

GREEN ENVIRONMENT THROUGH WASTE REDUCE, REUSE, AND RECYCLE IN GREEN VILLAGES OF SURABAYA CITY, INDONESIA

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The waste problem in Indonesia seems to have never seen an end. In addition to polluting the environment, it turns out that the waste problem also threatens the zero-emission target. Based on data from the Indonesia National Plastic Action Partnership released in April 2020, as much as 67.2 million tons of Indonesian waste still accumulates every year, and 9 % or around 620 thousand tons go into rivers, lakes, and seas. In Indonesia, it is estimated that 85,000 tons of waste are generated per day, with an estimated increase of 150,000 tons per day by 2025. This amount is dominated by household waste, which ranges from 60 to 75 percent. This two-fold increase is very likely to occur if there is no firm policy for plastic waste which results in pollution of ecosystems and the environment. As is known, the impact of the waste problem on the environment is very clear. Starting from marine pollution, river pollution, inhibiting groundwater processes, soil pollution, and making water and soil unhealthy for humans and other living things. Not only that, when garbage is on land and then burned, many do not realize that it also causes new environmental damage. Communities that live around this waste-filled environment will also be directly affected, such as a dirty environment, and garbage pollution, which can trigger health problems, one of which is the most dominating respiratory disorder. Other impacts in the form of hydrometeorological disasters can also occur due to the accumulation of this waste. Methane gas produced from unmanaged organic waste will increase global warming (global warming). Currently, the Indonesian government has set a strategic target to reduce the amount of waste entering the oceans by 70% by 2025 (Pranita, 2021).

Surabaya is a densely populated city and produces a lot of waste, so waste management must be modern. At least nine of the 187 temporary waste disposal sites in the city of Surabaya, East Java, currently apply the 3R (reduce, reuse, recycle) concept in waste management. The nine 3R polling stations are located in Karang Pilang, Kedung Cowek, Sutorejo, Tenggilis, Gunung Anyar, Waru Gunung, Jambangan, Bratang, and Osowilangun. The incoming waste is then processed and produces recycled products, compost, and residue. Temporary waste disposal sites with the 3R program are able to reduce up to 60 percent of incoming waste. Surabaya has many achievements in the field of the environment and many other areas which are then studied. Not all temporary landfills have a 3R concept due to land constraints, waste can be sorted from home, and the fleet of garbage transported to the temporary landfills per day also does not mix organic and inorganic waste. The less residual waste that enters the landfill, the costs for waste management will decrease and the remaining funds can be used for community empowerment programs in the environmental sector. For that, it needed a pilot project from the Surabaya City Government so that there is a pilot village, such as Kampung Surabaya Smart City. In addition to the many waste banks that already exist in Surabaya, the existence of this pilot village will strengthen the performance of waste management in Surabaya, especially since Surabaya residents are actively involved in making the city advanced and environmentally friendly (Fakhruddin, 2021).

Surabaya is one of the cities in Indonesia that is considered capable of managing waste properly, through the 3R (reduce, reuse, recycle) program. Not only that, the 3R Program is considered to have become the basis for independent waste management efforts by the community, in order to reduce waste and extract economic value from waste. This makes Surabaya an example of a city whose people are successful in managing waste, thus becoming a role model for countries in the Asia Pacific. The city of Surabaya is an example of a city that has succeeded in managing waste. An indicator of success in terms of waste management is the existence of a waste bank and composting house, so that waste is no longer a useless item, but instead is worth money. Surabaya has experience in waste investment. This includes collaborating with Japan in terms of waste management (Bulelengkab, 2019).

The Surabaya City Government develops green villages to empower the community's economy and preserve the environment. These villages consist of superior villages, tourism villages, the environment, and science. Several villages that have successfully implemented the 3R (Reduction, Reuse, and Recycle Waste) program include (i) Jambangan Village in Karah District; (ii) Pulo Wonokromo Village in Wonokromo District, and (iii) Gundih Village in Bubutan District. Jambangan Tourism Village is located in Karah District, Surabaya. This village is famous in foreign countries because of its leaders and residents who have succeeded in creating a healthy, clean and comfortable environment. The leaders and residents of this village for decades of full awareness have succeeded in managing their household waste. In each RT, garbage depots are placed. Garbage collectors sort waste and group it into a collection bin. There is a tub filled with dry trash. The other tub contains wet garbage. Dry waste in the form of cardboard or plastic is to be sent to the waste bank. Like other commercial banks. Each resident who sends his dry waste will be recorded by an officer, how many kilograms of garbage are deposited into the waste bank. Dry waste trucks every certain period of time will come to the waste bank and take it to the collector for later weighing. From dry waste that is sold to collectors, residents (customers of the waste bank) will receive a certain amount of rupiah. Then the bank officer distributes this profit to every waste bank customer who needs it. Wet waste in the form of kitchen waste and vegetables is then composted (composting) by placing it in plastic drums (composter). Blue plastic composter drums are placed in every alley in the Jambangan Tourism Village neighborhood. The composter is made in such a way with a good aeration system and allows for the development of waste-decomposing microbes. Before composting, the materials were chopped (cut into pieces) first into smaller parts. This is to facilitate microbial activity (decomposers) in decomposing the compost material. By turning the compost material regularly every 2-3 days and inserting a starter (compost seed) that already contains EM 4 (Effective microorganism) then for 2-3 months you can get mature manure (compost) which is ready to be used. as plant organic fertilizer. The residents of this village put compost into polybags (plastic bags) as organic fertilizer for a mixture of growing media for vegetables or ornamental plants. They grow vegetables or ornamental plants in pots or polybags because they are constrained by the lack of land. With their creativity and high enthusiasm, they are able to turn the narrow alleys into an area full of ornamental plants so that the village environment becomes clean, healthy, and beautiful. Invitations or slogans to villagers about the importance of using water resources wisely are also the main programs related to environmental management in this area. Jambangan Tourism Village also plays an active role in participating in the intellectual life of

the nation, this is proven by the establishment of a reading garden (library) for local residents (Smart, 2019).

Pulo Wonokromo, Jagir Village in Wonokromo District, Surabaya, has been transformed into an environmentally friendly village. The village is called the Pertamina Health Safety Security Environment (HSSE) Green Village. The purpose of establishing Pertamina's HSSE Green Village is to create a healthy residential environment as well as to support the Surabaya City Government's efforts to reduce plastic waste. Green Village also empowers the elderly to earn additional income through various developed economic activities. Residents and the elderly are given the training to process and utilize waste in handicrafts or recycled it into goods that have more uses. HSSE Green Village has 3 target groups, namely Wasiat (Residents Ready for Emergency Response), Happy Elderly (Healthy and Beneficial Elderly), and Waste Banks (Kumparan, 2019). Jagir Village is a village assisted by PT Pertamina TBBM (Terminal Fuel Oil) Surabaya Group. This village is full of environmental innovations. Various facilities and infrastructure for environmental management are utilized in this green village, including aquaculture (catfish, tilapia eels, and snails), mushroom houses, domestic wastewater treatment plants, hydroponics, and the processing of patchwork waste into doormats. Patchwork waste treatment utilizes patchwork waste from small and medium businesses in the Perak area, Surabaya. Processing organic waste into compost, liquid fertilizer, and biogas. Compost and liquid fertilizer are used to fertilize all the plants in this village. Meanwhile, biogas is used to cook villagers. Waste bank to process non-organic waste produced by residents. The results from the existing domestic wastewater treatment plants have been used for watering vertical garden plants and for washing motorbikes (Zamroni, 2019).

Gundih Village in Bubutan District is famous for its wet cake and wingko hawker center. This small food business managed by residents is able to survive and become an icon for Gundih Village. In the 1990s, Gundih Village was known as the "red area" or village of thugs. This motivates some people to change. As a driving force for activities, environmental cadres were formed who routinely gave directions to residents to protect their respective environments. The policy starts by sorting waste, prohibiting drying clothes in front of the house, and maintaining environmental cleanliness. Environmental education through daily practices is applied to every level of society to sustainably protect the environment. Gundih Village implements a policy that every additional family is required to provide one manga tree that has been determined in size. The community's efforts to carry out reforestation were also successful. Gundih village now has a sewage treatment plant, a batik center, and biogas production (Melani, 2019).

Bratang Binangun Village is located in Gubeng District. It is called a green village because the residents' houses are filled with various kinds of plants in pots and trees. The village is also categorized as environmentally friendly because it has implemented wastewater treatment technology. Residents have tools that allow them to clean water from sewers and reuse it for watering plants or washing vehicles. The tool is in the form of three parallel pipes that are installed vertically and in a row. Each pipe contains components such as sand, gravel, and pumice to filter impurities contained in the water. Before entering the pipe, the water is filtered in an underground tub. Clean water can be used for the needs of 10 families. The existence of a waste bank in the village is very helpful for the local people's economy. The money collected from the waste bank is then distributed to residents who are

customers or garbage collectors at certain times, such as before Lebaran. In addition to being collected in a waste bank, the villagers also collect waste to be used as handicraft materials (Putro, 2016).

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