Recent Progress and Suggestions on Waste Management Strategy in Kalisalak village, Batang regency

by Dian Ratna Sawitri

Submission date: 26-Apr-2023 08:00AM (UTC+0700)
Submission ID: 2075627079
File name: rosiding_recent_progress_and_suggestions_on_waste_management.pdf (281.31K)
Word count: 3832
Character count: 20659

Recent progress and suggestions on waste management strategy in Kalisalak village, Batang regency

The 6th International Conference on Eco Engineering Development 2022

Pending

View Paper

Resubmitted on
Oct 7, 2022

Recent progress and suggestions on waste management strategy in Kalisalak village, Batang regency

M A Budihardjo[1], S Sumiyati[1], D R Sawitri[2], A M Sari[1], M I Julianggara[1]

[1]Department of Environmental Engineering, Faculty of Engineering, Diponegoro University, Tembalang, Semarang, 50275, Indonesia

[2]Faculty of Psychology, Diponegoro University, Tembalang, Semarang, 50275, Indonesia

m.budihardjo@ft.undip.ac.id

Abstract. In a developing country like Indonesia, waste management remains one of the main problems faced due to a lack of coordination between various stakeholders and budget limitations to implement advanced waste management methods. The Batang regency is no exception, where overall waste reduction and waste recycling percentage (out of total generated waste) are only 0.61% and 0.08% respectively. One of its villages, Kalisalak village, is a religious agritourism village that has a lot of economic potential in various sectors, with by-products that can be utilized and processed as various materials and resources to improve the local community and support sustainable development. Organic waste from Kalisalak village can be processed into organic fertilizers, eco-enzymes, takakura basket, and bio pores, while plastic waste can be used as paving block materials. Non-domestic sawdust waste from non-domestic sectors can be processed into growing media for ornamental plants, horticulture, and edible mushrooms. Thorough field surveys are still needed for this study.

1. Introduction

Waste management is among one of the main problems in developing countries including Indonesia [1]. The amount or volume of waste generated is directly proportional to the level of consumption of an item that is used daily by the Indonesian people. The volume of waste generation that is increasing every day can cause soil, water, and air pollution. Until now, the waste management paradigm used in Indonesia is generally collection-transport disposal. In Indonesia, there is a lack of coordination, and the process is limited to only collection and transportation to the final dumping site. The mainstay of a city in solving its waste problem is removal by backfilling in landfills, with over 80% of the budget is used for waste collection alone[2]. The remaining budget constraint is among the reason why there has not been any proper further handling process and the generated waste are only dumped in the open land available as it is, also known as open dumping [3]. Some of the landfills in Indonesia do not have proper landfill facilities such as drainage and leachate system. The leachate affects the properties of groundwater, such as the high concentration of total dissolved solids, electrical conductivity, hardness, chloride, COD, nitrate, and sulfate, as well as the presence of heavy metals, where the content tends to decrease after the rainy season and increase before the rainy season[4]. This would lead to high possibility of harming the environment [5, 6]. To optimize waste management in Indonesia, the government has targeted to reduce the number of waste produced by 30% and to properly handle 70%

of the waste by 2025 through Presidential Decree No. 97/2017 on National Policy & Strategy on Management of Household Waste and Household-Like Waste, also known as the road to '2025 Clean-from-Waste Indonesia' [7].

Batang regency, located in Central Java, Indonesia, has set the waste handling target to 70% by 2025 for household waste and household-like waste [8]. The existing organic household waste is not processed first, so it will only be directly dumped into Randukuning Landfill. for inorganic waste management, each of the 11 waste banks available only handles around 0.0005% to 0.026% of the total waste generated in the regency, which reached 89543.84 tonne in 2021 [9]. One of its villages, Kalisalak village in Batang district, is a religious agritourism village. The village has many economic potentials, especially in agriculture. Its by-products can be utilized and processed as various materials and resources to improve the local economy and creating sustainable society. The effort will ultimately lead to improving the quality of the environment and public health [10], as well as increasing tourist attraction. This paper will examine current waste management practices by Batang regency, and eventually propose appropriate strategies for waste management in Kalisalak village as tourist destination.

2. Methods

2.1. Area of observation

Batang Regency is an area located on the northern coast of Java Island with a population of Batang Regency in 2021 reaching 810393 people, which has increased from the previous year, and the highest population density condition is located in Batang District . Batang regency has total area of 78864.16 Ha and is divided into 15 subdistricts. Agriculture, trade, and manufacturing sectors are among the most prominent economic sectors in the regency [11]. Most of the waste generated in the regency comes from household settlements, with compositions of organic and inorganic waste being 78.34% and 21.66% respectively [12]. Randukuning landfill, which serves Batang regency accumulated up to 86664 m^3 of waste in 2021 [11]. The volume of waste entering the TPA is 122 m^3/day from within the city and 23 m^3/day from outside the city [13].

Kalisalak village is one of the villages under the administrative area of Batang district. This village has an area of 144.99 Ha with a population of 3103 people and a population density of 2140 people/km^2. The village consists of 4 hamlets, 4 rukun warga (RW or sub-hamlet) and 19 rukun tetangga (RT or neighborhood) [14].

Kalisalak village is classified as an independent village and is a religious agritourism village in Batang regency. Some of the village's potential to be developed comes from agriculture and plantations, including grapefruit, rambutan, cassava, durian, sengon forest and rice. The majority of the population make a living as traders. There is a special shopping center belonging to Kalisalak village called Pujasalika (Kalisalak Village Shopping Center). This shopping center is a collection of stalls developed by the youth and local village government to improve the local economy. In addition, there are micro, small and medium enterprises (MSMEs) that are developing in the village, including furniture and sweetened banana chips.

So far, the existing waste management in Kalisalak village has only been carried out by the waste bank by collecting specific inorganic waste such as plastic bottles, cardboard, paper, metal, glass. Still, the sustainability of the waste bank has not been implemented optimally due to the pandemic. Although Kalisalak Village is one of the villages that are pretty active in waste management in Batang Regency, it is shown by the existence of a waste bank. However, it is still necessary to improve waste management into reusable products. Reusing domestic and non-domestic waste can be a business opportunity for the local community. Thus, in addition to minimizing the amount of waste generated, it can also increase the local community's income.

2.2. Data collection and analysis

This paper gathers secondary data obtained through the internet as well as from brief survey. Some of the data are hauled from online sources includes the Central Bureau of Statistics of Batang Regency and the National Waste Management Information Systems of Indonesia. The data will then be interpreted qualitatively with comparisons to previous related research to formulate the most appropriate waste management strategy according to Kalisalak village waste characteristics and potentials.

3. Results & Discussions

3.1. Batang regency waste management performance

Waste management is a systematic, comprehensive, and sustainable activity that includes waste reduction and handling. Waste management aims to improve public health and environmental quality and make waste a resource. The principles of waste management include reducing and waste management which is detailed as follows:

1. Waste reduction
   - Restriction of waste generation
   - Waste recycling
   - Waste reuse
2. Waste management
   a. Sorting (type, amount, nature)
   b. Collection
   c. Transportation
   d. Processing
   e. Final waste processing

Waste management performance of Batang regency reflected the existing efforts in both waste handling to the disposal and waste recycling. From Table 1, it can be inferred that minimal effort has been done to manage waste generated in Batang regency with its waste reduction and waste recycling percentage being only 0.61% and 0.08% respectively.

Table 1. Batang regency waste management performance, 2021

Performance	Unit	Amount
Waste generation (annum)	tonne/year	89543.84
Waste reduction (annum)	tonne/year	546.99
% of waste reduction	-	0.61
Waste handling (annum)	tonne/year	86797.00
% of waste handling	-	96.93
Handled waste (annum)	tonne/year	87343.99
% of handled waste	-	97.54
Waste recycling (annum)	tonne/year	67.65
Recycling rate	-	0.08

Source: [15]

3.2. Batang regency waste management performance

3.2.1. Organic waste

Organic waste is waste that comes from organic materials, such as the remains of vegetables, animals, paper, pieces of wood from household appliances, bits of twigs, grass during garden cleaning, and so on. The high percentage of organic waste generated in Batang regency demanded waste management strategy to be focused heavily on organic and domestic waste management and processing. Organic waste has a fairly high nutrient content, making it easier for the decomposition process to become the basic material for fertilizers. The manufacture of this fertilizer can be used for plants that can increase and accelerate the growth and development of cultivated plants, increase and accelerate crop production, and increase the fertility of cultivated plants so that plants are more resistant to various kinds of pests and diseases. One method that is often used in making compost is the takakura method. Takakura Method is one way of making compost by recycling organic kitchen waste using a basket container. Takakura benefits include increase soil fertility, increased water absorption capacity by soil, improve yield quality (taste, nutritional value, and amount of harvest), increased water absorption capacity by soil provides hormones and vitamins for plants, suppresses growth/attack of plant diseases, and reduced environmental damage due to the use of chemical fertilizers that farmers widely use. The materials and tools used in making takakura are :

a. organic kitchen waste (rice, fish, vegetables, chicken, etc.)
b. finished compost
c. husk pillow
d. basket
e. basket cover
f. cardboard
g. cloth cover.

The steps for making a takakura basket include the following:

1) Line the inner basket with a cardboard husk pillow at the bottom of the basket
2) Fill the basket with compost, approximately 1/3 of the basket. Compost is a starter for the composting process because it contains decomposing microbes.
3) Cut the kitchen waste into small pieces, then fill it into the basket and stir
4) Put another husk pillow on top of the garbage and compost mixture
5) Cover the mouth of the basket with a cloth, then close it tightly with a lid
6) To ensure the composting process runs, place our hands 2 cm from the compost. If it feels warm, you can be sure the composting process is running.

Another utilization product is eco-enzyme which is the result of fermentation of organic waste in liquid form which is used as a pesticide and disinfectant [16]. Eco-enzyme is made from organic waste mixed with water and sugar (as molasses) in a certain ratio. The ratio used to manufacture this eco-enzyme liquid is 3:1:10, where three are for organic kitchen waste (fruits or vegetables), 1 for sugar or molasses, and 10 for water.

The eco-enzyme production process is straightforward and utilizes easily available ingredients around us so that everyone can make their own. This product has great potential to be produced on various scales, not only on a large scale but also on a small scale, such as in households. Therefore, this product is very prospective to be produced on various scales, including small scale on a community basis [17]. Eco-enzyme has several functions: a floor cleaner, vegetable and fruit cleaner, insect repellent, and plant fertilizer. The benefits of eco-enzyme as a disinfectant are caused by the alcohol and acetic acid content in the liquid. This fermentation process is the result of the activity of enzymes found in bacteria or fungi.

The eco-enzyme liquid is made by:

a. prepare organic waste, such as soft fruit peels and vegetables. Chop it into small pieces, then put it in a bottle that already contains a mixture of water and sugar.

b. let it sit for three months, but in the first two weeks, the bottle cap must be opened and closed regularly because this organic material will release gas
c. filter and store at room temperature for use in various purposes

The biopore infiltration hole method is a hole made with a diameter of about 10 to 30 cm and a length of about 30 to 100 cm covered with organic waste. The advantages and benefits of biopore infiltration hole are preventing (mitigating) flooding, converting organic waste into compost, utilizing soil fauna and plant roots, preventing waterlogging, and overcoming various causes of diseases such as malaria, dengue fever, elephantiasis, and other conditions. The location where the biopore infiltration hole is made must be arranged in such a way and adapted to the available land. Because it functions as a groundwater absorber, the placement of the biopore infiltration hole must choose a location where water tends to stagnate or collect [18]. In making biopore infiltration holes, materials and tools are :

a. soil drill or crowbar
b. PVC pipe that has been perforated on the sides, and a 10 cm diameter cover
c. organic waste
d. water

The steps for making biopore infiltration holes are as follows:

a. Determine the location that will be used as a place of manufacture.
b. Flush the soil that will be used to make the biopore infiltration hole with water so that the ground becomes softer and easier to perforate.
c. Make a hole in the ground using a soil drill. Try to make a vertical one.
d. Make a hole with a depth of approximately 1 meter with a diameter of 10 cm.
e. After that, line the hole using a PVC pipe whose size is the same as the diameter of the hole.
f. Then, fill the hole with organic waste such as leaves, grass, fruit peels, and garbage from other plants.
g. After that, cover the hole using iron wire, or you can also use a PVC pipe cap that has been perforated first.

Optimal results of composting using biopore media can be obtained at week 6. Where the colour of organic waste has become blackish brown, most of the texture has become like soil grains and does not show any odour [19].

3.2.2. Inorganic waste

Inorganic waste is an inorganic-based waste with a decomposition process that takes a very long time. This process is influenced by the level of decomposition of each different material. Plastic waste tends to dominate the generation of inorganic municipal waste, especially with Indonesia being ranked second to dump the highest number of plastic waste worldwide [20, 21]. Polypropylene fiber is one type of plastic that has been most often used as fiber material in concrete mixtures for many years. It has high tensile stress and modulus of elasticity. It is considered to be difficult to degrade and takes hundreds of years to decompose in nature, and if this plastic waste is thrown away in various places (rivers and seas), it can become microplastic that is harmful to river and sea ecosystems. But on the other hand, plastic waste with the type of polypropylene has the potential to be used as a substitute material in the manufacture of paving blocks [22].

Paving block or Concrete Block is a building material made of cement, water, and aggregate. Paving blocks are often used in buildings that are very environmentally friendly and have many sizes to add aesthetic value. Previous conducted research shows that the composition of PP plastic : sand by 30% : 70% as paving block has a compressive strength value of 16.11 MPa which is classified as C quality and can be used for pedestrians based on SNI 03-0691 1996 [23].

Other inorganic waste cannot be exactly determined because the insufficient waste composition data for Batang regency from the Waste Management Information Systems of Indonesia. In addition, inorganic waste can be used for handicraft materials such as bags, tablecloths, flower vases, and others. Recycling can reduce the generation of inorganic waste, especially plastic waste, and can be used as a business opportunity to improve the economic level.

3.2.3. Non-domestic waste

The waste produced by the people of Kalisalak village does not only come from household activities (domestic waste), but also comes from the trade, tourism, agriculture and plantation sectors. Although Kalisalak village is considered as active in waste management with the existence of waste banks, however, it is still necessary to improve the management of waste into reusable products. The reuse of domestic and non-domestic waste can be a business opportunity for the local community, apart from it improving the quality of the environment and public health [10] and supporting sustainable development. Thus, in addition to minimizing the generation of waste generated in Kalisalak Village, the village community can also improve the economy by increasing income through waste management.

Kalisalak village has agricultural and plantation potential. Straw is the part of the plant stem without roots that remain after the fruit is harvested. Straw and sawdust which are by-products of agricultural activities and furniture contain organic materials such as cellulose, hemicellulose and lignin as a source of carbon and energy for mushroom growth. Utilization of this straw is one way to deal with environmental pollution from plant residues. Sawdust contains more cellulose and lignin, so the spread of mycelium in sawdust growing media is relatively faster than straw growth media [24]. However, because the C/N ratio of sawdust was higher than straw, it caused more mushroom fruiting bodies, albeit in smaller sizes. Therefore, a mixture of straw and sawdust growing media can support optimal growth with a composition ratio of 700 g sawdust, 100 g straw, 50 g bran and 150 g green compost [25].

Conclusions

Kalisalak village as a religious agritourism village has high economic potential in tourism, agriculture, plantation, and trade sectors, with its by-products obtained both from domestic and nondomestic sources that can be processed further into valuable materials that will also increase income of the local community. Organic waste from domestic waste can be processed into organic fertilizers, eco-enzymes, Takakura basket and used as biopores. Inorganic waste after being managed through a waste bank has the potential to be used as building products, such as paving blocks from plastic waste.

Non-domestic sawdust waste originating from micro, small and medium enterprises, furniture and straw from the agricultural sector can be processed into growing media for ornamental plants, horticulture, and edible mushrooms. However, this study has some limitations. The waste management performance data in this study only represents Batang regency in general and field surveys in Kalisalak village, including waste sampling, are yet to be conducted. Moreover, the Waste Management Information Systems of Indonesia do not have any updated data regarding the specific waste composition of Batang Regency, which should be helpful to gain insights and more appropriate recommendations for waste management strategies to be implemented in the village.

References

[1] Khair H, Rachman I and Matsumoto T 2019 Analyzing household waste generation and its composition to expand the solid waste bank program in Indonesia: a case study of Medan City *Journal of Material Cycles and Waste Management* **21** 1027-37

[2] Damanhuri E and Padmi T 2019 Pengelolaan sampah terpadu (Edisi 2). Bandung: ITB Press)

[3] Kurniawan T A, Avtar R, Singh D, Xue W, Othman M H D, Hwang G H, Iswanto I, Albadarin A B and Kern A O 2021 Reforming MSWM in Sukunan (Yogjakarta, Indonesia): A case-study of applying a zero-waste approach based on circular economy paradigm *Journal of cleaner production* **284** 124775

[4] Vasanthi P, Kaliappan S and Srinivasaraghavan R 2008 Impact of poor solid waste management on ground water *Environmental monitoring and assessment* **143** 227-38

[5] Rahim I R and Jamaluddin A 2015 Cost Analysis of The Fukuoka Method Landfill System In North Kolaka Regency, Southeast Sulawesi, Indonesia
[6] Widyarsana I M W, Damanhuri E, Agustina E and Aulia R N 2019 Risk assessment and rehabilitation potential of municipal solid waste landfills in Bali Province, Indonesia *GEOMATE Journal* **17** 164-71
[7] Wang Y and Karasik R 2022 Plastic Pollution Policy Country Profile: Indonesia *NI PB* 22-05
[8] Batang K 2019 Peraturan Bupati Kabupaten Batang Nomor 40 Tahun 2019 tentang Kebijakan dan Strategi Daerah dalam Pengelolaan Sampah Rumah Tangga dan Sampah Sejenis Sampah Rumah Tangga.
[9] Sampah D P 2021 Timbulan Sampah, Bank Sampah, dan Komposisi Sampah. ed D P Sampah: Sistem Informasi Pengelolaan Sampah Nasional)
[10] Rozi Z F and Samitra D 2021 Pengabdian pada Masyarakat Kota Lubuklinggau *Jurnal Cemerlang: Pengabdian pada Masyarakat Berdasarkan Peraturan Pemerintah Nomor 27 Tahun 1999 tentang Analisa* **4(1)** 14-21
[11] Statistik B P 2022 Kabupaten Batang Dalam Angka Tahun 2022 *Batang: Badan Pusat Statistik Kabupaten Batang*
[12] Darmasaputra A B and Hariani D 2019 IMPLEMENTATION OF REGIONAL REGULATION NUMBER 3 OF 2016 CONCERNING WASTE MANAGEMENT IN BATANG REGENCY (CASE STUDY OF THE FINAL RANDU KUNING TEGALSARI REGENCY IN BATANG REGENCY) *Journal of Public Policy and Management Review* **9** 205-19
[13] Subiyanto S 2014 Analisis Geospasial Persebaran TPS dan TPA di Kabupaten Batang Menggunakan Sistem Informasi Geografis *Jurnal Geodesi Undip* **3**
[14] Statistik B P 2021 Kecamatan Batang dalam Angka Tahun 2021 *Batang: Badan Pusat Statistik Kabupaten Batang*
[15] Mahyudin R P 2017 Kajian permasalahan pengelolaan sampah dan dampak lingkungan di TPA (Tempat Pemrosesan Akhir) *Jukung (Jurnal Teknik Lingkungan)* **3**
[16] Tangapo A M and Kandou F 2022 Edukasi Pemanfaatan Eco-Enzim Hasil Fermentasi Sampah Organik Rumah Tangga Menjadi Hand-Sanitizer Di Kelurahan Meras Manado *The Studies of Social Sciences* **4** 1-9
[17] Rambe T R 2021 Sosialisasi dan aktualisasi eco-enzyme sebagai alternatif pengolahan sampah organik berbasis masyarakat di lingkungan Perumahan Cluster Pondok II *Jurnal Pengabdian kepada Masyarakat* **2** 36-40
[18] Sudiana I K, Parwata I P and Kristiyanti P L P 2021 Lubang Resapan Biopori Sebagai Solusi Penanganan Masalah Sampah Dan Peningkatan Resapan Air *Proceeding Senadimas Undiksha* 733-40
[19] Restanti E, Thohari I and Rachmaniyah R 2019 Efektifitas Mereduksi Sampah Organik dalam Biopori (Studi di Desa Sekargadung Kecamatan Dukun Kabupaten Gresik Tahun 2018) *Jurnal Penelitian Kesehatan" SUARA FORIKES"(Journal of Health Research" Forikes Voice")* **10** 168-72
[20] Pertiwi A, Kiky S P, Wiwik B, Ratna P, Budi P S and Arya R 2018 Preliminary Study on Plastic Waste Handling in Semarang City-Indonesia: Estimated Generation and Existing Management. In: *E3S Web of Conferences*: EDP Sciences) p 07008
[21] Sigalingging R, Susanto E, Panggabean S and Munte K 2019 Design and fabrication of integration of organic-inorganic waste pyrolysis equipment. In: *IOP Conference Series: Earth and Environmental Science*: IOP Publishing) p 012015
[22] Kusuma G A 2019 Pemanfaatan Sampah Plastik Jenis PP (Poly Propylene) sebagai Substitusi Agregat pada Bata Beton (Paving Block). Universitas Islam Indonesia)
[23] Erdin E K Z and Soehardi F 2021 KUALITAS PAVING BLOCK DENGAN MENGGUNAKAN LIMBAH PLASTIK POLYPROPYLENE TERHADAP KUAT TEKAN *JURNAL TEKNIK* **15** 185-90

[24] Wahidah B F and Saputra F A 2015 Perbedaan pengaruh media tanam serbuk gergaji dan jerami padi terhadap pertumbuhan jamur tiram putih (Pleurotus ostreatus) *Biogenesis: Jurnal Ilmiah Biologi* **3** 11-5
[25] Hariadi N, Setyobudi L and Nihayati E 2013 Studi pertumbuhan dan hasil produksi jamur tiram putih (Pleorotus ostreatus) pada media tumbuh jerami padi dan serbuk gergaji *Jurnal produksi tanaman* **1** 47-53

Recent Progress and Suggestions on Waste Management Strategy in Kalisalak village, Batang regency

ORIGINALITY REPORT

11%	9%	5%	4%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Hendra Arifin, Nurhasan Syah, Eri Barlian. "Waste Management in Kurai Taji Market Sub-District South Pariaman, Pariaman City", IOP Conference Series: Earth and Environmental Science, 2019 Publication	1%
2	docplayer.net Internet Source	1%
3	Aulia, Teuku Budi, and Rinaldi. "Bending Capacity Analysis of High-strength Reinforced Concrete Beams Using Environmentally Friendly Synthetic Fiber Composites", Procedia Engineering, 2015. Publication	1%
4	Submitted to Minnesota State University, Mankato Student Paper	1%
5	Submitted to Poltekkes Kemenkes Riau Student Paper	1%
	dicf.unepgrid.ch	

6	Internet Source	1 %
7	jurnal.uns.ac.id Internet Source	1 %
8	Satwika Desantina Muktiningsih, Tomoo Sekito, Sindi Rahmaudina, Yutaka Dote, Tri Budi Prayogo. "Material Flow and Waste Recovery in a Community-Based Waste Management System in Batu, Indonesia", IOP Conference Series: Earth and Environmental Science, 2023 Publication	1 %
9	prosiding.unimus.ac.id Internet Source	1 %
10	waste4change.com Internet Source	1 %
11	teras.unimal.ac.id Internet Source	<1 %
12	en.wikipedia.org Internet Source	<1 %
13	ejournal.uncen.ac.id Internet Source	<1 %
14	ejournal.insuriponorogo.ac.id Internet Source	<1 %

15	I K Irianto, G Y Arygunartha. "Integrated waste management in the review of technology and environmental law aspects", Journal of Physics: Conference Series, 2020 Publication	<1 %
16	N Citrasari, K P A Pamungkassari, T W C Putranto, N Hamidah. "Paving block with product 1 material as a substitute of portland cement and landfill mining residue", IOP Conference Series: Earth and Environmental Science, 2019 Publication	<1 %
17	Supriyadi, Sugiharto, Edy Suhartono, Sukoyo, Dadiyono, Aqqibaini, Trilaksono. "Analysis of Development Block Paving with Plastic Waste Material Adhesive Leaves", International Journal of Advances in Scientific Research and Engineering, 2019 Publication	<1 %
18	eduvest.greenvest.co.id Internet Source	<1 %
19	journal.unhas.ac.id Internet Source	<1 %
20	journal2.uad.ac.id Internet Source	<1 %
21	journals.ums.ac.id Internet Source	<1 %

22	jurnal.stie-aas.ac.id Internet Source	<1%
23	repository.umy.ac.id Internet Source	<1%
24	www.waste.ccacoalition.org Internet Source	<1%
25	ojs.uma.ac.id Internet Source	<1%

Exclude quotes	On	Exclude matches	Off
Exclude bibliography	On		

Recent Progress and Suggestions on Waste Management Strategy in Kalisalak village, Batang regency

GRADEMARK REPORT

FINAL GRADE

/0

GENERAL COMMENTS

Instructor

PAGE 1

PAGE 2

PAGE 3

PAGE 4

PAGE 5

PAGE 6

PAGE 7

PAGE 8

PAGE 9