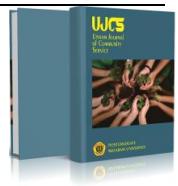
UJCS 5(2) (2024)

Unram Journal of Community Service

https://jurnalpasca.unram.ac.id/index.php/UJCS



Socialization of Environmental Road Maintenance in Settlements with the Application of Biopores to Reduce Water Runoff to the Road Surface

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Received: April 8, 2024
Revised: May 27, 2024
Accepted: June 25, 2024
Published: June 30, 2024

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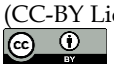
DOI: 10.29303/ujcs.v5i2.610



Abstract: As a result of rapid population growth, the Montong Are area in Mandalika Village, Mataram City experienced a change in land use from rice fields to residential land. The main obstacle faced is inadequate drainage due to the low position of the location and the height of the ground water level. Therefore, water often overflows onto the road surface during the rainy season, hampering traffic and causing damage to infrastructure. Water runoff can be reduced and drainage can be improved with the use of low-tech solutions such as biopores. Biopores outreach and training is needed to build a sustainable housing environment and reduce the negative impact of water runoff on road infrastructure. The stages of socialization activities include: Preliminary Survey; Preparation for implementation; Implementation of Socialization; evaluation stage; and Preparation of Reports and Outputs. The socialization activity began with the delivery of material about biopores and discussion, followed by a demonstration on how to make biopores. The community has been successfully educated about biopores and their function in absorbing rainwater into the soil and reducing the possibility of erosion and flooding. The community was very enthusiastic about taking part in the socialization of biopores making activities considering its benefits for use in road maintenance activities. The knowledge gained can increase public awareness of utilizing this concept as a solution that can be applied to overcome the problem of runoff and flooding on the road surface. So that people can actively participate in the construction and maintenance of biopores around where they live because of the benefits they experience.

Keywords: Biopores; Drainage; Residential Areas; Road Maintenance; Water Runoff.

Introduction

The Mandalika sub-district area is the city of Mataram Hulu which is a residential, plantation and rice field area. One area that continues to grow along with the growth of the population is included in the Mandalika Village area, Sandubaya District, Mataram is Montong Are (Pemerintah Kota Mataram, 2021) The main challenge faced in the development and maintenance of the infrastructure of this area is drainage which plays a role in removing excess water (Nurhamidin et al., 2015) because it is in a low topographic position and high groundwater table.

This area is experiencing changes in land use from rice fields to settlements, a phenomenon that is common in various urban areas. These changes have an impact on the surrounding environment, especially related to water management. Lowlands that previously functioned as rice fields tend to have water flow patterns that have the potential to cause water runoff to the road surface during the rainy season (Warsilan, 2019) This has a negative impact, related to the environment. One of the

How to Cite:
Karyawan, I. D. M. A., Negara, I. D. G. J. ., Yasa, I. W. ., Mahendra, M. ., & Joniarta, I. W. . (2024). Socialization of Environmental Road Maintenance in Settlements with the Application of Biopores to Reduce Water Runoff to the Road Surface. *Unram Journal of Community Service*, *5*(2), 71–77. https://doi.org/10.29303/ujcs.v5i2.610

problems that arises is the increased runoff of water to the road surface during the rainy season. Not only does this interfere with daily activities, but it can also cause damage to road infrastructure (Muliawan, 2019)(Taufikurrahman et al., 2022)

Heavy rainfall in the region causes standing water on road surfaces, which can disrupt traffic due to ineffective drainage systems. In addition, rainwater that is not absorbed properly around housing overflows to the road surface (Timur et al., 2023) This requires efforts to increase public understanding and awareness of the importance of environmental stewardship, including ways to reduce the negative impacts of water runoff.

Awareness of environmental problems related to water runoff to the road surface and its negative impacts on the environment, such as flooding, soil erosion, water pollution, and infrastructure damage to the community needs to be done. Here community involvement is needed in actively participating in protecting the environment with awareness of shared responsibility in road maintenance. In fact, the approach of environmental education to children who are the next generation needs to be formed awareness in protecting the environment (Ismail, 2021).

The application of simple technology such as a biopore system as an artificial infiltration hole to improve groundwater infiltration can be done. This needs to be introduced to the community regarding its benefits in reducing surface water runoff, preventing flooding, restoring groundwater quality, and maintaining environmental sustainability (Arifin et al., 2020) The application of this biopore can be done by practicing making biopores, including the right location, appropriate size, and necessary care. And by providing examples of communities that have successfully applied biopores in road maintenance, residential neighborhoods and get positive benefits from it.

Based on the exposure of problems and alternative solutions to overcome, it is necessary to socialize the maintenance of residential neighborhood roads with the application of biopores to the community in the residential environment of Montong Are Hamlet which aims:

a. Increase public awareness about the importance of protecting the environment, especially related to rainwater management in residential environments.
b. Provide understanding to the public about the concept and benefits of applying biopores as one solution to reduce water runoff to the road surface.
c. Invite the community to actively participate in the construction and maintenance of biopores around their housing.

Thus, through this socialization, it is hoped that it can create a more sustainable and environmentally friendly housing environment, as well as reduce the negative impact of water runoff on road infrastructure.

Method

The implementation method is made with the intention that the socialization of road maintenance of this residential environment can be carried out effectively and have a positive impact on the environment and local community. This implementation method consists of steps to socialize about road maintenance of residential neighborhoods with the application of biopores to reduce water runoff to the road surface, as in Figure 1.

Socialization activities consist of 5 stages, namely: 1) Preliminary Survey; 2) Preparatory Stage; 3) Socialization Implementation Stage; 4) Evaluation Phase; and 5) Preparation of Reports and Outputs. The stages are described as follows:

1) Preliminary Survey

The survey was conducted to obtain field information on the problems faced such as: inundation and rain runoff. Collect data on the location of inundation and rain runoff. Furthermore, summarizing field data and designing ways of extension of absorption techniques with Biopores.

2) Preparatory Stage

Prepare clear and informative material about the concept of biopores, their benefits in reducing water runoff, and steps for their implementation in a residential environment, must be easily understood by everyone who will participate in socialization, prepared by Ir. I Dewa Gede Jaya Negara, ST, MT. The preparation of socialization materials on the function of rainwater runoff infiltration for groundwater and other water sources and the effect of excessive rain runoff on settlements was prepared by Dr. Ir. I Wayan Yasa, ST, MT; Material on the impact of excessive rain runoff on road service life was prepared by Dr. Ir. I Dewa Made Alit Karyawan, MT. Material about the inadequate dimensions of the darinase channel that causes puddles on the road surface is prepared by Dr. Made Mahendra,ST.,MT. Material on the concept and working system of biopores in absorbing water was prepared by I Wayan Joniarta.

Identify who the target audience of this socialization is, such as homeowners, housing residents, government elements within the neighborhood, community leaders, religious leaders, youth organizations, and school students around. Then it is necessary to agree on the schedule and location of procurement with prospective socialization participants. It is necessary to ensure the schedule can be followed by

as many interested people as possible, and the location is easily accessible to participants.

In addition to material preparation, equipment and materials are also prepared to demonstrate how to make biopores. Figure 2 and Figure 3 show the necessary equipment and materials i.e. 4 inch pipe, pipe cover (punched), solder to punch holes in the pipe and lid, saw, T-shaped manual soil drill, crowbar and hoe (Firdaus, 2023).

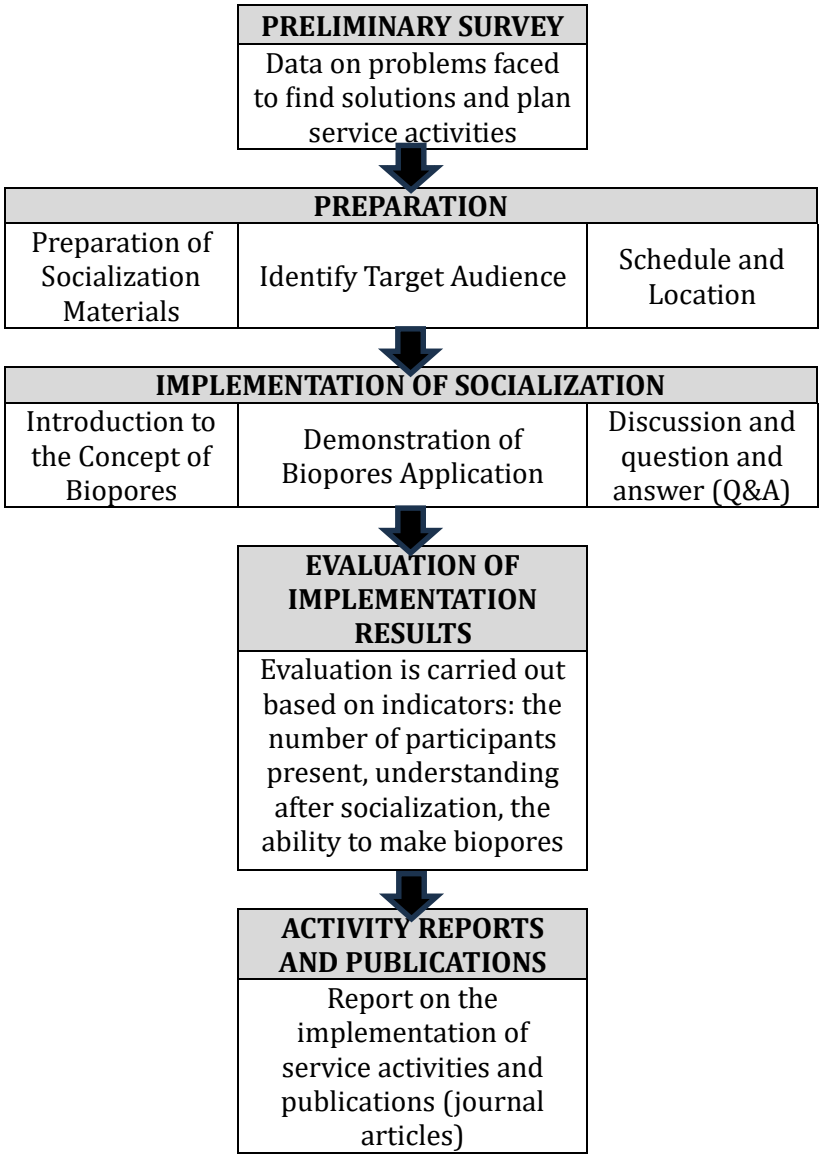


Figure 1. Stages of socialization implementation

3) Socialization Implementation Stage

The socialization began with the presentation of the Biopores Concept. In this section, the concept of biopores is explained, which are vertical holes made in the soil to increase water infiltration into the soil. Explanations of its benefits in reducing road surface water runoff and preventing flooding are given. Previously, material was shared containing information about biopores and the steps for their implementation. It is guaranteed that all participants can easily follow the presentation of material by speakers from the Unram community service team. These materials can be taken home for subsequent handling or duplicated for further dissemination in their environment. Provide opportunities for participants to ask questions and discuss about the implementation of biopores in their environment. Each question must be answered until the participant is clear.

In order for participants to better master how to make biopores, it is necessary to demonstrate the application of biopores with practical examples with the tools needed to make biopores.

4) Evaluation Phase

The evaluation was carried out based on indicators: the number of participant's present, understanding after socialization, and the ability of participants in making biopores according to direct practice during socialization.

5) Report Preparation and Output.

The socialization implementation report is prepared after the socialization activities are completed. The output of socialization activities is a publication written in the form of articles published in accredited national journals.

Result and Discussion

Socialization is carried out after preparation such as the preparation of socialization materials in the form of lectures and demonstrations on how to make biopores. In addition, coordination has also been carried out with local community leaders regarding activity plans regarding participants and activity venues. Other implementation preparations are the preparation of all implementation administrations such as attendance lists, sound system and overhead projectors and light consumption of socialization participants. Another preparation is equipment for making biopores (see Figure 2).

Figure 2. Biopore making equipment

The socialization was held at the meeting hall of Sri Sedana Temple, Montong Are in Mandalika Village Area, Sandubaya District, Mataram. The socialization was attended by 36 people consisting of community leaders, youth and children. Participants were very enthusiastic in participating in the socialization, starting from the time of delivering the material to the practice of how to make biopores (Figure 3), followed by how to install (Figure 4).

Figure 5 shows the delivery of socialization materials. The socialization material was given by the Community Service Team of Mataram University, which was about the introduction of the concept of biopores. Here it is explained that biopores, which are vertical holes made in the soil to increase water infiltration into the soil. It also explains what the benefits are in reducing road surface water runoff and preventing flooding (Khotimah et al., 2022) In the presentation of the material, an interactive discussion was carried out between participants and speakers from the Unram community service team. The discussion is limited to understanding for the purpose of implementing biopores in their environment. All questions are clearly conveyed by participants and answered with descriptions that can be understood by participants. The Unram community service team also provide solutions related to obstacles they may face later during implementation.

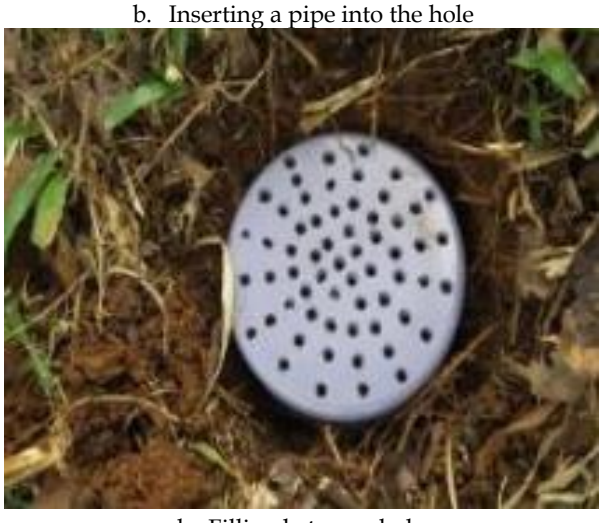
Furthermore, a live demonstration was carried out on how to make biopores in a residential environment. On that occasion also given practical examples and successful application elsewhere by playing videos.

Figure 3. Steps for Making Biopores Described During Training

a. Hole making

b. Inserting a pipe into the hole

c. The pipe is installed



d. Filling between holes

Figure 4. Instructions for installing Biopores start from making a hole, inserting the biopore pipe and installing the pipe cap

Figure 5. Delivery of socialization materials by Unram's community service team

The community who attended the socialization event welcomed the implementation of socialization regarding the maintenance of environmental roads with the application of biopores. One of the representatives of the community stated that the implementation of the socialization results is a very important step in maintaining environmental sustainability, especially in dealing with the problem of water runoff to the road surface. The community is grateful to the Unram community service team for providing an understanding of the concept of biopores and how to apply them so that they can help reduce water runoff which is often a problem in residential environments. The community also appreciates the efforts of the Unram Community Service Team who have initiated this socialization and provided opportunities for the community to learn and participate. The hope is that by understanding the concept of biopores and implementing them in the environment they will not only contribute to reducing the risk of flooding and waterlogging, but also play a role in maintaining environmental sustainability and the quality of our common life.

The implementation of socialization shows success. This can be seen from the results of the evaluation with measurable indicators such as the number of participants present, the level of knowledge before and after socialization, and the ability of participants to explain how to make biopores with teaching aids prepared by the service team. after socialization. In terms of participants, based on the attendance list as many as 36 people, more than previously estimated. The level of understanding before and after socialization can be seen from the questions and the ability of participants to explain while demonstrating how to make biopores as explained by the previous speaker.

Conclusion

Socialization of road maintenance in residential neighborhoods with the application of biopores can provide an understanding of the importance of protecting the environment, especially related to rainwater management in residential environments, as well as its positive impact on road maintenance efforts. By knowing how biopores can help in infiltrating rainwater into the soil and reducing the risk of flooding and erosion, it can arouse public awareness using this concept as an effective solution to overcome the problem of inundation and runoff on road surfaces. Thus, the community will actively participate in the construction and maintenance of biopores around their housing, so

that its application strengthens the effectiveness and sustainability of environmental road maintenance programs.

Acknowledgments
This outreach is part of the activities of the Independent Community Service Program. In connection with this, our community service team from the Faculty of Engineering would like to thank the Institute for Research and Community Service (LPPM) at the University of Mataram which has approved and provided support in various forms so that activities can be carried out well. Thank you to the Montong Are community for their participation in attending the socialization regarding the use of biopores to reduce water runoff onto the road surface

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