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Coastal Environment and Ancient Tomb Damage: A Case Study of The Tomb of the King and Hadat Banggae at Majene West Sulawesi Indonesia

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ABSTRACT

The Hadat Banggae Kings Tomb Complex contains 480 ancient tombs. These ancient tombs have been mixed with new tombs, most recently in 1985 the addition of new tombs was stopped. In general, the technique of making graves that is recognized is the technique of connecting in layers and having supporting poles at each corner and having a stone or wooden headstone. In addition, there is also an antero tomb, which is a monolith stone tomb carved into a square shape. Usually there is a hole for a headstone above it. All types of rock that make up the tombs in the Hadat Banggae ondongan Tomb Complex are divided into two types, namely coarse porous coral and fine porous sedimentary rocks. In addition, some tombs use wood for headstone. Of the total ancient tombs, both with and without limbs, there are 68 graves that use wooden graves. The methods are used like field survey, archaeological data collection is carried out by using archaeological survey techniques such as, measurement, and description of damage and weathering at the site. Interviews are used to collect information from the community about the environment, current activities on the site, especially in the grave, headstone, decoration and layout of the tomb, as well as damage caused by human activities. Biological laboratory analysis is carried out in order to identify weathering that occurs in tombs, both stone and wood. Based on the analysis, it shows that tombs made of wood or stone and are in a shady environment are mostly overgrown by microorganisms in the form of moss such as bryopsida and lichens, but the most are bryopsida with a cover percentage of up to 80 percent. The types of microorganisms that grow in tombs such as bryopsida. Moss / true moss (Bryopsida) is a type of moss that has the most amount. Leaf moss are similar to small plants that grow upright about 10 cm high, and some are up to 40 cm. The leaves are small and scattered around the stem. The moss causes weathering both on rock and wood. When these lower plants dry and peel, the surface of the burial material will also come off. This is very dangerous for archaeological data, especially if moss sticks to or grows on the surface of the tomb which contains ornaments or inscriptions.

Keywords: ancient tombs; conservation; lichens; bryopsida; Majene.

1. INTRODUCTION

Indonesia as a country with the longest coastline is 108,000 km; is in second place after Canada. As an archipelagic country, Indonesia has maritime potentials such as marine resources that cannot be doubted anymore. Maritime besides covering the sea, it also includes land such as the coast, ports with all the potential that exists [13].

The Site of the Tomb of the Hadat Banggae Kings Complex is located right on the waterfront, from Majene

Bay. Environment and climate are very influential in causing the destruction of ancient tombs. The tomb complex of Raja Raja Hadat Banggae consists of tombs whose materials are not only made of stone, but some are made of wood. This grave complex has undergone comprehensive archaeological conservation, and is currently under the full supervision of the South Sulawesi Cultural Heritage Conservation Agency (BPCB). The protection of these grave sites is an effort to preserve these ancient tombs as cultural heritage. Protection in the form of environmental preservation measures and several damaged graves. In addition,

several preservation measures and other rescue measures have been taken, such as installing site signage and fences in the tomb complex area [6] [12].

The diversity of human activities, from the first time they were present on earth, left a variety of remains of ancient activities, both on land and in waters. This legacy can be seen from the evidence of activity in order to better understand humans. Much evidence of the results of human activities can be seen in mobility, trade, belief, art, technology, customs, and traces of other human activities in their lives. Various finds of cultural reserves originating from land and water and their relationship have become archaeological discoveries. It takes special handling to handle, so that the evidence can be protected from damage and loss. Because the place or location that is unique to each cultural heritage object is found, handling is also needed in accordance with the findings of these cultural objects [2].

The existence of the Raja Hadat Banggae Tomb Complex at an altitude of 46 m above sea level and also close to the coastline of Majene Bay in the Pangali-ali Neighborhood, Pangali-Ali Village, Banggae District, Majene Regency.

The name on this site is based on the name of a leader in the Poralle area named Banggae. This leader was appointed as Mara'dia Lasalabose daeng Poralle and Banggae who held the position of hadat around the 15th century with the title I Puang Banggae (supreme ruler). This grave complex is intended for the burial of kings or mara'dia and proud nobles who are members of hadat. This grave or complex is thought to have existed during the reign of Daenta Melanto (Mara'dia Banggae II) when Totoli joined the Banggae kingdom. when Totoli joined the Banggae kingdom [10] [6].

As a cultural heritage or archaeological heritage, the number of tombs in the King Hadat Banggae Tomb Complex includes 480 tombs made of stone and wood. Tombs with various decorations with anthropomorphic motifs, flora, geometric symbols, Arabic calligraphy, and swastika symbols. These decorations are generally found around jirat temples, headstones and graves [6].

Conservation actions have been carried out by BPCB Sulseira in the Banggae Raja Hadat Tomb Complex twice, the first time restoration was carried out in 1987 to 1990. This ancient preservation activity was continued in 2014 by the conservation sub unit of the South Sulawesi Cultural Heritage Conservation Center. The concentration of archaeological conservation action activities is carried out on tomb rocks by carrying out mechanical, chemical cleaning to clean moss [4]. Currently, the archaeological conservation of tombs made of wood has not been carried out intensively.

Provisions relating to the protection of cultural heritage objects have been made legally in law of

Cultural Heritage (Undang Undang No 11 Tahun 2010). Philosophically, the law is quite broad, not only limited to objects but also covering buildings, buildings, sites and cultural heritage areas that are on land and / or waters. This cultural heritage unit or group needs to be preserved because it has important values for history, science, education, religion and / or culture through a process of determination. Sociologically, this law discusses ownership, control, transfer, compensation and incentives. Juridically, this law regulates matters relating to conservation which include protection, development and utilization [12].

2. METHODS

Because this research is a historical archaeological study, two research methods are used, namely the archaeological research method and the data collection method. Collection of library data by collecting various literature related to the existence of the tomb sites of these kings, namely archaeological data as primary data and historical data in the form of historical writings, especially those that are directly related to field data or theories and methods to be used. Field survey, archaeological data collection is carried out using archaeological survey techniques, namely direct observation to the field to record archaeological data. Systematic surveys to collect field data with activities such as; inventory, measurements, drawings, aerial mapping, and descriptions of on-site damage and weathering.

Interviews are used to collect oral data to community stakeholders who understand, know about evaluation to get information from the community about the environment, current activities on the site, especially in graves, headstone, grave decoration and layout, as well as human-caused damage.

Data analysis or data processing is about the damage and weathering that occurs at the Tomb of the Hadat Banggae Kings Complex. The first step in site data classification is to categorize the types of damage and weathering of the graves based on the degree of damage. The next step is to identify the level of damage and weathering of the data based on the results of data processing, analogy, and comparison. The results of this analysis can provide an explanation of the causes and anticipation of rescue as cultural heritage objects that need to be saved.

Biological laboratory analysis is carried out to identify weathering that occurs in graves, both rock and wood, which is caused by biological factors.

3. RESULT AND DISCUSSION

3.1 Coastal Environment

Discusses the environment related to the preservation of an artifact, archaeological site. So a

thorough understanding of all matters relating to the preservation of artifacts or archaeological sites. Including the potential damage to artifacts or sites should also be known. The site of the ancient Tomb of the Kings of Hadat Banggae is in a coastal area.

The coastal environment for cultural heritage objects has several potentials that can cause damage. The trigger for damage is due to the interaction between water and wind material (soil). Potential damage caused by dynamic wind and water as well as interacting with cultural heritage objects that are around it will accelerate the damage.

The movement of water and wind that carries salt elements, considering the level of salination of the coastal environment is quite high and the media that carries salt elements or other damaging chemicals. The site for the ancient tombs of the Kings of Hadat Banggae suffered some damage due to the high level of salination (salt).

Besides being able to cause postula on the rock, salt can also corrode, high salt levels can make the rock more brittle, experience degradation.



Figure 1 Physical damage of ancient tombs (Doc. Andi Oddang, 2020)

One of the triggers for the development of damage and weathering of cultural heritage objects is caused by biotic factors. Biotic factors develop more easily if climatological or climatic extremes occur repeatedly in an area where cultural heritage objects are located. Daytime temperatures are high or hot. The rock becomes easier to expand, at night when the air becomes cold, the rock shrinks. Temperature conditions like this have an impact on the rock being broken or cracked [11]

3.2 Damage and Weathering of the Ancient Tomb

After identifying the existing ancient tombs, it was discovered that damage and weathering had occurred

which were divided into two parts based on the tomb's raw materials, namely stone and wood.

Damage and weathering in archaeological conservation are two different things. Damage which means a change in form and or a change in function and does not experience a change in material (damage). For example, if a chair made of wood is broken, it means that it has changed shape, and undergoes a change in function, the two separate parts still have the same material, namely wood. Weathering is a form of damage. Weathering means, changes in shape, accompanied by changes in physical characteristics (disintegration) and changes in its chemical properties (decomposition). Damage and weathering can occur in only one form, it means they occur simultaneously [7].

Mechanical, physical, chemical, and biotic damage occurred. Stone graves are generally in many situations such as open, closed, humid climates that will easily overgrow lichens, fungal growth and also algae breeding. This is what makes the surface of the stone leave a new color that covers the original color. An even worse incident can make the depth of the rock porous. Especially if in humid conditions.

Degradation of materials on cultural heritage objects due to the potential for the environment and climate that carries destructive elements. This destructive factor triggers other damage, such as when the salt content in the rock increases, the salt is carried by water or wind. When the temperature is high, the salt carried by the water enters through the pores of the rock. Salt that has entered the body of cultural heritage objects, if the temperature around the salt is low, then the salt will turn solid in crystalline form. This condition is if the salt has increased the temperature inside the object, then the salt will find a way out through the pore. The pressure of salt will form postules on the surface, a kind of boil or bubble on the surface of the object. If this happens repeatedly and there is no rescue treatment, the postules will break, leaving a trail of holes in the object (see figure 2). The rock surface in the tomb looks rough and in some parts there are holes. Severe cracks in the wall of the mesh.



Figure 2 Physical damage to large cracks in the tomb (Doc. Andi Oddang, 2020)

Biological weathering of the stone tombs, some graves are attacked by moss, algae, lichen, and are overgrown with several lower plants. This condition can exacerbate the damage to those previously damaged, both in the unstable position of the tomb and the feeding condition that tends to have degraded material. Damage to graves that have weathered due to moss [11].



Figure 3. Biological Weathering of the ancient tombs (Doc. Andi Oddang, 2020)



Figure 4 Biological weathering on the stone tombs overgrown with low-level plants (Doc. Andi Oddang, 2020)

3.2.1 Mechanical damage

Mechanical damage to the material is caused by static or dynamic force of the building or force from within the material. These styles can be earthquakes, building pressures/loads, ground instability/foundations that cause deformation, visible symptoms, cracks, slopes, cracks and strain of components or structures of buildings [7].

Vandalism in the form of beatings (in the process of making /forming work) can also result in the cracking of the work or the loss of some material. The scavenging and shrinkage caused by temperature can alter the physical properties of brick materials. Heat fertilization or movement can produce a force strong enough to cause a rift [1]. Fractured objects or wakes can be caused by two things, firstly, the shift in the center of gravity of some building components so that there is a shift in the weight force to achieve a new balance, and secondly, due to a decrease in the carrying capacity of the building. under the structure. The shape of the cracks due to the movement of the structure of the building is usually large at the top and smooth at the bottom [1]. This can happen in both stone and wood objects. In addition, uncontrolled human activity factors can be the most fatal cause of damage to cultural reserves. Observations at the tomb complex showed that 37 headstones had suffered mechanical damage in the form of damage and obliqueness. The observable form of damage is fractures and 7 oblique headstones. The damaged part of the headstone is the trunk on the legs and shoulders, as well as the head of the headstone. In addition, on the headstone part is also found fragments of ornaments.



Figure 5 cracks in the wooden headstone (Doc. Andi Oddang, 2020)

3.2.2 Physical Weathering

The physical symptoms of weathering are observed in the presence of cracks and wear on the surface of the wooden headstone. Observations of the cracks showed small cracks in all the headstones and large cracks in the 36 headstones that were mostly found in the legs. Based on observations, a total of 64 wooden headstones were overgrown with moss. The impact of the growth of fungi is the appearance of stains on the surface of the wood. The resulting stains are white, green, bright green and black. The further impact of fungal growth is to cause weathering. According to the information, the wood used for the manufacture of tombstones is sappu

wood or ulin wood. The environmental condition of the tombstone is 4 meters from the ketapang tree.

The use on the surface of the wood causes the surface to become slippery so that it is no longer visible. Observations on the headstone show the worn part is found on the motif so that the shape and writing on the headstone is not clearly visible. There are nine worn wooden tombstones.



Figure 6 Wear on the surface of the wooden headstone (Doc. Andi Oddang, 2020)

3.2.3 Biotic Weathering

1 Biotic weathering is caused by the activity of living things such as fungi, mosses, and plants and insects that damage wood. Biotic weathering is triggered by high rainfall and humidity conditions [3]. In addition, the position of the wooden headstone that comes into direct contact with the soil affects moisture in the wood. The results showed that biotic weathering was caused by the growth of moss, grass and termite attacks.

3.2.3.1 Termite infestation

Based on observations, there is a wooden headstone that suffered a termite attack on the body of the headstone. This tombstone is in the first sector area.



Figure 7 One of the wooden gravestones that was attacked by termite insects (Doc. Yusriana, 2020)

3.2.3.2 Moss

Based on observations, a total of 64 wooden headstones were overgrown with moss. The impact of fungal growth is the removal of stains on the surface of the wood. The resulting stains are green, bright green and blackish. The further impact of fungal growth is to cause weathering. According to the information, the wood material used for the manufacture of the headstone is Sappu wood (Mandarnese language) or ulin. The environmental condition of the headstone is four meters from the ketapang tree.



Figure 8 Moss on the surface of a wooden headstone (Doc. Andi Oddang, 2020)

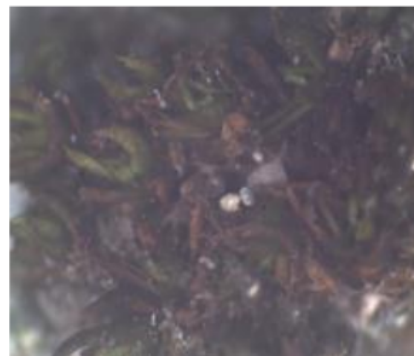


Figure 9 Laboratory identification results of Bryopsida (Source:: Muda, 2020)

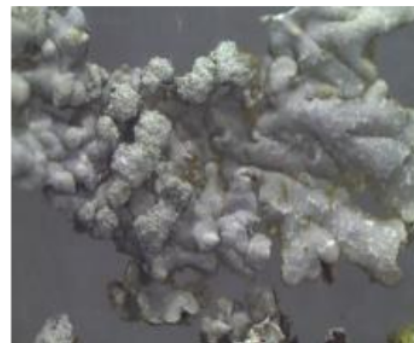


Figure 10 Laboratory identification results of Lichens
(Source: Muda, 2020)

The condition of the Tomb of Raja-Raja Hadat Banggae which has been conserved twice, can generally be said to be in good condition. In the rescue and prevention of damage experienced namely the reduced strength and stability of cultural heritage objects due to age, as well as anticipation of damage caused by the environment, climate, and human treatment safety of cultural heritage objects.

The site of the king's tomb complex, which coincides on the coastline of Majene Bay with a high level of saline threatens corrosion to the rocks of the tomb material, the wood on the tombstone. The extreme environment and climate triggered damage to the tomb complex of these kings.

The environment and climate are seen as causing damage to cultural heritage objects, therefore there must be anticipation, to mitigate the effect. Knowing the main materials are stone and wood that exist in this tomb complex. The treatment in conservation of these two materials is not the same, as it must be adapted to the material of the cultural object and the degree of damage.

When discussing wood, according to Suranto then two terminology that has mechanical power produced by plants. Wood is produced from dichotil known as perdu tree type, while the bayu is produced from monochotil plants, known as from coconut, ruyung, rattan and so on. Wood also contains exactive substances is a substance that makes wood durable [9]. In the wood there is starch stored in the parenkin tissue, and the starch content in this wood will vary every time. Or starch content varies for each wood. As organic wood material is damaged and weathered, various factors can trigger damage and weathering whether it is severe or not. Agencies and factors that spur damage can be caused by a variety of causes. Wood damage caused by microorganism be it fungi, bacteria, termites, beetles, bees, and ants. Wood has pores so that its permeability is able to absorb air and water in the form of pollution. Bacteria in the form of colonies have the ability to be in wood by doing sintas, organisms obtain food intake through penyerapan in the form of a solution. Fungi are small plant-like organisms, have no leaf stems and roots, can only be explored through a microscope, have no kholorophyl [9].

4. CONCLUSION

Archaeological conservation measures are needed to save damaged cultural reserve objects. One of the benefits of antiquities preservation measures, in anticipation of further damage if cultural heritage objects are damaged. The damage suffered at the site of the Tomb of the Kings hadat Banggae is very important as historical evidence. In this tomb complex there is a

tomb made of stone as a whole and some of the other tombs have wooden headstones and jirat made of stone.

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