



Gray Alluvial Soil Management as Elite Housing



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1. Introduction

Of all the global environmental problems, soil infertility is, perhaps, the most threatening formidable issue for poor rural people. Soil infertility itself is defined as the result of a physical or chemical problem in the soil that inhibits or prevents the growth of plants. Soil with a poor physical structure can limit your plant's access to oxygen and water, while chemical problems are the result of an imbalance in the naturally occurring elements in your soil.

If a soil is infertile, farmers and people who works in the agriculture would experience loss and even cannot survive in this daunting world. Therefore, these type of soils that are infertile needed to be utilized in another more effective way so that people can make full use of these soils.

From all of the different type of soils in this world, including topsoil, peatland, alluvial soil, and many other types of soil, alluvial soil is one of the type of soil that can be fertile or infertile when placed on some certain locations. We can know directly where it is placed by seeing the color of the alluvial soil. If the color is gray, it means that it is placed on some rice fields, but if its color is dark brown, the soil is located on anywhere but rice fields. However, the alluvial soil that is infertile usually has a low level of nutrient and has a clay to hard structure. Its pH level is lower than 6.5, it is strong when humid and hard if dry. The characteristics of this soil type depends on what material forms the sediment.

In general, this land has either a rough or a smooth soil texture. Sedimentary land which is on the edge of a river or lake has a smooth texture, whereas sedimentary land in the river flow has a rough texture. This happens because there are many rocks that are carried by the river flow. The texture owned by alluvial soil does not significantly affect fertility. The most influential factor is precisely the matter of forming soil deposits. Meanwhile, on the West side of Surabaya which is an area like hills, the land contains a lot of lime (chalk) that is high and not good if used as agricultural land. This means that the alluvial soil that is located in West Surabaya can be included as infertile and because of that, as an example regarding this issue, this research will be focused on the infertile alluvial soil in Citraland (*Singapore of Surabaya*).

Citraland or so called as *Singapore of Surabaya* was built since 1993 with a tagline "The Singapore of Surabaya - Living a Clean, Green, and Modern City" located at Surabaya, East Java. On 2003-2004, they set a sales record in the Ciputra Group by earning Rp. 850 billion in revenue. Until 2010, from 2,000 hectares, 850 hectares had been developed with a population of 5,000 families or around 24,000 people. The majority of residents are productive age, a combination of business people and professionals. Generally they didn't only buy houses, but also facilities and infrastructure.

However, in this world not only soil infertility that is a thread to citizens but also housings or so called as a place to live. Poor people, especially those poor rural people, are really struggling to even find a place to live. But of course everyone knows that building a house costs a lot for poor rural people, not to mention that the quality of the facilities aren't that good either. Not only that, elite housings are also one of the most damaging environmental problems in this world since it should've been used to plant trees and that it has extremely high prices that can affect other housing's prices.

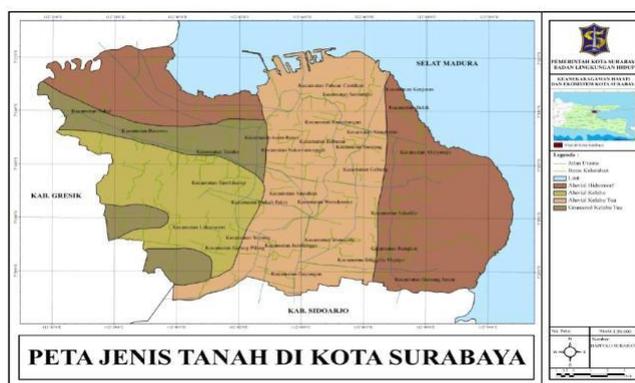
By that, this research delivers the reasons why houses nowadays are extremely expensive, what type of soil do they usually use, some processes of elite housings, Citraland's management and the most important thing is to find out the process of the gray alluvial soil management as elite housing.

2. Research Method

The methodology that is used is the study literature methodology where the researcher gathers up informations from researches and journals that are related to alluvial soil and its management which the content will later be connected to some theories and informations about elite housing and the economy of Citraland in order for this research to be filled with facts to support and strengthen the existing arguments. In general, the study literature methodology is a way to solve problems by tracing the writing sources that have been made before.

In order to finalize this research, the processes of the utilization of alluvial soil until it becomes elite housing, the price difference between several areas in Citraland, maps, supporting statments, facts regarding the disadvantages of building elite housings and so is the reason why some areas in Citraland have price difference are going to be inserted.

3. Results and Analysis



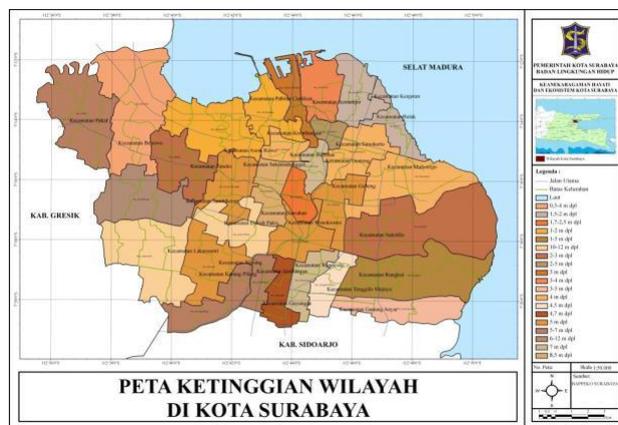
The map above shows the areas that are included as the gray alluvial soil, the dark gray alluvial soil, and many more. It can also be seen there that Citraland's sub-district where we live in, the Lakarsantri sub-district, is covered by the gray alluvial soil. This proves that the soil in most areas in Citraland is indeed the gray alluvial soil.

It has been said that the alluvial soil is actually a fertile soil if its location is at the mountains. However, since the alluvial soil this research adopt is located at Citraland which now has been processed into elite housing, this infertile alluvial soil has a low level of nutrient, a clay-structured soil, below 6 pH level, and has a gray color. Alluvial soil have different characteristics depending on the location of the sediment. Because of that, it can also be utilized efficiently according to its location. However, in Citraland, alluvial soil are included as the infertile soil. So, the question is, how can it be utilized to form those elite housings?



Firstly, understanding the slope of Surabaya, especially West Surabaya is very important. It is the foundation of knowing the later processes on how the soil is being managed. The map above represents the geomorphology of Surabaya. Geologically, the Surabaya area is basically formed from rocks which are clay and sand. The soil condition in Surabaya is mostly in the form of alluvial landforms that occur by river deposits or coastal deposits which are generally very fertile and suitable for agricultural areas. But as it has been said earlier that on the west side of the city which is an area like hills, the land contains a lot of lime (chalk) that is high and is not suitable if used as agricultural land.

The soil arrangement in Surabaya is uneven or not similar and has different carrying capacity. These uneven soil arrangement made us even more confused on how Citraland managed to make full use of the gray alluvial soil.



The area of Surabaya is an area dominated by lowlands, approximately 80% of the area, while the remaining 20% is a low wavy hilly area. Which includes low-lying areas which are, areas in East Surabaya, North Surabaya, and parts of Surabaya South. The lowlands are mostly formed by alluvial deposits consisting of river deposits and coastal deposits. The land in the Surabaya area is generally smooth textured with effective depth that can be more than 90 cm with a low slope around 0 - 3% so that the speed of the surface water flow is low.

Erosion in the lowland areas of Surabaya is rarely found except in bumpy hilly areas but the drainage conditions shown by the length and frequency of saturated soils on the water content can be divided into three, which are areas that have never been flooded, temporarily flooded, and continuously flooded.

For water conditions in the Surabaya area it can be said to be bad because in this area most of them rely on well water and river water which are used for daily needs as well as part of agricultural land where the condition of the water has been heavily polluted by industrial and household waste. Most of the land in the Surabaya area has been used as residential, industrial and tourist attractions. Once again, these statements have made our heads dizzy on how well managed Citraland is, that the gray alluvial soil can be utilized as elite housings with an uneven soil arrangement and bad water conditions.

Before knowing the ways of the utilization of the gray alluvial soil, knowing the nature process of soil itself is important. Firstly, rocks are the main foundation of soil. The breaking of rocks or called as the weathering process happens physically, chemically, and even biologically. This process needs a lot of time where it is generally influenced by weather so that rocks that have undergone weathering will turn into soil. Then, it will experience the softening process where water and air are the two components that play an important role in this process. The water and air later will enter between rock breaks to soften the structure. After going through the softening process of the rock structure, it will proceed to the process of growing a variety of pioneer plants.

Finally, the last stage will help the soil to undergo an enrichment process of organic materials. Where soil which initially contains only minerals from the weathering process will flourish with the presence of organic weathering.

This organic weathering can come from animals or plants that die on the surface of the soil. In this case soil microorganisms have an important role in the process of forming soil.

Not many people knew that these types of soil that are rather infertile could be used as housings, not to mention that it can also be used as elite housing. As it has been said that the gray alluvial soil is the soil under the floor we're stepping on. As though the soil in Citraland was mostly alluvial soil, the economy of Citraland and the price of each soil to built elite housings are extremely high. According to the location, the price are high because it is strategic, not only because Citraland is very famous for their facility but also because they have such a strategic location for people to sell goods and services.

Citraland having a reputation of maintaining great facility was indeed right. Citraland has been equipped with various social facilities & places of worship, commerce, government, sports and entertainment, for example there is a Waterpark, 27 hole golf course, schools ranging from playgroups to universities, phenomenal GWalk, mosques & churches and various other facilities, so Citraland develops into a city complete with an independent city. To maintain environmental security, several security posts were built in strategic locations, clusters use a one gate system with maximum security 24 hours.

For the water equipment, Citraland has been equipped with a Water Treatment Plan (WTP) with a capacity of 150 lpd. To ensure water quality, ISO 9001: 2008 is tested periodically and has exceeded the standards. As an adjustment, various facilities in Citraland are also built with international standards, ranging from markets, tourist attractions, highways, pedestrian areas to road signs and landmarks. These facilities shows that it does help the economy of Citraland.

The main reason why eventhough the soil of Citraland is alluvial soil but the price is still high, is because the facilities, managements of the utilization of alluvial soil are well managed.

After mentioning multiple times that Citraland is actually made of alluvial soil, there is actually another type of soil that are suitable for building houses which is the soil between clay and ordinary soil. This type of soil has a very good texture. This soil is also easy to clot when squeezed by hand. Not like peatland, former swamps, sandy soil, rice fields, and those soil that are soft, water containing, and are not easy to clot. Therefore, it is not suitable for the building of houses because if a building is built on top of it, within a year the land will experience a decline, and the buildings above it can experience cracks - both on the floor, the wall, and some other important parts.

With high quality facility and management of the elite housing, the price of each soil sold is 6.9 million / m² for places far from the facilities. But for places near the facility, it costs 25 million / m² at crowded places.

4. Conclusion

With such an infertile soil, Citraland was able to be economically succesfull. This shows that alluvial soil - a soil that is not suitable for building houses, can be utilized as elite housings and so are the other types of soil. Any type of soil, with proper management and efficient processes, it can be utilized into anything. Not to mention that Surabaya has such slopes and heights that logically aren't capable of being built into houses, Citraland still manage to do a perfect job. This doesn't apply to only Citraland or Surabaya, it can also be applied to any city or even countries. About the alluvial soil itself, not all sedimentary soils are fertile alluvial soils. The level of nutrient content is indeed largely determined by the main ingredients causing the sediment.

If the main ingredient is inorganic substances, of course the content of the substance is a little so it is not good for agricultural land. But if the main ingredients of the sediment are organic substances that contains a lot of nutrients, of course this land is very suitable to be used as agricultural land.

Therefore, the conclusion is that even if the soil of Citraland is mostly gray alluvial soil and even though this gray alluvial soil is included as an infertile soil, Citraland still manage to set a high price for each and every soil that is being sold. How? Because Citraland provides such great facilities with proper management of soil and water. Hence, any type of soil at any location could have so much benefits if proper management is done.

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