

# Artificial Rainfall Aquifer to Supply Clean Water Requirement During the Dry Season in Selengen Village, North Lombok Regency

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**Abstract:** Selengen Village is one of the villages in North Lombok Regency that always experiences drought and lack of clean water every year. The problem of clean water availability is caused by limited water sources on the surface. The frequency of rainwater in Selengen Village is very small and with very low intensity. In order to meet the need for clean water, the community has to pay additional costs to buy clean water or wait for a drop from the government. The Selengen Village community has limited information regarding simple methods that can be used to collect clean water sourced from rainwater. The method used to introduce rainwater capture as a source of clean water is to provide direct outreach to the Selengen Village community about rainwater storage in the form of ABSAH (Artificial Aquifer for Rainwater Savings). The ABSAH method can be done individually or in groups. The socialization was carried out at the Panggung Barat Hamlet office involving the community consisting of farmer groups, community leaders, youth organizations and housewives. The result of the socialization regarding the introduction of artificial rainwater aquifers is the high desire of the community to create rainwater storage, either independently/individually or in groups. In the process of making it, the community hopes to get assistance from the implementation team so that the calculation of the storage volume is in accordance with the volume of water used. Apart from that, the community also hopes to be given drawings of storage designs, installations for collecting water from the roofs of houses and designs of distribution networks to people's homes.

**Keywords:** ABSAH; rain; Network; Clean water; Storage.

## Introduction

Lombok Island is one of the islands in eastern Indonesia which is characterized by low rainfall. Fulfilling multi-sector water needs on Lombok Island relies on surface water sources in the form of rainwater, river water, springs, and water that is stored both naturally and artificially. The problem of water shortages occurs almost every year, especially during the dry season which exceeds its time limit, so that surface water sources dry up. Even more extreme, the provision of clean water is very limited, so social problems often arise, especially disease outbreaks. On a

normal scale, the rainy season occurs from October to March, while the dry season usually occurs from April to September (Meteorology, Climatology and Geophysics Agency, 2014). The timing of these two seasons cannot currently be predicted due to changing global climate conditions. The uncertainty of when the rainy and dry seasons start in Indonesia has the potential to create vulnerabilities and dangers that threaten the lives of creatures in it, one of which is a lack of water.

One of the areas on Lombok Island that often faces a shortage of clean water during the dry season is Selengen Village, Kayangan District, North Lombok Regency. Selengen Village is an area where most

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residents during the dry season have to buy clean water from water traders at a price of Rp. 1600 for 60 liters of water. Where 60 liters of water are used to meet the needs of one person in one day (Julindra, et al, 2017). So residents have to pay quite a lot of money to meet their water needs, so alternative technology is needed to provide more economical water sources to meet these water needs, such as rainwater.

The water source available throughout the year is rainwater. Utilizing the potential of rainwater is part of the sustainable use of clean water on a small scale (Kurnia, 2017). Rainwater can be collected using the Artificial Rainwater Storage Aquifer (known ABSAH) method to meet daily needs. The ABSAH building is an independent raw water supply building which is made by utilizing rainwater which is stored and channeled into an artificial aquifer and then stored in a reservoir or water intake tank (Irhaz & Putra (2021). This building is a modification of the Rainwater Storage (known PAH) building conventional or similar. Conceptually, the ABSAH building has four main components, namely a water intake tank, an artificial aquifer tank, a water storage tank and an artificial aquifer tank containing coarse gravel, medium gravel, sand, crushed red brick, and charcoal, lime and palm fiber. These components make ABSAH have regulatory advantages, both in quantity and quality, compared to conventional PAH (Soenarto, 2003)., 2016).

Selengen Village in North Lombok Regency is classified as a village that has limited water resources. The frequency of rain and the duration of rain tend to be limited and last for a very short time. Likewise, river water is classified as an intermittent river, so the availability of surface water is very limited, namely only available during the rainy season. Likewise, the land texture in Selengen Village tends to be sandy, causing the soil to be very porous and unable to hold water for a long time. In an effort to provide the clean water needs of the people in Selengen Village, it is very important to introduce a household-scale rainwater collection system in the form of ABSAH or PAH, especially to meet clean water needs during the dry season. The rainwater storage system construction system can be below the ground surface or above the ground surface. With the knowledge possessed by the Selengen people, it is hoped that a culture will be created for the Selengan people to make real efforts to address clean water sources by creating rainwater reservoirs, both individually and in groups.

## Method

### *Scope of Activities*

Some of the activities carried out in the socialization include:

### 1. Study of literature

Activities to collect relevant references related to the introduction of rainwater harvesting systems, which can be used as guidelines in developing the design that will be implemented.

### 2. Coordination

Coordination activities are carried out directly with the Selengen Village Head, Hamlet Heads and community groups. The purpose of coordination is to determine the socialization schedule, time and place for the socialization.

### 3. Preparation of rainwater collection system materials for clean water

- a. Preparation of socialization plans and designs
- b. Preparation of socialization modules
- c. Identification and selection of participants
- d. Procurement of materials and preparation for outreach

### 4. Implementation of Socialization

#### *Activity Method*

In order to obtain the expected results and targets, several stages are carried out including:

#### a. Preparation

In order to achieve the expected goals from the results of this activity, the initial stages of preparation and meetings of the service implementation team were carried out.

#### b. Procurement of materials and equipment

Procurement of materials and equipment is carried out by utilizing references available either via the internet or directly visiting shops in the city of Mataram.

#### c. Socialization

The training involves all members of the farmer group regarding training in planning and technical operations and maintenance of rainwater harvesting systems.

#### *Location of Service*

The service was carried out in Selengen Village, Kayangan District, North Lombok Regency. The distance of Selengen Village from the city of Mataram is approximately 40 km and access to the service location is very easy with excellent road access. Location map as shown in the following map (Figure 1).



Figure 1. Location of Activities



Figure 3. Rainwater Flow System to The Storage Tank

## Result and Discussion

### Coordination

Coordination of the implementation of the introduction of the rainwater storage system in Selengen Village, Kayangan District, North Lombok Regency was carried out by involving the Village Head and Mataram University students who carried out Real Work Lectures (KKN) in Selengen Village. Coordination materials include the implementation time, implementation location and the number of participants who took part in the socialization implementation. Based on the results of the coordination, it was determined that the implementation of the socialization would take place in Panggung Barat Hamlet with participants coming from various elements, namely: the Hamlet Head, farmer groups, community leaders, youth organizations and the head of Dharma Wanita.

### Rainwater collection network model

The rainwater that will be collected into the reservoir is collected from the roof of the house. Rainwater from the roofs is channeled into a reservoir using materials such as split paralon pipes and can also use bamboo available at the location. The drainage system is designed simply, where pipes and split bamboo are simply hung with hooks and the slope is adjusted so that it can flow into the reservoir.

### Rainwater Storage Model

Various types of rainwater storage models are commonly used, namely using prefabricated plastic reservoirs, using brick masonry, cast concrete and the simplest one using plastic tarpaulin. In general, the water collected comes from rainwater which is collected through roofs and channeled to reservoirs using pipes or using bamboo. However, in several places far from residential areas, the water collected is surface runoff which is channeled into storage tanks. During the socialization, a model with bricks was introduced which was equipped with a filter tank which functioned to purify the water. The following is a model of an artificial aquifer that was socialized in the Panggung Barat hamlet, Selengen Village.



Figure 2. Rainwater Capture System from the Roof of the Building

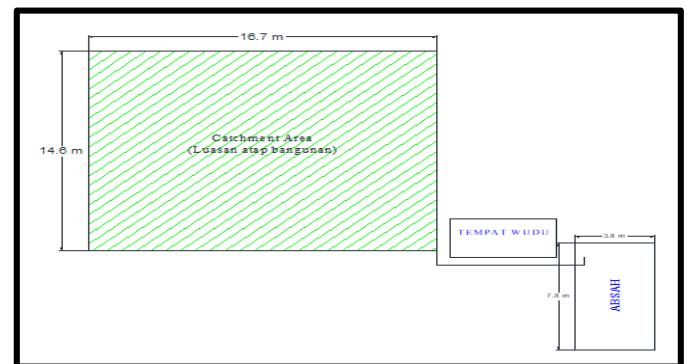


Figure 4. Plan of Rainwater Storage

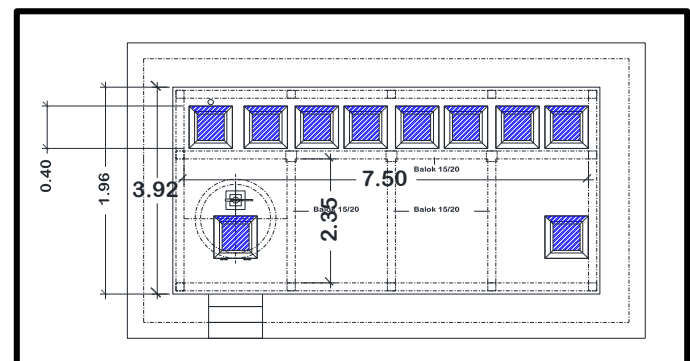


Figure 5. Top View of Rainwater Storage



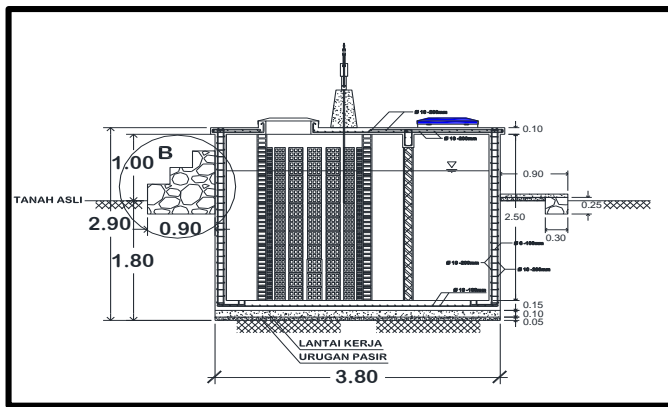


Figure 6. Section of Rainwater Storage

### Utilization of Rainwater Storage

The existence of rainwater storage has significant benefits, especially in areas with limited water sources and low rainfall intensity. During the dry season, surface water from rivers dries up and shallow ground wells experience a decrease in water levels. In these conditions, to meet the need for clean water, people obtain water by looking for water from water sources that are quite far away or waiting for water to be supplied from the government. In drought conditions, the existence of rainwater storage is very useful for providing clean water for daily needs. The provision of clean water from rainwater reservoirs is very dependent on the volume of the water reservoir created. The tamping volume can be obtained from calculating water needs which is a function of the number of people served and the planned length of service time. Collecting or utilizing rainwater can be collected directly using a bucket, using a pump or you can also use a pipe distribution network to people's homes.

### Implementation of the Introduction of Rainwater Storage

The introduction of the ABSAH in Selengen Village was carried out in Panggung Barat Hamlet by involving the Selengen village community, community leaders, youth organizations, grape farmers and Mataram University students who carried out Real Work Lectures. The material presented includes:

1. Rainwater catchment network
2. Design of an artificial aquifer to store rainwater
3. Calculation of rainwater storage volume
4. Utilization of rainwater storage
5. Method for collecting water from rainwater reservoirs
6. Quality of rainwater storage

The community in Selengen District is taking socialization activities seriously and hopes for assistance in the process of making rainwater reservoirs. For the people of Selengen, the use of rainwater harvesting is not only used to fulfill clean water needs but is also hoped

to be used to fulfill the water needs of plants, especially grapevines planted in their yards.



Figure 7. Socialization of rainwater storage



Figure 8. Photo Session with Resource Persons and Socialization Participants

## Conclusion

Based on outreach activities regarding the introduction of artificial rainwater aquifers in Selengen Village, Kayangan District, North Lombok Regency, several things can be concluded that: (1) Rainwater storage in Selengen Village is really needed by the community to meet the need for clean water during the dry season; (2) The use of rainwater storage is not only used for clean water needs but is also used to provide water for plants, especially grape plants in the yard; (3) Rainwater storage can be made individually or in groups; (4) Rainwater can be collected from the reservoir using a pump or channeled by gravity to each resident's house.

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