaque to the Sukawening Village Government. The following section provides photographic documentation of the community service implementation activities.



Figure 2. Presentation of Educational Materials on Waste Management



Figure 3. Household-Scale Composting Practice

## 1.2. TPS 3R Facility Plan

Based on the assumption of seven containers, where each container serves approximately three neighborhood units (RW), a minimum area of 40.32 m<sup>2</sup> is required. A portion of the organic waste is processed in the organic treatment area using the open windrow method, consisting of 26 units. The remaining waste, including non-recyclable inorganic waste with no economic value, is transported to the final disposal site (TPA). Valuable inorganic waste is directed to the inorganic processing area and subsequently transferred to a waste bank for recycling purposes. The spatial requirements for the planned TPS 3R facility are presented in Table 1 below.

Table 1. Area Requirements for the Proposed TPS 3R Waste Management Facility

No	TPS 3R Facility Component	Area Requirement (m <sup>2</sup> )
1	Reception Area	55
2	Inorganic Waste Area	41
3	Organic Processing Area	52
4	Container Storage Area	41
<b>Total</b>		189



### 1.3. Efficiency of the TPS 3R Plan

The waste generation of residents in Sukawening Village can be reduced by up to 27.55% for the total amount of organic and inorganic waste. Approximately 50% of organic waste can be processed within a period of 14–30 days. Meanwhile, most inorganic waste still needs to be transported to the final disposal site (TPA), as not all types of waste generated fall under the categories accepted by the waste bank, such as ceramics and broken glass. The efficiency of this waste processing facility does not include the scenario in which every resident of Sukawening Village independently carries out household-scale composting. If implemented, such practices would further improve waste reduction and significantly decrease the waste burden at the TPS 3R facility.

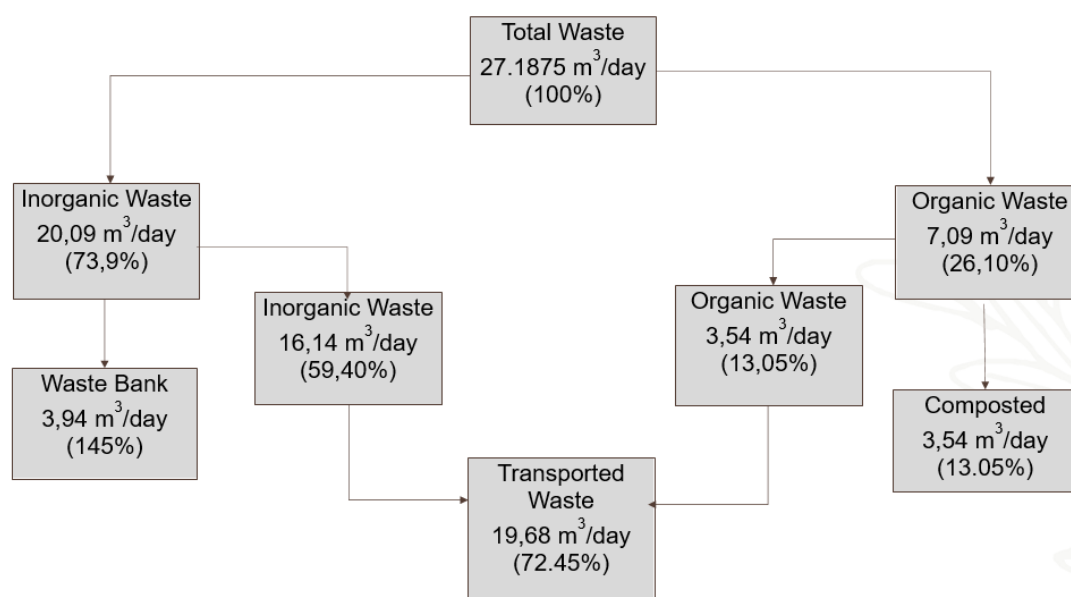


Figure 4. Waste Management Mass Balance TPS 3R

## D. CONCLUSION

The TPS 3R facility represents one of the solutions to address the waste generation problems in Sukawening Village. The capacity of the TPS 3R facility in Sukawening Village must be sufficient to accommodate all waste generated within the village, thereby preventing the downstream negative impacts associated with waste accumulation. The planned TPS 3R system is expected to support the sustainable development of Sukawening Village. However, its implementation requires strong commitment from all stakeholders, including the village government and the community. It is expected that the community will adopt household-scale composting practices and strengthen environmentally responsible behavior in accordance with the vision and mission of Sukawening Village.

## E. ACKNOWLEDGEMENTS

The authors would like to express a gratitude to the KKN (Community Service Program) students of Universitas Persatuan Islam in Sukawening Village for facilitating this activity.



The authors also extend their appreciation to the Sukawening Village government and the local community for their willingness to receive and support this community service program.

#### **F. AUTHOR CONTRIBUTIONS**

The contributors to this community service activity are as follows. Basic education on waste management and healthy environmental practices: MAH, SRW, RS, DS. Waste composting practice: MT. TPS 3R planning and manuscript writing: ADPP.

#### **G. REFERENCES**

- Ompusunggu, A. R. I., Safinatunnaja, E. N., Ridwan, R. M., Khaerina Ramdani, T. C., Ana, A., & Achdiani, Y. (2025). Pengelolaan Sampah Rumah Tangga dan Dampaknya Terhadap Kesehatan Keluarga. *Health & Medical Sciences*, 2(3), 1-10. <https://doi.org/10.47134/phms.v2i3.431>
- Siddiq, T (2025). Strategi Pengelolaan Sampah dalam meningkatkan kebersihan lingkungan di Bojong jambu RW 11 Desa Sukawening Kec.Ciwidey Kab. Bandung. *Fala Jurnal Ilmiah Multidisipliner*. 2 (2). 1-11. E-ISSN: 30629403
- Sukawening Village Government. (2020). Village Profile of Sukawening [in Indonesian].
- Minister of Public Works Regulation No. 3 of 2013 concerning Waste Infrastructure and TPS 3R Technical Guidelines
- Government Regulation No. 22 of 2021 concerning Environmental Protection and Management
- SNI 3242:2008: Procedures for Waste Management in Residential Areas [in Indonesian]
- Ritonngga Y & Usiono (2023). Sampah Dan Penyakit : Systematic Literature Review. *Jurnal Kesehatan Tambusai*, 4 (4), 5148-5157. <https://doi.org/10.47134/phms.v2i3.431>
- Law No. 18 of 2008 concerning Waste Management
- Wulandari, S (2025). Pemberdayaan Masyarakat dalam Pengelolaan Sampah Berbasis Ecovillage. 3 (1). 987-990. <https://doi.org/10.5281/zenodo.17218385>