

Repong damar as a mitigation effort for the ulun saibatin landslide disaster in the regency of Pesisir Barat

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ABSTRACT

The background of this research is that Pesisir Barat Regency is prone to landslides, so that landslide disaster mitigation efforts are needed using the local wisdom of Repong Damar. The purpose of this study was to determine the role of Repong Damar in landslide disaster mitigation. The method used in this study is a qualitative method with a descriptive approach. The results of the study describe Repong Damar's role in landslide disaster mitigation efforts includes the role of the canopy as a water reservoir, thereby reducing the amount of rainwater that reaches the ground. The second role is that large roots will have a grip on the soil which can reduce the possibility of soil movement and increase the shear strength of the soil. The third role, evapotranspiration plays a role in reducing soil saturation, so that water does not accumulate in the impermeable layer. The existence of Repong Damar will minimize the occurrence of erosion, because Repong Damar has woody trees that have strong roots such as damar, duku, petai, jengkol, teak and durian trees.

KEYWORDS

Repong Damar; Mitigation;
Pesisir Barat;

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Introduction

Geographically, the Pesisir Barat Regency is categorized as an area prone to natural disasters, such as landslides and floods. Therefore, the public is urged to increase awareness of the possibility of natural disasters, due to the high intensity of rainfall. The potential for landslides in the West Coast region is quite large. In addition, this district is located in the Bukit Barisan mountain range. Based on the rainfall according to the Meteorology and Geophysics Agency (BMKG), the rainfall in Pesisir Barat Regency is 2,500-3500 mm per year or 140-221 mm per month. Pesisir Barat Regency has mountainous and hilly areas, followed by surrounding valleys with more land slopes (Paski & Pratiwi, 2018).

Landslides that have occurred in the West Coast, among others, according to the Regional Disaster Management Agency of Lampung Province in 2014 occurred several landslides caused by high rainfall. The landslides occurred on 5 February 2014, 23 February 2014, 8 November 2014 and 13 November 2014. The landslides that occurred caused casualties, property losses, and environmental damage (Paski & Pratiwi, 2018). In 2017 there were two landslides. Pesisir Barat Regency is an area that is included in zone I and zone II which is prone to disasters such as landslides and soil erosion. The danger of landslides has a great influence on human survival and always threatens human safety (Herlina, dkk, 2020). Then a landslide in the District of Lemong, Pesisir Barat Regency which caused six people to die who was buried in the soil material, which occurred on Saturday 27 April 2019 (Yasland, 2019). The landslide disaster that just occurred on Thursday, January 9, 2020, was on the West causeway (Jalinbar), Pekon Gedau, Pesisir Utara District. The disaster was caused by heavy rains that flushed the area (Pamungkas, 2020).

Based on the occurrence of natural disasters and the condition of the community that is prone to disasters described above, it is necessary to understand and anticipate, as well as mitigate natural conditions in an integrated manner. One of the forms is through efforts to reduce disaster risk through local wisdom. This means that public

awareness of efforts to reduce the risk of landslides is very important. Local wisdom that can be used to mitigate floods and landslides is Repong Damar. Local wisdom that can be used to mitigate floods and landslides is Repong Damar. Thus the need for this research so that people can understand the importance of the role of Repong Damar in life.

Repong in the terminology of the people of the West Coast is a piece of dry land overgrown with various types of productive plants from various types of wood that have economic value. The income obtained from Repong Damar, especially the damar tree, is used to support the necessities of life such as food and non-food needs. Besides being used as an economic support, Repong Damar can also be used as a natural disaster mitigation. Repong Damar has an important role in restraining the movement of the soil when a landslide will occur. This is reinforced by the reason that roots have functions such as strengthening the soil, providing support to the top soil so as to reduce erosion (Saputri et al., 2015).

The institutionalization of Repong Damar is also inseparable from the role of adat which in Lampung customary law is called balance. It is through this traditional role that Repong Damar develops and becomes institutionalized in people's lives. The process of institutionalizing repong damar uses several stages, namely the first to clear forest land by mutual cooperation. Clearing forest land means building a place for agricultural activities. Anyone can clear land anywhere. This is because all the forests in Pesisir Barat Regency are places that can be used for agricultural activities (Istiawati et al., 2017).

As a form of preservation of Repong Damar, the community is involved in customary law, where if the damar tree is cut down intentionally and carelessly it will be a disaster that befell the logger's family, on the other hand if enriching the damar garden with other plants such as clove trees, durian, jengkol, and so on, then resin gum harvest will increase. With the existence of customary law or government, protection of Repong Damar is not enough, but what is no less important is how the community provides understanding to the younger generation so as not to damage Repong Damar as a source of community life (Herlina et al, 2020).

Research on Repong Damar was researched by Herlina et al (2020) entitled "Local Wisdom of Repong Damar for Landslide Mitigation in Way Krui Sub-district Pesisir Barat Regency Lampung". This study examines the local wisdom of Repong Damar which focuses only on the Way Krui community. From the research that has been researched, the researchers will develop and deepen research by examining more deeply about Repong Damar as landslide disaster mitigation, and the impact of socio-economic resilience of ulun saibat in all Pesisir Barat Regency through the preservation of Repong Damar. Then the researcher will map the wider area in Pesisir Barat Regency, the area used is the relevant area that can be used for research.

Based on the explanation above, the researchers are interested in researching more deeply about landslide disaster mitigation using the local wisdom of Repong Damar. The purpose of this study was to determine the existence of Repong Damar in Pesisir Barat Regency, to find out how to mitigate landslides through Repong Damar in Pesisir Barat Regency.

Literature review

Pesisir Barat

Pesisir Barat Regency is one of the regencies located in the coastal area of Indonesia, precisely in Lampung Province. This district officially became an autonomous region on October 25, 2012 which is the result of the division of West Lampung Regency. The formation of the West Coast District is also based on Law No. 22 of 2012 concerning the Establishment of the West Coast District in Lampung Province. Pesisir Barat Regency has an area of ±2,9707.23 km² which consists of 11 (eleven) sub-districts, including the North Coastal District, Central Coast, South Coast, Bengkunt Belimbing, Bengkunt, South Krui, Karya Penggawa, Banana Island, Lemong, Way Krui, and Ngambur (Seli, 2015).

Repong Damar

Repong Damar is the local wisdom of the Krui Coastal community in sustainable forest conservation. Based on the results of the research, the community does not know for sure when Repong Damar existed and how it came from, what they know is Repong Damar, which has been growing since a long time ago and still exists because of the inheritance system, meaning that it has been passed down from generation to generation. Another opinion says that the damar tree has been cultivated by the Krui Coastal community since the Dutch era about 120 years ago and has become part of the local community's agricultural system through the cultivation of mixed forest trees (damar) with several agricultural commodities, both seasonal crops (such as rice) and other crops. other annual crops (such as coffee, pepper, and fruits) (Herlina et al, 2020). The people of Pesisir Barat Regency, especially those who depend on tree resin, have their own way of preserving Repong Damar, namely with the existence of a forbidden forest, anyone who cuts forest excessively is believed to suffer.

Landslide Disaster Mitigation

Landslides are ranked fifth out of the total number of disaster events that often occur in Indonesia with an average number of events 92 times per year. To reduce the negative impact of landslides, the government and other stakeholders carry out a landslide disaster mitigation program. Mitigation is generally defined as all actions taken before a disaster occurs which aims to minimize the occurrence of a disaster. Building an early warning system for landslides (EWS) and installing ground motion monitoring equipment, building roads with concrete construction, wire gabions, building water channels and strengthening slopes on the right and left sides of the road with concrete materials, are some of the ways the government has taken to mitigate soil disasters. landslides (Setiawan, 2015). Local communities individually and in groups also have strategies in dealing with landslides. One of them is using local wisdom. For example, people in Pesisir Barat Regency use local wisdom from Repong Damar to mitigate landslides.

Methods

The method used in this study is a qualitative method with a descriptive approach. Researchers believe that research questions are very complex and dynamic, so it is possible to obtain data obtained from these sources through more natural methods (ie direct interviews with sources) to obtain responsible answers. Data collection techniques used are observation techniques, interview techniques, and documentation techniques.

The observation activities that we carried out were observations at several Repong Damar points, including Way Krui District, Pesisir Tengah District, Karya Panggawa District. Interviews were conducted using purposive sampling technique. The sources that the researcher will interview include the head of the ulun saibatin custom named Zulfikar (2021) and the owner of Repong Himmir (2021). In this documentation technique, researchers search and extract sources from several journals taken from Google Scholar and accredited national journals, archives taken from the region or through the website digitalcollection.universitaititleiden, as well as using documents in the form of data from the West Coast Regional Disaster Management Agency (BPBD), data from the Meteorology, Climatology and Geophysics Agency (BMKG), and data from Department of Communication and Information of Pesisir Barat Regency.

Data analysis was carried out in 4 stages which include, data collection, namely collecting information from the object of research through data collection techniques. Data condensation, in this process the selection, focusing, simplification, abstraction, and transformation of data, which is found in the field notes or transcripts under study. Presentation of data, in this process the researcher draws conclusions and takes action, including: various types of matrices, graphs, networks, and charts. Conclusion (verification), at this stage the researcher draws conclusions from the results of the study and verified the truth.

Results and Discussion

The Existence of Repong Damar in the Pesisir Barat Regency

According to Zulfikar (2021) as the head of the ulun saibatin custom of Pesisir Barat district, he stated that, damar has existed since the Dutch era, damar is also the only income in the main Krui area compared to rice fields. The history of the existence of Repong Damar was originally a forest, this forest must be protected because the results can be used by the community, especially the product from this resin. In addition, this forest consists of many trees other than resin, such as duku, durian and so on. community is resin (Zulfikar, 2021).

Damar has entered the short distance trade routes in Southeast Asia since 300 years ago. Damar is also thought to have been the first long-distance trade product that developed between Southeast Asia and China between the 3rd and 5th centuries. Damar reappeared in the list of products sold to China from Southeast Asia in the 10th century. Meanwhile, Damar exports to Europe began in 1832 (Harianoto, 2016).

According to historical records, since the 18th century the process of clearing forest land into Repong Damar has been going on, starting from areas adjacent to settlements, then growing further inland until now it has reached the boundary of the Bukit Barisan Selatan National Park (hereinafter abbreviated as TNBBS). The forestry agency then defined and determined the Repong Damar land belonging to the resident as a buffer zone for BBSNP. Physically, Repong Damar looks like a natural forest. According to the results of research conducted by Suparno, that the level of diversity of biota living in the damar forest is approximately 75-85% the same as the virgin forest (original forest). Almost all types of flora and fauna in BBSNP which it supports are found in Repong Damar (Suparno, 2017).

The resin is used for lighting and caulking boats in its producing areas. In traditional history, resin is also traded as incense, adhesive coloring and medicine. In the middle of the nineteenth century, along with the development of the varnish and paint industry in Europe and America, followed by Japan and Hong Kong, resin began to gain new economic value. However, since the 1940s, resin has been faced with serious competition from synthetic resins (a mixture of artificial non-metallic materials and usually derived from organic compounds) as a

result of petroleum processing (petrochemicals) which are preferred by industry (Harianoto, 2016).

According to Himir Sholih as the owner of Repong Damar, in 2006 the price of resin was not as high as it is now, even the price of resin dropped to 15 thousand per kg. This made people less interested in the development of resin, because the income was less than the maximum or not comparable with people's daily needs (Himir, 2021).

According to Zulfikar (2021), the people of the West Coast generally have not paid much attention to it. It should be when someone falls, collapses and so on or is hit by a landslide, replanters should immediately replant it. Now the repong damar has decreased somewhat because the people don't care, but when the price of resin has started to rise, people just care, because the local price of resin is quite high, especially for export, the resin that is exported is in the form of crystal resin, which has been processed, cleaned until it is clear like glass. The price of crystal resin that will be exported can reach 100 thousand per kilo, for ordinary resin sold locally it reaches 35 thousand per kg (Zulfikar, 2021).

Given the increasing price of resin, so that it has a fairly impact on economic progress. The higher the price, the more enthusiastic the community in cultivating and processing resin. Because the impact is not only the owners who feel economic progress, but the people who do not own Repong Damar also feel the economic welfare, because they can work as resin workers or resin harvesting workers. Until now the development of this resin is getting better. The formation of the Repong Damar ecosystem is influenced by the lives of residents around the forest who are very dependent on the existence of Repong Damar. For people who manage forests, resin / gum damar is the main source of income that provides regular income to meet daily family livelihoods, while other Multi Purpose Tree Species (plants with many functions) become side income because they can be harvested only in certain months. According to Lubis, farmers' decision making in choosing the types of plants cultivated in Repong Damar land is based on economic influences (Bhaskara, 2018).

Based on the Decree of the Minister of Forestry No. 47/Kpts-II/1998 stated that the area of Repong Damar covering an area of 29,000 hectares as a Special Purpose Area (KDTI). This decision is an important milestone that for the first time the Government of Indonesia officially recognizes the farming system developed by local communities as a sustainable forest resource management system. Management rights were granted to 16 local indigenous peoples. The total area of Repong Damar is divided into 2 parts, namely 21,000 hectares located outside the area and 8,000 hectares located within the area. According to information from the Head of Forestry Section of the Plantation and Forestry Office of Pesisir Barat Regency, it is estimated that the damar population outside the area has decreased by up to 50% due to the felling of damar trees to sell timber. The quality of the resin wood, which belongs to the meranti species, attracts timber companies to use resin wood as a raw material for the sawmill industry (wood craftsmen). The farming community's need for money also encourages the frequency of selling damar trees for wood use (Anasis & Sari, 2015).

Landslide Disaster Mitigation Process Using Local Wisdom Repong Damar

Risk mitigation is the final stage of the risk management process and provides the methodology of controlling the risk. At the end of the evaluation procedure, it is up to the client or policy makers to decide whether to accept the risk or not, or to decide that more detailed study is required. The landslide risk analyst can provide background data or normally acceptable limits as guidance to the decision maker but should not be making the decision (Popescu & Sasahara, 2009). Part of the specialist's advice may be to identify the options and methods for treating the risk. Typical options would include (AGS, 2000):

- Accept the risk - this would usually require the risk to be considered to be within the acceptable or tolerable range.
- Avoid the risk - this would require abandonment of the project, seeking an alternative site or form of development such that the revised risk would be acceptable or tolerable.
- Reduce the likelihood - this would require stabilization measures to control the initiating circumstances, such as reprofiling the surface geometry, groundwater drainage, anchors, stabilizing structures or protective structures etc.
- Reduce the consequences - this would require provision of defensive stabilization measures, amelioration of the behavior of the hazard or relocation of the development to a more favorable location to achieve an acceptable or tolerable risk.
- Monitoring and warning systems - in some situations monitoring (such as by regular site visits, or by survey), and the establishment of warning systems may be used to manage the risk on an interim or permanent basis. Monitoring and warning systems may be regarded as another means of reducing the consequences.
- Transfer the risk - by requiring another authority to accept the risk or to compensate for the risk such as by insurance.
- Postpone the decision - if there is sufficient uncertainty, it may not be appropriate to make a decision on the data available. Further investigation or monitoring would be required to provide data for better evaluation of the risk. The relative costs and benefits of various options need to be considered so that the

most cost effective solutions, consistent with the overall needs of the client, owner and regulator, can be identified. Combinations of options or alternatives may be appropriate, particularly where relatively large reductions in risk can be achieved for relatively small expenditure. Prioritization of alternative options is likely to assist with selection (Popescu & Zoghi, 2005).

Pesisir Barat Regency is one of the disaster-prone areas because the Pesisir Barat Regency has its own characteristics. Judging from the potential for disasters, Pesisir Barat Regency is an area with the potential for landslides. The entire area of Pesisir Barat Regency is included in the national disaster-prone map, because the northern Pesisir Barat Regency often occurs landslides because the topography of the land has many cliffs and is located on the slopes of the South Bukit Barisan Mountains. In addition, tornadoes, droughts and quite large west winds occurred several times. In addition, the Pesisir Barat Regency is an area that is included in zones I and II, namely zones that are prone to disasters (Basmar, 2008).

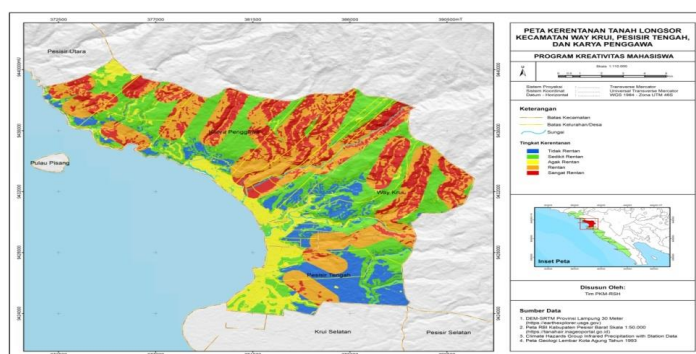


Figure 1. Landslide Vulnerability Map, Way Krui District, Central Coast and Employee Works (Source: Personal Documentation)

Areas that are prone to landslides in this study are Way Krui, Pesisir Tengah, and Karya Penggawa sub-districts. This is because the road is surrounded by mountains or cliffs so that when there is heavy rain for a long time, landslides will occur because the soil cannot withstand the rush of water, so the area needs water infiltration such as suitable trees to prevent landslides. Landslide is one of the natural disasters that often results in loss of property and loss of life, as well as damage to facilities and infrastructure that can have an impact on the socio-economic conditions of the community. An understandable principle is that landslides occur when the driving force on the slope is greater than the resisting force.

On picture 1. Landslide Vulnerability Map of Way Krui, Pesisir Tengah and Karya Penggawa Sub-districts, we can see that each sub-district has a different level of vulnerability. The level of vulnerability in blue indicates the area is not prone to landslides. The level of vulnerability in green indicates the area is slightly vulnerable to landslides. The vulnerability level in yellow indicates the area is somewhat vulnerable to landslides. The level of vulnerability which is yellowish red indicates the area is vulnerable to landslides. The level of vulnerability in red indicates the area is very vulnerable to landslides.

Way Krui, Pesisir Tengah and Karya Penggawa sub-districts are areas prone to landslides, so it is necessary to mitigate landslides by using local plants in the area. In research that has been carried out by the people of Way Krui, Pesisir Tengah and Karya Penggawa sub-districts using Repong Damar in preventing landslides. The existence of RepongDamar will minimize the occurrence of landslides, because Repong Damar has woody plants that have strong roots such as damar, duku, petai, jengkol, teak and durian trees.

One predictor of the cause of landslides is rainfall. Rainwater infiltration into the soil layer will saturate the soil and weaken the slope-forming material, thus triggering landslides. Rain with high rainfall and intensity will provide a higher hazard of ground movement. Rainfall in Pesisir Barat Regency is quite high, ranging from 2,500 - 3000 millimeters per year or 140 - 221 millimeters per month. Way Krui, Karya Penggawa and Pesisir Tengah sub-districts are in line or zone A with the number of wet months >9 months. With high rainfall on this route, there are many streams of water from the top of the hill that lead to the surface which in turn causes landslides.

Rainfall in the range above 3,000 mm/year dominates the study area, this means that the research area is located in an area that has a relatively high average annual rainfall. The area of rainfall in this sub-district is almost the same in every area, with this fairly high rainfall causing this area to have almost the same level of vulnerability when viewed from the rainfall factor. With a fairly small area in this sub-district, it causes rainfall in every area such as areas A, B, C, D, and E to have the same rainfall, which is above 3000 mm / year.

According to Basmar (2018), the entire Pesisir Barat Regency is included in the national disaster-prone map, due to:

- 1) The geographical condition of the area in the west which extends from north to south is directly facing the Indian Ocean so that it has the risk of a tsunami disaster;
- 2) Located on the Semangko Fault plate (Semangko Fault) in the west of Sumatra Island which is at risk of tectonic earthquakes;
- 3) Passed by 13 watersheds (DAS), including: Malaya, Kemala, Tenumbang, Biha, Ngambur, Tembulih, Ngaras, Pintau, Bambang, Pemerihan, MenangaKiri, Pemerihan, and Belimbing so that the risk of flooding is high;
- 4) The northern coast of Pesisir Barat Regency often experiences landslides because the topography of the land has many cliffs and is located on the slopes of the Bukit Barisan Selatan mountains. In addition, hurricanes, droughts and quite large west winds occurred several times. In addition, the Pesisir Barat Regency is an area that is included in zones I and II, namely zones that are prone to disasters.

Mitigation efforts can be carried out in the form of structural mitigation by strengthening buildings and infrastructure that have the potential to be affected by disasters, such as making building codes, engineering designs, and construction to withstand and strengthen structures or buildings that resist landslides, retain coastal walls and others (Suzanne et al., 2009). In addition, mitigation efforts can also be carried out in non-structural forms, such as avoiding disaster areas by building away from disaster locations that can be identified through spatial and regional planning and by empowering communities and local governments (Suwaryo & Yuwono, 2017).

The role of RepongDamar in disaster mitigation is that the first role of damar begins with the role of the canopy as a water reservoir, thereby reducing the amount of rainwater that reaches the ground. Damar is classified as a large tree with a height of up to 60 meters and a diameter of 150-200 cm. Damar also has bark with a thickness of 1 -2 cm which is gray-brown. Resin plants have a crown that is not wide, conical in shape and when the plant is young the arrangement is very tight. However, it will become a little loose and flatten when the tree is old. The crown is the appearance of the entire leaf, branch, twig, flower and fruit. This canopy is used as a water storage which can reduce the amount of rainwater that falls to the ground.



Figure 2. Stems, leaves, flowers and resin fruits
(Source: alamendah.org)

The second role, large roots will have soil grip which can reduce the possibility of soil movement and increase the shear strength of the soil. The root system in resin plants is a taproot whose size is horizontal and its shape is perpendicular. Beside the main root there are small root hairs and there are many in number. When the tree matures, the main root is about 3 meters long while the root fibers can reach 10 meters.



Figure 3. Resin tree roots
(Source: Personal Documentation)

The third role, evapotranspiration. Evapotranspiration is the combination of evaporation and transpiration of plants living on the earth's surface. The liquid that is evaporated by the plants is left to the atmosphere. Evaporation is the movement of liquid into the air from various sources such as soil, roofs, and bodies of water. Transpiration is the movement of fluid in plants that is lost through the stomata due to evaporation by the leaves. In areas with high rainfall intensity, the evapotranspiration process plays a role in reducing soil saturation, so that water does not accumulate in the impermeable layer, and water becomes slip material in shallow landslides.

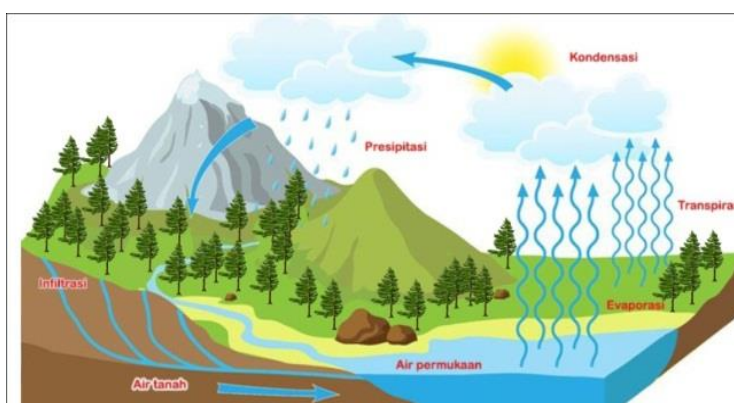


Figure 4. Evapotranspiration process
(Source: Personal documentation)

Based on the results of the study, the attitude of the community in Way Krui, KaryaPanggawa, and Pesisir Tengah Districts towards landslide disaster mitigation is in the very good category. The community believes that disaster mitigation can provide benefits to reduce the risk of landslides. Not all aspects of landslide disaster mitigation efforts are supported by the community, especially those related to meeting community needs. For example, planting trees with strong roots around slopes such as RepongDamar in hilly areas.

The level of knowledge of landslide disaster mitigation by the people of Way Krui, KaryaPanggawa, and Pesisir Tengah sub-districts is in a fairly good category because the people there are very concerned about the preservation of RepongDamar in addition to the source of income for the people there but also for landslide disaster mitigation. Likewise, the aspect of community attitudes towards landslide disaster mitigation is included in the fairly good category because the community is positive about the benefits of implementing landslide disaster mitigation. So, with RepongDamar on the west coast, the majority of which are directly adjacent to TNBBS (South Bukit Barisan National Park). Where with a high level of rainfall is very effective to minimize the occurrence of landslides or landslide disaster mitigation in the Pesisir Barat Regency.

The research area for landslides is in Way Krui, KaryaPenggawa and Pesisir Tengah sub-districts, this sub-district is vulnerable to landslides because it has its own characteristics, namely in the form of lowlands to hills and has a coastline that is directly opposite the Indian Ocean. In addition, the physiographical conditions, which are partly steep hills and the result of the construction of public facilities such as highways that cut the contours, make this area prone to landslides.

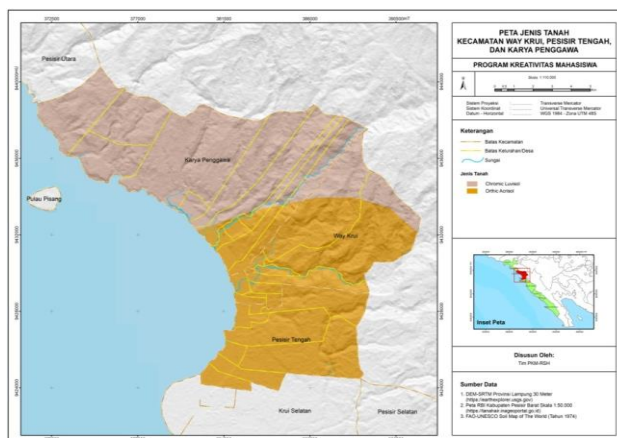


Figure 5. Map of Soil Types in Way Krui District, Central Coast and Employee Works

(Source: Personal Documentation)

The observation areas of Way Krui, KaryaPenggawa and Central Coast districts themselves have Chromic Luvisol and Orthic Acrisol soil types. By looking at the map of soil types in Way Krui, Pesisir Tengah and KaryaPenggawa sub-districts that have been made as well as residential areas which are other factors causing landslides that are prone to occur in the three sub-districts

Various Plants in Repong Damar

1. Resin Tree

Agathis Dammara (Lamb.) Rich. or what is known as a resin tree is a tree member of conifers and is an Indonesian native flora. This plant is widely cultivated for its sap which is then processed into copal. Copal is the result of processed sap or resin that is tapped from the trunk of the resin tree.

The root of the resin tree is a taproot. The shape is perpendicular and the sides are horizontal. The main root is conical in shape and surrounded by many smaller roots. These root fibers can reach 10 meters at maturity and the main roots grow only up to 3 meters. The tip of the root of this tree is protected by a slimy plant tissue. This tissue is also known as the root cap, and the mucus acts as a lubricant for the roots when the roots grow through the soil.

The landslide disaster mitigation process using local wisdom using the Damar tree is very necessary because the resin has strong roots that can reach 10 meters. For people who live in the West Coast area, of course, they really anticipate landslides by planting Damar trees. Damar trees are able to prevent landslides from occurring usually after heavy rains. Due to the steep slopes, the soil cannot withstand the water load so that it will cause landslides. Natural factors and the topology of the local area are the triggers for landslides. This disaster occurred due to the movement of the soil mass, it could be due to rainfall and it could also be because the texture of the soil is indeed loose so it cannot withstand too much load, so the Damar tree is very helpful in preventing landslides.

Prevention can be done with protective plants, such as the Damar tree, one of them. The function of protective plants in land conservation is to seep water into the deeper layers of the soil than the impermeable layer (sliding plane) because the selected protective plants have tap roots and their roots function to support soil particles so that it will reduce erosion on the soil surface.

2. Durian Tree

The durian tree is a type of fruit-producing tree originating from Indonesia, mostly from Kalimantan, Sumatra and the Malay Peninsula. The height of the durian tree is generally around 30 to 40 meters, but in some conditions it can reach a height of 50 meters with a trunk diameter of 2 to 2.5 meters. Durian stems grow upright and have many branches which will later become a place for flower and fruit growth. The durian tree produces fruit that we know as durian fruit. This fruit has a very high economic value.

Durian plants have strong and deep taproots and side roots. Roots like this are good for preventing slope erosion. So that the durian tree is not only used for profit in economic value, but with this type of taproot from the durian tree it is very helpful in preventing landslides, especially in areas where the soil has steep slopes.

3. Duku Tree

Duku (*Lansium domesticum* Corr) is a Dicotyledoneae and gummy plant with a fruit tree shape of 15-20 m high and a trunk diameter of 35-40 cm. On the stems are grooved and sticking high and the bark of the duku stem is greenish-brown or grayish in color and has a white gummy. In addition, the bark is a little thin and rather difficult to remove from the stem. On the surface of the duku trunk there are brown spots, cylindrical in shape, monopodial branching, namely between the main stem and the branches, it is clear from the difference in size, the direction of growth of the stem is perpendicular and the direction of branch growth is inclined upwards. Including strong and durable woody stems. Duku root is a tap, stuck to the ground, this plant is very strong standing upright and sturdy. The roots have many large branches to the ends, namely the root cap or root hairs. Duku roots are yellow-brown in color. Planting duku trees is also very helpful in the economic aspect of the community, but duku trees are also suitable for preventing landslides. This is because its strong roots stand tall and strong.

4. Jengkol Tree

The jengkol plant is a type of wild tree that can grow anywhere as long as it is in accordance with its

habitat. This plant has a height of about 20 m, erect, round, woody, slippery, and has simpodial branches, dirty brown. This jengkol tree is a type of woody shrub that can grow tall. This plant can grow to a height of 20 meters.

The stems of this plant grow upright, round in shape, and dark brown in color. The texture of the bark of this tree trunk feels very slippery. This jengkol plant is known to have a taproot which functions to support the plant body and to absorb nutrients and water in the soil. So that jengkol plants are very suitable for preventing landslides, especially during heavy rains.

5. *Petai Tree*

Petai, petai or mlanding (*Parkiaspeciosa*) is a tropical annual tree of the legume tribe (Fabaceae), the petai-petai (Mimosoidae) sub-tribe. This plant is widespread in the western archipelago. The seeds, which are also called "petai", are consumed when they are young, either fresh or boiled. Petai tree is a chronic, up to 20 m tall and less branched. The leaves are compound, arranged parallel. Compound interest, arranged in humps (typical of Mimosoidae).

The banana plant has a deep taproot and long side roots that are somewhat deep below the soil surface. The flowers are collected on a single head (like a pin), which is called a yellow lump, until it looks like a gadha. Long-stemmed and hanging. These local plant species are the right priority in efforts to prevent and mitigate landslides in areas prone to landslides. Banana plants are able to prevent landslides because they have strong roots.

6. *Teak tree*

Teak tree with the Latin name *Tectonagrandis* is a tree that thrives in the tropical forests of Asia such as Indonesia, Malaysia, India, Thailand, and Myanmar. Reporting from Wood Assistant, *Tectonagrandis* is a species of tropical hardwood tree from the flowering plant family (genus) Lamiaceae. Teak trees can grow about 40 meters with a trunk diameter of up to 1.5 meters.

Teak trunks produce hard, water-resistant, oil-containing wood so they can avoid rotting caused by fungi and bacteria. Teak trees have small, colorful flowers that grow at the ends of their branches. Teak flowers can produce reddish-green fruit with a diameter of 1 to 1.5 meters. In addition to towering tree trunks and large leaves, teak has other special characteristics. Namely, teak trees shed their leaves during the dry season. The larger the leaf surface area, the greater the evaporation that occurs in the stomata (Silmi, 2021).

In the dry season, large evaporation will cause trees to lack water. The purpose of teak trees to drop their leaves during the dry season is to drop their leaves during the dry season to reduce evaporation. This is a form of adaptation of teak trees to survive in dry soil due to drought. This teak tree plant is also a plant that can help prevent landslides because it can. Teak wood produces hard, water-resistant wood.

Conclusion

The role of Repong Damar in disaster mitigation is that the first role of damar begins with the role of the canopy as a water reservoir, thereby reducing the amount of rainwater that reaches the ground. The second role, large roots will have soil grip which can reduce the possibility of soil movement and increase the shear strength of the soil. The third role, evapotranspiration. In areas with high rainfall intensity, the evapotranspiration process plays a role in reducing soil saturation, so that water does not accumulate in the impermeable layer, and water becomes landslide material in shallow landslides.

In research that has been carried out by the people of Way Krui, Pesisir Tengah and Karya Penggawa sub-districts using Repong Damar can help in mitigating the prevention of landslides. The existence of Repong Damar will minimize the occurrence of landslides, because Repong Damar has woody trees that have strong taproots such as damar, duku, petai, jengkol, teak and durian trees.

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