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# ERGONOMIC ENVIRONMENT PREVENTING ACCIDENTS FROM NATURAL DISASTERS

By

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## ABSTRACT

Life and human life are in the natural environment. In nature can not be separated from natural disasters. Risks so as not to be overwritten by natural disasters require preventive measures. This paper discusses about the ergonomic environment as a measure to prevent accidents due to living and doing activities in nature on sloped land. This scientific writing design uses descriptive by presenting several opinions or research results. Methods of data collection using literature study. The inference method is done using deductive. Conclusion: a). The slope of the slope has a very significant effect on soil damage, including causing landslides, so that a slope of 0 -7 degrees is flat and very sloping land, the best for settlements and a slope of 7 - 15 degrees is sloping land, not dangerous for humans to build settlements, only requires soil hardening/accompaniment treatment. b). Ergonomic natural environment is a deep ecosystem shaping the terrestrial and aquatic environments to create within human and natural boundaries so that the natural work environment makes human activities safe, secure, comfortable, and healthy in life. Suggestion: It is hoped that the community will pay attention to ergonomic conditions, harden or provide hard assistance on sloped land, and avoid living on steep and steep slopes, so as to avoid the risk of landslides

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## 1. INTRODUCTION

Becoming a victim of a disaster is highly undesirable for all human beings. Disaster is an event or series of events that threatens and disturbs community life and livelihood. The disaster was caused by natural factors as well as factors non-natural and human factors resulting in human casualties, environmental damage, property loss, and psychological impact. In that sense, necessary to uncover natural disaster prevention of slope of the land with attention ergonomic environment.

As Suharko (2014) stated that "an environmental disaster caused by human intervention on nature, especially through industrial activities such as production, consumption and utilization of other natural resources. Therefore, disaster environment is an inherent part of modernization and environmental disaster is consequence of modernization".

In line with that, Robi (2020) revealed that "according to some root experts The problem of a hydrometeorological disaster is an environmental issue. You can see the rate of deforestation (logging activities in the forest) of 1.5 million hectares per year in Indonesia. Then 2,145 watersheds (watersheds) were damaged, and the status of rivers in Indonesia polluted by domestic wastes. This is an issue of concern, many catastrophic incidents that have occurred recently are the result of this without us realizing it have a long-term impact,

if not paid attention to it will have an impact dangerous for future generations.”

Natural disasters can have a devastating impact on the economy, social, and environmental. Damage to infrastructure can disrupt social activities, cause life, damage to ecosystems, and loss of shelter. As Decky Dwi Utomo, et al (2022) stated that "based on the research results it was concluded that it was stored various potential disasters. Disaster potential is seen based on past disaster events occur and other possible catastrophic events, disasters can also stop the flow the economy, especially for the victims, even though it is temporary, especially those with an impact significant losses reaching trillions of rupiah.

In order to prevent being a victim of nature (disaster), it is necessary to create an ergonomic environment. Ergonomic environment is very concerned about the physical environment, chemical environment and biological environment. Because each environment has a threshold value (NAV/*tashold value*) as well as quality standards. This is according to human and other biological limits/limitations, so that humans can live a healthy life. In this case the physical environment of the slope of the land needs to comply with the permissible thresholds/conditions.

## 2. METHODOLOGY

This scientific writing design uses descriptive, namely presenting several opinions or research results and then analyzing and drawing conclusions. The explanation is about the ergonomic environment, especially on the slope of the land for settlements and living activities. The data collection method uses a literature study, namely some qualitative data from various research opinions. The inference method is done using deductive.

## 3. RESULTS and DISCUSSION

### 1. Ergonomic Environment

The natural environment itself is divided into two, namely land areas and water areas. Both are equally created naturally. Terrestrial environments are on land whereas the water area is in the water. In line with that Jevi Nugraha (2015) said that "The natural environment consists of two types of ecosystems in its formation, namely the terrestrial environment and water. The environment in the mainland is divided into several types, such as hills, mountains, valleys, and others. Meanwhile, the environment in the water area includes rivers, seas, lakes, and rivers swamp". The author conducts an analysis and discusses that nature is used for living activities humans, so that attention is paid to an ergonomic environment. Because ergonomics is the study of motion/activity (*ergo*) and *nomi (nomos)* in nature. Create a natural state in terrestrial and aquatic environments.

Ergonomics is a way to create a work environment (movement/activity) that pay attention to the safety, comfort, and health of community activities. In a word In other words, ergonomics is a branch of science that aims to learn about the ability and human limitations, to then be applied to increase the interaction of people with product, system, and environment.

Sonny Mulaksono (2018) said that "according to the central health department work of the Ministry of Health of the Republic of Indonesia, the notion of ergonomics is the science that study human behavior in relation to their work. Science goals This relates to equipment and workplaces as well as the environment. Also, Herawati Taan (2007) says that "ergonomics is a scientific study of the relationship between humans and their work environment".

Therefore, humans work activities not only in a work environment that is limited by space, but also activities in a natural work environment. Human life in the world is in *environment* their respective All equipment is in the environment. The equipment used by the activity or not used by the activity is in the environment. A healthy environment, the people in it also become healthy.

To create a healthy environment, you must first understand how many types of environment there are. Because each environment has a threshold value (NAV/*tashold value*) as well as quality standards. NAV and quality standards are made according to research results. In accordance with human and other biological and natural limits/limitations. So that humans and other biology can live healthy and nature is maintained.

There is a physical environment, chemical environment and biological environment. If everything is in accordance with the NAV and quality standards, check that it is in an ergonomic state. Because all living things that inhabit nature can live and live comfortably within its limits. NAV and quality standards which are the limits of creature life and natural limitations. It can be seen in the NAV table and quality standard provisions.

In fact, keeping biological creatures alive is *sustainability*. This means that *sustainability* is keeping/making creatures live. Not extinct in nature. Creatures in this natural environment live healthily within their limitations. Not poisoned, is a safeguard for survival. Ergonomic conditions are environmental arrangements that must be adjusted to the limitations/limits of human life and natural boundaries. Tools and nature must also be adapted to the limitations/limits of human and natural abilities.

Ergonomic conditions, humans are very dependent on tools and the environment. Therefore the ergonomics



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approach is that tools and the environment must be adapted to human limitations and other biological and natural limitations.

## 2. Ergonomics Disaster Avoidance of Land Slope

Humans are in a natural environment. In the natural environment (*environment*), humans use tools/equipment (*equipment*) to work, do activities, and live. Such condition or position or performance. All humans are influenced by tools and the natural environment. Indeed, many natural damages are done by humans, such as from the impact of development. It can be said that natural disasters affect humans. However, the destruction of nature will also have an impact on human life. Therefore, in order for humans to be in an ergonomic state, namely to move naturally, the tools and natural environment that are made must be adapted to humans. Not a human adapted tool.

To be adjusted by humans, it is necessary to know the limitations (threshold value) of humans. Besides that, they also know the quality standard. In order for humans to live, stay safe, not get hurt, and stay comfortable. One that exists in nature is the slope of the land slope area. Mahmudi et al (2015) said that "the slope or slope is the ratio between the difference in height and distance". The slope of the land is used for human settlements and human life is very safe, safe and even dangerous. See table 1 below.

Table 1. Slope (Map Vision Indonesia, 2021)

Kelas	Kemiringan (Nilai Dalam Derajat)	Kemiringan (Nilai Dalam Persen)	Klasifikasi
I	0-2	0-2	Datar
II	2-4	2-7	Sangat Landai
III	4-8	7-15	Landai
IV	8-16	15-30	Agak Curam
V	16-35	30-70	Curam
VI	35-55	70-140	Sangat Curam
VII	>55	>140	Terjal

A land slope of 0 - 7 degrees is flat and very sloping land, the best for settlements. Why? Because the ground will not slide. At least the slope of the land is 7-15 degrees, gently sloping ground, not dangerous for humans to build settlements. Not easy to slide. Even then there must be lots of plants. (except hard ground like rock). Need hardening of the ground (foundations, walls and others). In order to be able to hold the ground, not landslide. The slope of 15 – 140 degrees of land is rather steep, steep, and very steep, there is a high risk of landslides, a risk of disaster. It is also best to avoid living on steep ground 1> 140 degrees.

When living on land that is rather steep to very steep, landslides will definitely occur. So, humans are at risk of accidents and even death. The existence of natural events in the form of rain, earthquakes, or whatever nature moves, will make natural events happen to humans like that called a disaster. Therefore, the natural environment and tools follow *the treatment* made by humans. *Treatment* of nature and tools adapted to human limits, that's ergonomics. Approach to the concept of ergonomics, will make life safe, accident-free and comfortable.

The slope of the slope of the land affects the occurrence of soil damage. As Mujiyo et al (2021) stated that "slope slope has a very significant effect on soil damage, land with a slope of 26-40% has a soil damage score significantly higher than 0-8% and 9-15%. Soil volume weight and porosity are determining factors for soil damage, land with a high soil damage score has a high unit weight and low total porosity..

The slope area has a landslide hazard impact. As according to Kuswaji Dwi Priyono et al (2015) gave the conclusion of his research, that "the impact on the slope area of Mount Merapi: landslide hazard level, moderate landslide hazard level, high landslide hazard level, and very high landslide hazard level which is large its area can reach 16.174 km<sup>2</sup>.

When humans do not understand the behavior of nature. There was an error in the treatment of the natural environment and the tools that were made. Surely at one time will harm the man himself.

## 4. CONCLUSION

- The slope of the slope has a very significant effect on soil damage, landslides, so that a slope of 0 - 7 degrees is flat and very sloping land, the best for settlements and a slope of 7 - 15 degrees is gentle, not dangerous for humans to build settlements, only requires hardening treatment /land assistance. This is a precautionary measure so as not to be hit by a disaster due to the slope of the land.
- Ergonomic natural environment is an ecosystem in the formation of the environment land and water to create

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within the limits of humans and nature so that the environment nature's work makes human activities safe, secure, comfortable, and healthy in life.

## 5. SUGGESTIONS

It is better for the community to pay attention to ergonomic conditions, harden or provide hard assistance, and avoid living on steep and steep slopes, so as to avoid the risk of landslides.

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