



Water Resources Management at Raden Intan Islamic State University, Indonesia

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Abstract. UIN Raden Intan Lampung is an Islamic university located at the southernmost tip of Sumatra. The area receives a rainfall ranging between 77-317 mm³ in 2022, and this rainfall must be harnessed and conserved as water reserves for daily needs. The university has a total area of 45 hectares, and it is home to a population of 34,482 individuals. The soil texture in the UIN Raden Intan Lampung campus area is predominantly clay, and the dense soil particles make it challenging to absorb water. Consequently, measures are required to regulate soil moisture levels to facilitate optimal water absorption. One strategy to preserve the water supply on campus is the construction of artificial ponds that capture rainwater. Ten such ponds have been built, covering 21.54% of the total green open space owned. Furthermore, around 8,000 biopore infiltration holes have been installed to maintain groundwater availability and improve soil fertility. The campus also conducts campaigns to promote water conservation and uses water-saving equipment technology. Treated wastewater from ablution activities in mosques is employed for secondary needs such as fish farming activities and irrigation. Ultimately, the preservation of water resources on campus must be sustainable, given the large population of people who depend on water for their daily needs, and ensuring water availability for the future is critical.

Keyword:

Sustainable campus, Water Management, Water Resources, Campus Activity

1. Introduction

Clean water is a resource that must be continuously available related to its primary function for human needs.[1] Access to clean water is vital for carrying out everyday tasks that are necessary for personal hygiene and health[2], as well as for the preparation of food and drinks.[3] Supply of clean water should be available only intermittently, as people require access to it at all times. Therefore, the management and conservation of water

resources are critical to ensure that they remain sustainable and accessible to everyone, now and in the future.[4]

Indonesia's abundant water resources, with around 5700 rivers flowing in the country and 421 groundwater basins originating from it.[5] Despite this abundance, Indonesia is facing a water crisis due to weak water governance.[6] Currently, the country is overly reliant on groundwater, which is being over-exploited without taking the potential of surface water resources. The situation is particularly concerning for Indonesia's Muslim population, who rely on the availability of clean water for ablution, one of the necessary acts of worship for prayer. Muslims in Indonesia perform ablution at least five times a day, making access to clean water essential for the fulfillment of their religious obligations.[7] The importance of proper water management and governance in Indonesia are needed to ensure the sustainable use of its water resources for religious practices and daily needs.

The objective of this paper is to disseminate knowledge on sustainable development practices, specifically with respect to water management, implemented at the UIN Raden Intan Lampung Campus. Universitas Islam Negeri Raden Intan Lampung is one of the largest campus in Indonesia that has a vision as an international reference in the development of multidisciplinary integrative Islamic science and environmental perspective in 2035. Main campus has a width of 45 Ha while postgraduate campus measured in 5 Ha. The main campus of UIN Raden Intan Lampung is located in a sub-urban area with a high level of vegetation. This neighborhood has a dry climate at the early and a tropical wet climate at the end of the year. UIN Raden Intan is located in Sukarame sub-district, Bandar Lampung Regency, which is located at the tip of Sumatra Island.

At 2022, this area received rainfall ranging from 77-317 mm³. Given this condition, it is essential to take advantage of this water and store it in reserves for daily use. By doing so, we can ensure a reliable source of water for our daily needs, especially during times of drought or water scarcity. The UIN Raden Intan Lampung campus area's soil exhibits a clay texture in approximately 35% of its characteristics. The soil particles are tightly packed, which makes it challenging for the soil to absorb water effectively. This can lead to a higher risk of waterlogging and reduced plant growth due to inadequate water absorption.[8] It is important to consider the soil type when planning for planting and irrigation and take necessary measures to improve water absorption, such as soil aeration and adding organic matter.

Considering the soil texture in the UIN Raden Intan Lampung campus area, it is crucial to take measures to regulate soil moisture levels to achieve optimal water absorption. Adequate soil moisture is essential for plant growth and can help prevent issues such as waterlogging and soil erosion. Thus, efforts must be made to maintain the appropriate soil moisture levels through irrigation management techniques, such as drip irrigation and mulching, to minimize water loss and ensure that the plants receive the required amount of water. Proper management of soil moisture can enhance the overall health and productivity of the crops grown in the area.

2. Points of Results and Discussions

2.1. Artificial Ponds

To ensure the availability of water in the UIN Raden Intan Lampung campus area, a practical step taken is the construction of ten artificial ponds to collect rainwater. These ponds serve as a sustainable water source that can be used for various purposes, such as irrigation and cleaning. Covering approximately 21.54% of the total green open space owned, these ponds are an essential component of the campus's water management system.

The construction of artificial ponds involves creating a basin or excavating a suitable area that can hold and retain water. The collected rainwater can be utilized for various purposes, including irrigation of crops, replenishing groundwater resources, or serving as a reliable water source during dry periods or emergencies. Additionally, artificial ponds can contribute to flood control and stormwater management by reducing runoff and preventing waterlogging in surrounding areas.[9]

Overall, the establishment of artificial ponds as a means of rainwater collection provides a sustainable solution to water scarcity by harnessing the abundant resource of rainfall and utilizing it for various beneficial purposes.

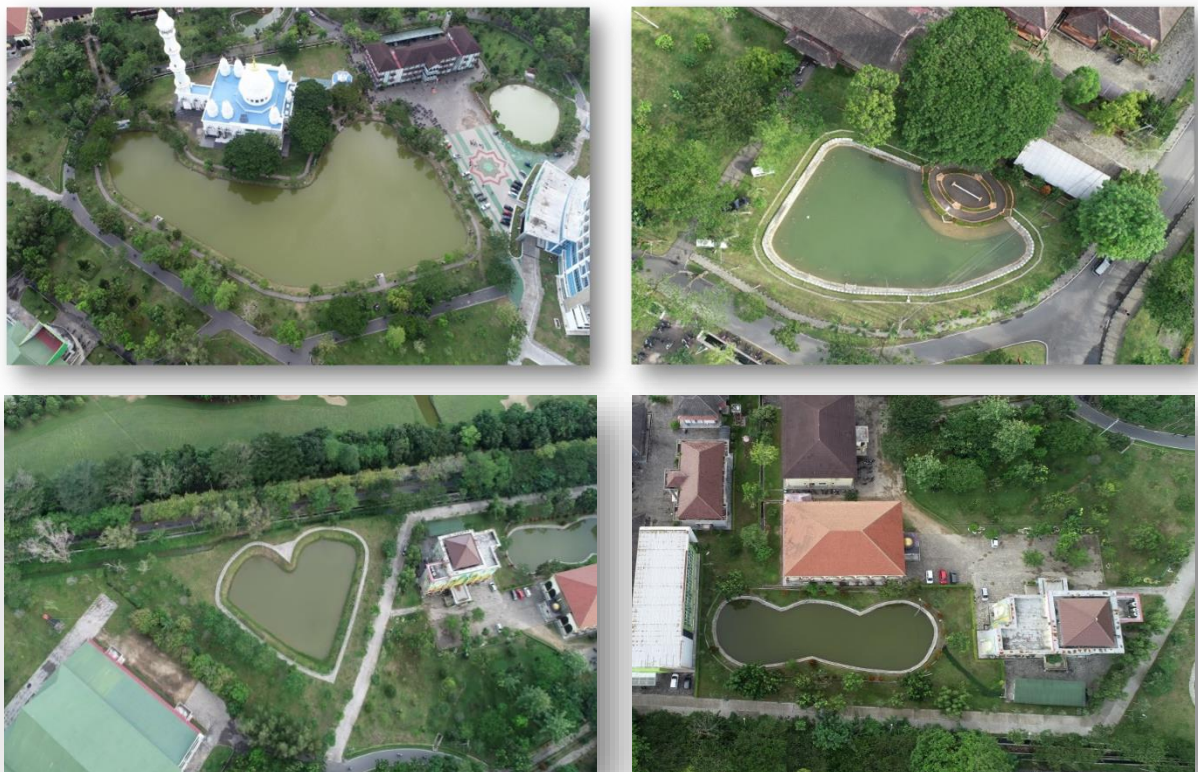


Figure 1. Artificial Pond for Water Conservation

2.2. Biopore Infiltration Holes

In an effort to maintain the availability of groundwater and promote soil fertility, approximately 8,000 biopore infiltration holes have been constructed in the UIN Raden Intan Lampung campus area. Biopore holes, also known as soil macropores, are vertical channels or cylindrical structures that are formed naturally in soil by the action of plant

roots, earthworms, and other soil-dwelling organisms. Biopore holes can range in size from a few millimeters to several centimeters in diameter and can extend several meters deep into the soil. The biopores also facilitate the transfer of oxygen, nutrients, and microorganisms between the soil and atmosphere, promoting soil health and productivity.[10]

Biopore holes can be created artificially as well, by using specialized equipment to drill holes into the soil. These holes can be used for various purposes, such as improving soil aeration, water infiltration, and root growth. In agricultural systems, biopore holes have been used in combination with conservation tillage practices to improve soil health and reduce erosion. The use of biopore holes can also help to sequester carbon in the soil, which can help to mitigate climate change.



Figure 2. Biopore infiltration hole for water

2.3. Water-saving Equipment

UIN Raden Intan Lampung campus is actively conducting campaigns to raise awareness about water conservation and the importance of responsible water use. This approach involves incorporating various water-saving devices and systems throughout the campus infrastructure. Examples of such technologies include low-flow faucets, aerated showerheads, dual-flush toilets, automatic sensor-based irrigation systems, and smart water meters. These advancements help optimize water efficiency by minimizing unnecessary water wastage and improving control over water usage.



Figure 3. Water-saving equipment installed at UIN Raden Intan Lampung

Implementing water-saving equipment technology yields multiple benefits for campuses. It not only helps conserve water resources and reduce water bills but also fosters

a culture of environmental stewardship among students, staff, and faculty. Additionally, reduced water consumption contributes to lowering the institution's environmental footprint, enhancing sustainability credentials, and aligning with broader water conservation goals.

Table 1. Water Efficient Appliances Usage

Appliances	Total Number	Total Water Efficient Appliances	Percentage
Toilet	1.652	508	30,75%
Wastafel	1.790	595	33,24%
Average Percentage			31,99%

Water-saving equipment, including hand washing faucets and flush toilets, has been implemented at UIN Raden Intan Lampung. The utilization of automatic hand washing faucets has led to reduced water consumption within work units. Furthermore, energy-saving equipment has been installed in toilets, allowing for adjustable water usage according to needs. Among the total of 1,652 toilets at UIN Raden Intan Lampung, 508 (30.75%) have implemented water-saving measures. Similarly, out of the 1,790 sinks, 595 (33.24%) have adopted water-saving mechanisms. Overall, the average percentage of water-saving equipment across the campus is 31.99%.

To maximize the effectiveness of water-saving technology, regular maintenance, monitoring, and awareness campaigns are essential. Engaging the campus community through educational programs and promoting responsible water use further reinforces the impact of these initiatives. By promoting these practices, the campus can minimize water waste and preserve this valuable resource for future generations. The intention to protect water resources reflects the campus's commitment to sustainability and responsible stewardship of the environment.

3. Conclusion

In conclusion, the UIN Raden Intan Lampung campus has demonstrated a commendable commitment to sustainable water management through the implementation of various water-saving measures. With a significant percentage of toilets and sinks implementing water-saving practices, the campus showcases its dedication to environmental stewardship and resource conservation. Through these sustainable initiatives, UIN Raden Intan Lampung sets a positive example for other institutions, highlighting the importance of adopting eco-friendly practices in the management of water resources.

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