

Analysis Of The Needs Of The Ilohungayo Village Community In The Utilization Of Sediment As An Alternative Construction Material In Gorontalo Regency

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Abstract

The need for more public knowledge about using local materials encourages an educational approach to introduce sediment as an alternative material for construction materials, either as a substitute for clay in making bricks or as a filling material. This study aims to analyze the needs of the Ilohungayo Village community regarding educational models that can improve their understanding and skills in utilizing dredged sediment from Lake Limboto, as well as evaluating its potential use as an alternative material for basic brick materials and other construction materials. The method used is a preliminary study with a quantitative descriptive approach. The study results showed that only 18.33% of respondents knew or had used sediment, while 81.67% needed to learn sediment utilization. The low utilization of sediment is due to the need for more knowledge and training in the community.

Keywords: Village Community, Construction Material, Local Material

INTRODUCTION

Local materials usually have different characteristics in each region, such as sediment from dredging Lake Limboto. This sediment is a significant concern, considering the potential sediment reaches 1,500,000 m³/year (Alfianto et al., 2020). Based on spatial analysis by Dunggio et al. (2022), around 8.54 million tons of sediment per year enter Lake Limboto, the estuary of 23 rivers.



This abundant sediment is also one of the causes of the shrinking area and shallowing of Lake Limboto, which has the potential to increase the risk of flooding and the emergence of new settlements. Therefore, it is essential to assess the potential of sediment so that it does not become waste that adds to the problem.

The results of observations show that this dredged sediment mainly contains clay and sand and is seen piling up in several places. Based on interviews with coastal communities of Lake Limboto, sediment is generally used only as fill material. Most coastal communities depend on agriculture and fisheries for their livelihoods by selling fish caught from Lake Limboto. The lack of public knowledge regarding the potential use of sediment as an alternative material encourages the need for an educational approach.

THEORETICAL BASIS

Sediment

Sediment is a fragment of material that generally consists of a physical and chemical breakdown of rocks. Particles like this have sizes ranging from large (boulder) to very fine (colloid) and various shapes ranging from round and oval to square. Sediment results are usually obtained from measurements of dissolved sediment in rivers (suspended sediment); in other words, that sediment is a fragment, mineral, or organic material that is transported from various sources and deposited by air, wind, ice, or water and also includes material that is deposited from material that floats in water or the form of chemical solutions (Usman, 2014). Several studies on sediment have been carried out, including:

1. Harun et al. (2023), this study used sediment material that passed through sieve no. 200 as a partial substitute for filler in the asphalt concrete mixture of the wearing layer. The study results showed that the Marshall Stability value of the asphalt concrete wearing course mixture and adding sediment material as a filler was 1259.44 kg. This value is above the limit required by the General Specification of Bina Marga (2018 Revision 2), which is a minimum of 800 kg.
2. Jamaludin et al. (2021) this study utilized river sediment and rock ash as filler materials in the AC-WC mixture. The results obtained from all tests of abrasion values and aggregate adhesion to asphalt, sieve analysis, Marshall parameter tests at 30-minute and 24-hour immersion at a temperature 600 have met the specifications. The durability value for variations in river sediment and rock ash fillers in the AC-WC asphalt concrete mixture with



retina bland 55 asphalt binder, variations in river sediment and rock ash fillers of 75%: 25% of 93.13% have met the specifications. Namely, it must be >90% normal.

3. According to Riyanto et al. (2021), river sediment taken from the East Flood Canal location in Semarang City can be used as raw material for Unfired Bricks. Adding cement and sand to the composition of Unfired Bricks can increase the brick compressive strength test results. The brick composition that produces the highest compressive strength test is A3.2 brick with a ratio of 40% cement, 10% sand, and 50% sediment, producing an average compressive strength of 44.176 kg/cm² at the age of 14 days. The results of the compressive strength test on this composition are still below the requirements for the Compressive Strength of Red Bricks according to SNI 15-2094-2000, where the minimum compressive strength of bricks is 50 kg/cm² but meets the requirements for the Compressive Strength of Concrete Bricks according to SNI 03-0349-1989 for solid concrete brick quality level class III with a minimum of 40 kg/cm² and class IV with a minimum of 25 kg/cm².
4. Hermawati, in Ichsan (2018), the results of the study showed that bricks using Limboto Lake mud sediment have a high water absorption value of 23.67%, for the compressive strength value it has an average of 49.08 kg/cm². For clay bricks, the absorption capacity is around 17.16%, for a compressive strength value of 64.17 kg/cm².

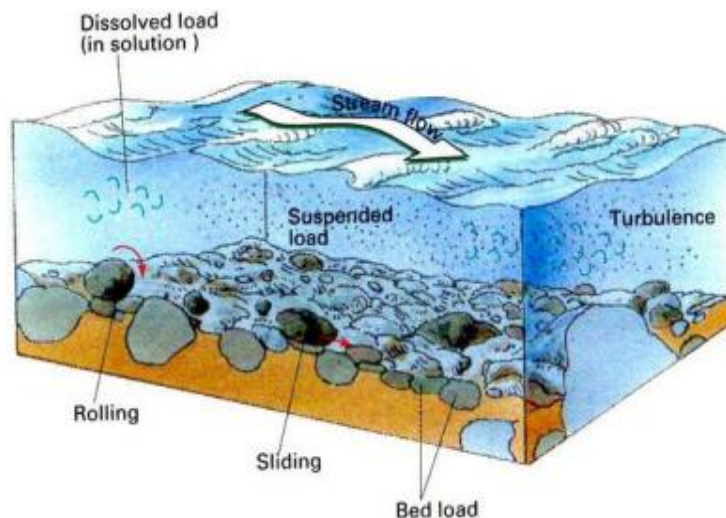


Figure 1. Types of Sediment Substrates at the River Bottom

(Source: Munandar et al., 2014)

Educational Model

Education is a systematic process that aims to transfer knowledge, skills, attitudes, and values from generation to generation through various methods and practices. It occurs not only in formal environments such as schools but also in informal contexts such as homes and communities. Contemporary education also emphasizes the importance of critical thinking skills, creativity, and adaptability to face global and local challenges (Binkley et al., 2022).

Education, also known as education, is any effort to influence other people, individuals, groups, or communities so that they do what is expected by education actors (Notoadmojo, 2023).

Ilohungayo Village Profile

Ilohungayo Village is located in Batudaa District, Gorontalo Regency. Its population is around 1,774, consisting of 901 men and 873 women (<http://prodeskel.binapemdes.kemendagri.go.id/>).

Location and Boundaries of Ilohungayo Village is located in Gorontalo Regency, with the following boundaries:

North: bordering Lake Limboto; South: bordering Pilobuhuta Village and Tontayuo Village, Batudaa Pantai District; East: bordering Pilobuhuta Village, Batudaa District, and West Kota District, Gorontalo City; West: bordering Payunga Village and Dunggala Village, Batudaa District.

Ilohungayo Village covers an area of approximately 819 hectares, characterized by diverse land uses. The village includes paddy fields spanning 30 hectares, which are further categorized into technical irrigated, semi-technical irrigated, rainfed, and tidal paddy fields. The majority of the land is allocated to dry land, encompassing 632 hectares that consist of dry fields and residential areas. Additionally, there are plantation lands covering 105 hectares, which include both community and individual plantations. Public facilities occupy 22 hectares, comprising offices, cemeteries, schools, and other essential amenities. Finally, forest land accounts for 30 hectares, consisting of protected, production, and community forests. This varied land use reflects the village's agricultural practices and community needs, highlighting the importance of sustainable management of natural resources in Ilohungayo Village.

The diverse land use indicates the potential for developing the agricultural sector, plantations, and construction materials from sediments around the lake area. Lake Limboto nearby, in addition to producing freshwater fish, is currently a lake threatened with extinction due to the massive silting process. It also produces sediment from dredging activities. This sediment



has excellent potential to be used as a construction material, and the use of this sediment is very relevant in the context of village development and improving community welfare through environmentally friendly technology.

Human Resource Potential

Ilohungayo Village has a population of around 1,774 people, with the level of education based on the age of Ilohungayo Village people shown in Table 1.

Table 1. The level of education based on the age

Level of education	Male	Female	Total Number
Age 3-6 years who have not entered kindergarten	11	9	20
Age 3-6 years old who attend Kindergarten/Playgroup	27	29	56
Age 7 - 18 years who have never attended school	0	0	0
Age 7 - 18 years who are in school	193	199	392
Age 18 - 56 years who did not graduate from high school	96	103	199
Graduated from junior high school/equivalent	5	55	108
Graduated from D-1/equivalent	39	29	68
Graduated from D-2/equivalent	16	26	42
Graduated from S-1/equivalent	57	59	116
Graduated from Masters/equivalent	2	4	6
Total Number	1.007	-	1.007

Based on Table 1, there is no data on children who have never attended school in the age group of 7 to 18, and the majority of them are attending school, both boys (193 people) and girls (199 people). Overall, 392 children at this age are currently studying.

Among the productive age community (18 to 56 years), some individuals still need to complete their senior high school. Ninety-six men and 103 women have not graduated from senior high school, but more have completed their education up to junior high school level and beyond. A total of 53 men and 55 women graduated from junior high school, while several other individuals also continued their education to a higher level, such as D-1, D-2, and S-1; 116 people have



completed their S-1 education, and six people are pursuing their S-2 education. However, only a few individuals can continue their education to a higher level. Overall, the people of Ilohungayo Village participate in formal education.

METHOD

The research method employed for this community needs analysis is quantitative descriptive research, which encompasses several key components. First, descriptive research is utilized to depict conditions or phenomena in the field without attempting to alter or manipulate the variables being studied. Second, a quantitative approach is adopted, involving the use of a questionnaire based on a Guttman scale as the primary data collection instrument. This approach allows for the calculation of data in percentage form to assess the community's knowledge and experience regarding sediment as a construction material. Third, data collection techniques are employed through interviews, field observations, and questionnaires administered to ten respondents. The responses from these questionnaires are subsequently calculated as percentages to provide an overview of the community's level of knowledge. This structured methodology ensures a comprehensive understanding of the community's needs and perspectives, laying the groundwork for informed decision-making and future interventions.

RESULTS AND DISCUSSION

Results

The results of the analysis were carried out by filling out a questionnaire involving ten respondents to measure their knowledge about the availability and benefits of sediment material from dredging Lake Limboto. The results of the needs analysis assessment can be seen in Table 2.

Table 2. Results of the Small-Scale Response Model Needs Analysis Assessment

No	Statement	Assessment Indicators	
		You (%)	Tidak (%)
1	Are there piles of Limboto Lake sediments around your residence?	20	80
2	Have you ever used the sediment of Lake Limboto?	30	70



3	Did you know that Limboto Lake sediment can be used as a building construction material, for example bricks or embankment material?	30	70
4	Have you ever made bricks from Limboto lake sediment?	30	70
5	Have you ever received training in making bricks from Limboto Lake sediment?	-	100
6	Have you ever seen brick making on you tube?	-	100
	Average	18,33	81,67

Table 2 shows that community knowledge and experience regarding using sediment as a construction material still needs to be higher. Only 20% of respondents stated that they saw piles of sediment around their homes, while 80% did not know or did not see the piles of sediment. Furthermore, only 30% of respondents had ever used sediment and knew that Limboto Lake sediment could be used as a brick material, while 70% of respondents needed to gain knowledge or experience regarding the use of sediment.

In addition, the results also showed that the majority of respondents (100%) had never received training on making bricks from sediment and did not have access to learning through online platforms such as YouTube. This illustrates the need for more intensive education and training regarding the potential and how to use sediment as a construction material.

Based on the survey and interviews, several primary needs were found:

1. Education and Information: Most people need more knowledge about processing sediment into construction materials.
2. Skills Training: Practical training is needed to turn sediment into bricks or other construction materials.

DISCUSSION

The results of this need analysis indicate that the coastal communities of Lake Limboto still need to gain adequate understanding and skills related to using sediment as a construction material. This finding also shows that community awareness and access to simple technology in utilizing local resources still need to be improved. This is further strengthened by the fact that

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most respondents (100%) have never attended training or received information through media such as YouTube, indicating minimal outside educational intervention.

The implications of these findings suggest that the educational model to be developed must encompass several critical aspects. First, there is a need to increase public awareness of the potential of Lake Limboto sediment through socialization activities and direct training initiatives. This will help the community recognize the value of sediment as a construction material. Second, providing easy access to information is essential, which can be achieved through technology-based media such as video tutorials or simple applications that facilitate learning and understanding. Lastly, the integration of practical learning methods is crucial to assist the community in comprehending the technical steps involved in processing sediment into construction materials. By addressing these aspects, the educational model can effectively enhance community knowledge and engagement with local resources, ultimately leading to improved utilization of Lake Limboto sediment in construction practices.

CONCLUSIONS

The research conducted on the coastal communities of Lake Limboto reveals several significant conclusions regarding public knowledge and understanding of sediment as a construction material. Firstly, it is evident that awareness is alarmingly low; the needs analysis indicated that most individuals are unaware of sediment's potential as an alternative material for bricks or other construction uses. Specifically, only 18.33% of respondents reported familiarity with or experience using sediment, while a substantial 81.67% lacked any knowledge about its applications. Furthermore, none of the respondents had ever received training on how to make bricks from sediment. Secondly, the data clearly demonstrate that the coastal communities are in urgent need of a comprehensive educational model focused on sediment utilization in construction. The average responses reflect a significant gap in knowledge and an overwhelming sense of helplessness regarding sediment use, underscoring the necessity for more intensive and systematic education. An effective educational program should encompass an introduction to the potential benefits of sediment, as well as practical guidance on its processing and application, which would greatly empower the community to optimize this valuable natural resource.



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