

## IMPLEMENTATION OF MOTOR WASH WASTE TREATMENT EQUIPMENT (APEL CITOR) USING THE SIMPLE FILTRATION METHOD AS AN ALTERNATIVE TO MOTOR WASHING WASTE TREATMENT

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### Abstract

Wastewater treatment for small-scale motorcycle washing businesses must be efficient, not require large areas of land, be easy to operate and be economical. Through this study, it is hoped that the community can apply it to the motorcycle washing business through wastewater treatment using a simple filtration method. The method chosen for this community service activity is the provision of material/counseling, discussion, and continued training in making motorbike washing waste processing equipment (APeL CiTor). This activity is specifically aimed at car wash entrepreneurs whose waste has not been treated. The decrease in detergent levels is also caused by the filter media used, namely sand and banana stems. Sand whose nature is in the form of porous, degraded, and uniformity-free grains. With materials that are relatively easy to find, the community (motorcycle wash entrepreneurs) are already able to make APeL CiTor (motorcycle washing waste processing equipment) at their respective business locations. **Keywords:** Motorbike Washing Waste, Simple Waste Processing, Motorbike Washing, Water Quality Improvement

### INTRODUCTION

The growth of transportation means has an impact on the need for vehicle washing places. The development of the motorized vehicle washing business is a promising business opportunity, but there are still many business places that still dispose of their waste without processing it first. Most of the motorized vehicle washing places in Pasayangan Village, Martapura District, Banjar Regency still dispose of the wastewater they produce into the river. Meanwhile, there are still many people in Martapura District, Banjar Regency, who live along the Martapura River, using river water to carry out their daily activities, such as bathing, washing, and other activities.

Motorcycle washing services are needed by vehicle owners, the rates are relatively affordable and more practical than having to wash them yourself. Among the many vehicle washing businesses located on river banks, they still dispose of their wastewater into the river. If the wastewater produced by this motorbike washing business is directly discharged into water bodies or waterways, it will cause pollution to the water bodies due to the content of detergents or ionic surfactants and oil contained in the car wash wastewater (Tahir, 2008). The high content of detergents or surfactants and oil in water bodies will cause a decrease in the quality of water

bodies and cause an unpleasant odor, this is due to the nature of detergents and oils which are difficult to decompose, causing a decrease in the self-purification of these water bodies.

The results of measuring the surfactant content of wastewater from motorized vehicle washing services from previous studies reached 25.32 mg/L (Chrisafitri & Karnaningroem, 2012). Water problems caused by detergents require proper handling so as not to pollute the environment and harm health. According to the Regulation of the Minister of Environment of the Republic of Indonesia, No. 5 of 2014 concerning the quality standard of liquid waste for industrial activities of soap, detergent, and vegetable oil products, the maximum allowable level of surfactant is 3 mg/L.

Wastewater treatment for small-scale motorcycle washing businesses must be efficient, not require large areas of land, be easy to operate and be economical. The need for motorbike-washing wastewater treatment before being discharged into water bodies so that it complies with quality standards, through community service activities (PkM) can be applied to motorbike-washing businesses through wastewater treatment using a simple filtration method.

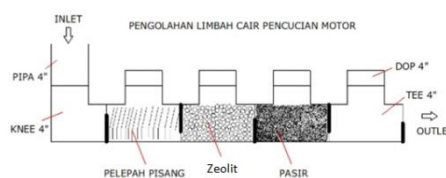
## IMPLEMENTATION METHOD

The method chosen in this community service activity is the provision of material/counseling, discussion, and continued training. This activity is specifically aimed at motorcycle wash entrepreneurs whose waste has not been processed.

In this counseling and training activity, the material provided is regarding river water pollution due to the disposal of motorbike-washing waste and the processing of motorbike-washing liquid waste using simple methods.

To fulfill the target of this community service activity, namely to raise awareness and community participation, especially in processing motorbike washing waste, the method taken to raise awareness and participation of motorbike wash entrepreneurs is through counseling and training activities which are expected to generate creativity and awareness to treat wastewater before discharge into the environment

This motor-washing waste treatment tool is designed in such a way that the resulting wastewater flows through the channel to the processing unit stage. After going through the treatment process, the resulting wastewater is expected to be safe for disposal and distributed to water bodies or the surrounding environment. The motorbike washing waste processing equipment used consists of several rooms as shown in Figure 1 below.



**Figure 1. Motor Wash Liquid Waste Processing Equipment**

The materials used for this tool are natural adsorbents, namely banana stems placed in room 1, zeolite material in room 2, and ordinary sand in room 3. The motor washing liquid waste processing tool is made of PVC material with a diameter of 4 inches a length of 90 cm, and 30 cm high.

## RESULTS AND DISCUSSION

The motorcycle washing business produces waste in the form of detergent solution and lubricating oil as a result of leaks in the motorized vehicles being washed which flow into the water system. byproducts such as oil leaking from motorized vehicles that are washed. Small-scale businesses will certainly not pre-treat the liquid waste from washing but will immediately dispose of it into the water bodies around the business location or gutters and will continue to flow into the water bodies in the rivers around the area or even into the sea.

The presence of detergents in water bodies can damage the gills and respiratory organs of fish so tolerance to low oxygen content due to the presence of detergents in water bodies also decreases (Savarino et al., 2009). If the river becomes a waste disposal site containing organic matter, most of the dissolved oxygen is used by aerobic bacteria to oxidize carbon and nitrogen in organic matter into carbon dioxide and water (Aminudin et al., 2021). Thus dissolved oxygen levels will decrease rapidly and as a result animals such as fish, shrimp and shellfish will die. In addition to causing disturbances to human health, detergent waste in drinking water will cause an unpleasant odor and taste. Cationic detergents are more toxic than other types of detergent if swallowed.

Motor vehicle washing wastewater has the characteristic smell of soap and is cloudy in color. Wastewater is taken directly from the sewer where the motorized vehicle washing business is located, which flows directly into the waterway in front of the business location using jerrycans. Liquid waste generated from motorized vehicle washing businesses generally contains detergents and other waste materials that are harmful to the environment (Mustafa, 2013).

The test results for the detergent content of wastewater from motorized vehicle washes before being processed were 56.74 mg/L. The test results for the concentration of this parameter exceed the wastewater quality standard with a maximum content of 3 mg/L, according to the Regulation of the Minister of Environment of the Republic of Indonesia No. 5 of 2014 concerning the quality standard of liquid waste for industrial activities of soap, detergent, and vegetable oil products.

The high content of contaminants contained in water can result in a decrease in the amount of dissolved oxygen in water bodies. This can cause the biota that lives in the waters to experience a lack of oxygen, and result in a decrease in the vitality of this biota, resulting in damage to the balance of the aquatic environment (Rusdi & Wardalia, 2016). Therefore, the treatment of motorized vehicle washing wastewater so that it is safer to be discharged into water bodies and does not pollute the surrounding aquatic environment is carried out through community service activities.

The motorbike washing waste processing tool that is applied to this service activity can reduce pollutant materials, using banana stem media, zeolite, and ordinary sand, the detergent content can be reduced by 99.89% from the initial level which is down to 0.058 mg/L.

Banana stems are used as filter media in this tool because they contain cellulose and have a high hygroscopic ability. The high cellulose content allows it to be used as an absorbent medium (Nugroho et al., 2015). The hygroscopic nature of banana stems serves to absorb harmful inorganic chemicals in aqueous media (Endahwati, 2012).

Detergent concentration the longer the residence time will decrease the concentration. The result of reducing the concentration of the best detergent parameters reached 91%. The

thicker the variation in the thickness of the banana stem filter media also increases the decrease in concentration. Filtration of wastewater using banana stem filter media is also influential in reducing detergent contamination. Detergent is a molecule attached to the surface and pores of the banana stem vessels. Banana stems have a porous or perforated material structure that is wide enough and has a variety of shapes so that it can accept or filter out large and small pollutant molecules. The surface and structure of the banana stem can attract these organic molecules.

The research results of Arba & Mustafa, (2022) state that banana fronds or stems can be used as filter media because they contain cellulose and have high hygroscopic abilities. The high cellulose content in banana stems allows them to be used as an absorbent medium.

According to Yudo (2010), detergents can dissolve carcinogenic substances, so detergents are very harmful to the environment and health. In addition to disturbing health problems, the detergent content in drinking water will cause an unpleasant odor and taste. The decrease in detergent content was also caused by the filter media used, namely sand and zeolite. Sand whose nature is in the form of porous, degraded, and uniformity-free grains. Where grains of sand have pores and gaps that can absorb and hold particles in water. Can filter dirt, separator floc remnants, and separator iron particles formed after contact with air.

After going through the sand media, the wastewater then flows into the zeolite media, where the zeolite can function as a water softener replacing polyphosphate which can cause ecological damage. This is because hard water is difficult to use for washing. After all, calcium and magnesium compounds react with soap to form deposits and prevent foam from forming in the water. Therefore, polyphosphate is often added to soap production as an additive, but because it is considered to be detrimental to the ecology, polyphosphate is then replaced by using zeolite which can adsorb and also cation exchangers. In general, magnesium and calcium which cause hardness in water will be absorbed and exchanged with sodium ions contained in zeolite so that hard water can become soft.

Besides functioning as a catalyst and ion exchanger, zeolite is also the most effective as an adsorbent media, because the determining factor as a good adsorbent is its pore size which affects the amount of absorption that occurs. Zeolite has special mineral properties, namely the presence of empty spaces that form channels in the structure, this space can trap other compounds into the space, resulting in an absorption process and diffusion of molecules into the free space between crystals, in addition to absorption based on the size of the molecular diameter. a vacuum if there are 2 or more molecules that can pass but because of the influence of the poles and the relationship between the zeolite molecules themselves and the molecules of the substance being absorbed, only one is released while the others are held or rejected, molecules that are more polar or unsaturated will be more accepted than unpolarized or unsaturated.

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## CONCLUSION

From the results of the activity, it can be concluded that educational activities as well as training in making motorbike washing waste processing equipment. The community (motorcycle washing entrepreneurs) can already make it Apel CiTor (motorcycle washing waste processing equipment) at their place of business. It is hoped that the people who take part in this activity will be able to practice and disseminate the knowledge/skills they get to their surroundings.

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