The Effect of Karst Damage on Socio-Ecological Changes in The Cikeusal Village Cirebon Regency

Muhammad Fadil

{dielsevenfold77@gmail.com}

Community of SALAM Institute, Cirebon 45132, Indonesia

Abstract. Cikeusal Village is a village located in the karst area. However, since PT. Indocement Tunggal Prakarsa was present, it turned out to have a negative impact. The living space of the community around Mount Karst is gradually narrowing due to the expansion of the mining area. The deprivation of the living space of the Cikeusal village community will certainly affect the socio-ecological community. As a result of mining activities resulting in reduced water sources, decreased water quality and reduced soil productivity. The research was then carried out with a descriptive qualitative analysis approach. The purpose of this research is to find out what is being exploited and how severe the ecological damage is, how much influence the ecological damage has on the social, and how the community survives. The damage that occurred was already severe enough to see the number of caves and hills that were missing. In addition to natural exploitation, residents' settlements are gradually being evicted for security reasons. The occurrence of land acquisition, makes many people move and look for work elsewhere.

Keywords: Karst, Social, Ecological

1 Introduction

Karst is an area consisting of porous limestone so that water on the ground surface always seeps and flows into the soil surface. Because the soil material is limestone, it is not suitable for making wells. Kars has a characteristic in the form of basins, hills, and rivers below the ground surface, and there are many caves. Linguistically, karst is taken from German which means rocky arid land. According to Ford and Williams [1], karst is a field with characteristic hydrological conditions as a result of soluble rock and has a well-developed secondary porosity.

When rainwater falls in the karst area, most of it enters the ground through the cavities or diaclase that are abundant in the karst area, so that the developing river system is an underground river system [2]. Surface water is only found in ponds (dams) in the karst area, which was originally a doline valley or in the local language a treasury area, the bottom of which is covered by a layer of impermeable terrarose soil so that it can accommodate a certain amount of rainwater. Surface water in karst areas is found in relatively small quantities, namely in lakes and surface rivers in the karst ecosystem.

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For example, the village of Cikeusal which has these characteristics, where around it is surrounded by karst.The natural condition that is surrounded by karst will certainly affect the lifestyle of the surrounding community, with evidence that there are stone miners and farmers. The large number of stone miners is because there are many limestone mines so that they work by mining for their daily needs, and farming is one of the jobs in the context of both production and consumption.

In the local community, they only produce what they consume. Through the historical evolution of society, and after the emergence of economic exchange which is realized through the circulation of products taken over by producers. The productive process acquires emergent attributes that overlap with their natural character, but without suppressing them. As Schmidt states: "Metabolism between man and nature a special case of the general interaction of natural things was placed by Marx in the category of exchange and, conversely, he used the concept of metabolism when characterizing the process of exchange. In the process of direct labor, namely the metabolism between man and nature, material triumphs over historically determined form; in the exchange process, which depends on the work process,

Human life cannot be separated from its environment, be it the natural or social environment. According to Law no. 32 of 2009 article one states that life is a unity of space with all objects, power, conditions and living things including humans and their behavior that affect nature itself both the survival and welfare of humans and other living creatures. Humans with the ability to reason can affect the conditions of their environment and vice versa the environment will also affect them.

But unexpectedly, even though the abundance of nature did not make the community prosperous, because of the company's presence.The karst area which contains a lot of lime is one type of mineral C which is widely used in industry and building. There are many cases where areas containing lime are often targeted by companies that use lime for cement, such as PT. Indocement Tunggal Prakarsa Tbk. Many cases have occurred between the cement factory and the local community regarding this mining case. The impact of natural exploitation, which is certainly so damaging to nature, will certainly affect the condition of the community around the mining area. For those who have already been mined, like it or not, the community must be able to adapt to their exploited natural conditions.

The impact of mining activities certainly does not only change the environment but also has an impact on the social changes of the community. As in Cikeusal Village, for example, which is one of the six villages affected by the exploitation carried out by PT. Indocement Tunggal Prakarsa {Tbk}. They have had to deal with their damaged natural condition for decades. Ecological changes such as scattered mining dust, lack of water, as well as increasingly narrowing agricultural land and settlements can certainly affect the social community. Like it or not, they have to survive and adapt in the midst of their damaged natural condition.

Prior to the existence of PT. Indocement Tunggal Prakarsa Tbk, residents' activities in mining already exist. They mine in traditional ways such as using a wedge, hammer and rope. However, the mine does not mine in the area of PT. Indocement Tunggal Prakarsa (Tbk) but they mine elsewhere far from where they live. Even though they are actually both mining, if it is seen from the destructive power, of course from the PT. Indocement Tunggal Prakarsa Tbk which is more destructive. Because they mine in more exploitative ways, such as blasting and dredging with heavy equipment, apart from damaging they also accelerate the damage. It is estimated that the

company can mine 4.1 million tons per year. This karst exploitation will certainly damage the balance of the ecosystem.

In plain view, the karst surface does look barren with several plants around it. However, this karst contains a lot of water stored in caves and underground rivers. If this karst is damaged, then the water content in it is also lost. Besides having a function as water absorption and storage of water reserves. Karst itself has a water absorption capacity of up to 54 mm/hour, while the absorption capacity of ex-mining mines, even though it has been reclaimed, only reaches 14 mm/hour or only 25% of its natural absorption capacity. If not reclaimed, the former mining area in the ex-mining ecosystem only has a water absorption capacity of 1 mm/hour [4]. Karst also has a function to absorb CO2,

In the perspective of developmentalism, forced industrialization to shift the agrarian sector to the industrial sector resulted in widespread proletarianization and chaotic urbanization. The population is controlled by the state very tightly and ultimately has a negative impact on modernity, including environmental damage, pollution, depletion of natural resources, anomie, and apathy among the wider community. This syndrome has forced the government to spur development through massive exploitation of natural resources without paying attention to conservation in a balanced way. In this case, nature is seen as a development resource that seems to have unlimited capabilities [5].

Companies may not think about whether what they are doing will have a bad impact on the people around them. Where in addition to destroying nature, they also damage the social relations of society. Based on the above background, the researchers are interested in researching "The Effect Of Karst Damage On Socio-Ecological Changes In The Cikeusal Village Cirebon Regency". The research aims to find out how much damage has occurred, find out what the impact of karst damage on people's social life, and what adaptations are made by the community when their nature is damaged.

2 Methods

The research method becomes a design in developing a general framework for conducting research. In this study, the research design used is descriptive analysis research design, to describe the problems that exist in a study. This research was conducted in Cikeusal village, Gempol sub-district, Cirebon district, this location was chosen because this village is the most affected village compared to other villages. This research was conducted for one week, to be exact, on December 7 to 13, 2021. On the first day the researchers made direct observations to see the conditions that had occurred, then carried out mapping from the boundaries of the area, river flow, land status, geographical location and natural conditions. . Then on the third to the last day the researcher conducted direct interviews with informants and resource persons to find out more clearly about the current conditions and compare them with previous conditions. In addition to using primary data, the researcher also uses secondary data needed to strengthen the researcher's argument. This study aims to find out how much damage occurred and then the impact caused and what the surrounding community did when they saw this damage occurred. As well as providing awareness to many people, especially the surrounding community. The

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With a socio-ecological approach, in order to see the socio-ecological changes that are happening. Since the occurrence of natural resources due to human population and the quality of human activities. Ecological change is the impact of human interaction with nature that takes place in the context of exchange. The exchange process itself involves the exchange of energy, material and information between humans and nature. Humans ask for material, energy, and information from nature to meet the needs of life. Meanwhile, nature gets more energy, material, and information from humans in the form of pollution and waste which results in more losses for life.Ecological and economic overlap is not only evident, but also an unavoidable and larger feature of social metabolism. Because it expresses the transit of material flow through two different planes. This kind of juxtaposition implies a process of appropriation that is not open about the existence of two separate processes, but actually becomes an inseparable part.

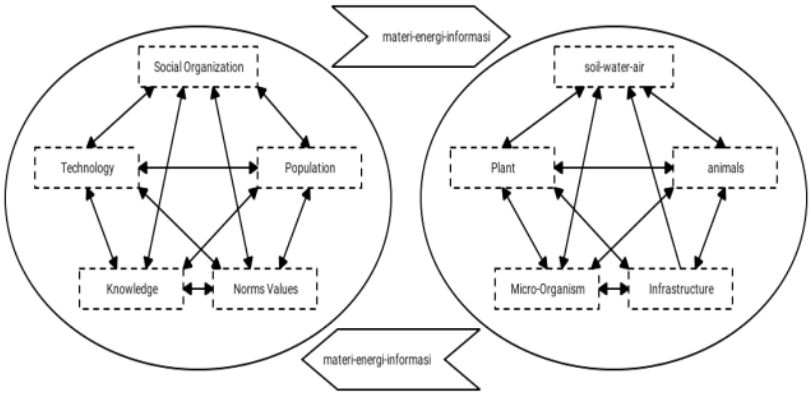

Fig.1 Concepts of Social and Ecological Relations Theory

In the picture above, the social system is built by five components that influence each other, namely: social organization, technology, population, knowledge system, and social norms. The ecological system is also built by five components, namely: basic elements of nature (homeland, air), animals, plants, micro-organisms, and infrastructure. The process of exchanging energy, matter and information involves all components of the two subsystems [6].

3 Results and Discussion

3.1 Destruction and confiscation by the company

3.1.1 Exploitation of Kars and Surroundings

PT. Indocement Tunggal Prakarsa (Tbk) entered into around 1985 by merging six cement companies with 8 factories. The initial name of this company was PT. Inticahaya Manunggal later changed to PT. Indocement Manunggal Prakarsa. In 1991 through the acquisition of PT. Tridaya Manunggal Perkasa Cement, Indocement increased its production capacity by 1.3 million tons/year with plant 9. In 1996 plant 10 complex in Cirebon was completed with a production capacity of 1.3 million tons/year, so if plant 9 and plant 10 combined production has amounted to 2.6 million tons/year. While in 2005 PT. Indocement Tunggal Prakarsa (Tbk), especially in the Cirebon area, the company has produced cement in the form of clinker of 2,024,105 tons per year and when it has turned into cement products it is around 2,269. 881 tons per year. In 2013 the Cirebon factory complex produced 3.9 tons of cement, then in 2015 the factory complex in Cirebon produced 4.1 million tons of cement [7].

The mining method itself is the Quarry mining method. This method is used for industrial minerals. There are five mining locations, namely quarry A, quarry B, quarry C and quarry D, while quarry E has been exhausted. Each mining site has a different quality of limestone. Each location is divided into several points based on its height. The mining process is carried out in several stages such as drilling, blasting, transporting, and crushing the rocks into smaller ones. Almost 94% of the raw materials for cement clinker are limestone and clay mined at the mine site.

In 2021, the company as a whole has produce 25.5 million tons/year. Cement production, which was originally planned to reach 2.1 million tons, apparently has exceeded the target of 2.7 million tons. Then in 2020 it decreased by 500,000,000 tons and increased again in 2021, which was 1.6 million tons. Based on data from the Indonesian Cement Association (ASI), the national cement industry capacity in 2021 has reached 120.5 million tons/year, even though the demand for cement is only 65 million tons/year, so the market is oversupplied by 55.5 million tons in 2021[8]. This shows that the current demand for cement is actually more than sufficient, the cement factory should not need to produce cement continuously, because it is overproduction. Actually this mining activity should stop because cement productivity is more than enough.

Exploitation of karst mines has been carried out by clearly damaging and even increasing production. According to residents there, almost all the karst areas near Cikeusal and the surrounding villages are about to run out and many are missing. The hills and caves that have been exhausted include Curi hill, Prahu hill, Suminta hill, Cikerud cave, Goong Cave, Gumbas cave and many more. Everything has been exhausted except for the Blimbis hill which has not been dismantled by the company. For now, the remaining hills are Hanjuang Hill, Petot Hill and Kidang Hill because they are not included in the mining area of PT. Indocement Tunggal Prakarsa (Tbk) but Perhutani. But unfortunately at this time half of the hill has also been used up due to mining activities by the Betta and Kedondong communities. According to residents, Curi Hill is the highest hill with a height of up to

50-70 meters above ground level and has now been completely excavated [9]. The mountain was almost razed to the ground, leaving only the soil material. For the rest that still exists, namely the Dalem cave which is located in the West Palimanan village area, the cave has hot springs and is used as a tourist destination. The cave is located in the area of PT. Indocement Tunggal Prakarsa (Tbk) and managed by the company, specifically for the local community, is free of charge. Not only is the karst lost, but the plants on it are also disappearing. There is nothing left when the karst is excavated, leaving only the soil material remaining, making the place an arid region.

Near the mining area, to be exact, close to a large water reservoir, there is a reclaimed forest with an area of about 11 hectares and the area belongs to PT. Indocement Tunggal Prakarsa (Tbk). The reason for making the artificial forest, namely for reforestation of the surrounding land as a form of responsibility from the company [10]. However, this has only just started planting around 2018, so why not do it a long time ago if the aim is to preserve the environment. Usually the wood that has grown will also be resold, I don't know where the wood is for sale. Can the reclamation area be able to repair the damaged area, if the reclamation area only covers 11 hectares while the area being mined is 500 hectares the comparison is very far. The plan is that in 2030 PT. Indocement Tunggal Prakarsa (Tbk) will be out of contract, whether they will still extend their contract or not. If it does not continue its contract, the company must of course be responsible for what has been tampered with.

3.1.2 Water Exploitation

Not only mountains are exploited, but the existing water is also being exploited. The water in the mining area is used to reduce dust in the summer and the needs of the cement industry. PT. Indocement Tunggal Prakarsa (Tbk) uses water with a water intensity of 0.29 m3/ton. If annually it is able to produce cement of 4.1 million tons/year with a water requirement of 1,189,000 m3/year.

Especially for quarry C, it has an area of 389,878 m2 and this is the largest quarry area compared to other quarry. There are about five quarries in the mining area. It is known that the rainfall capacity in the area is around 26.7189 mm/hour and in a day it is around 138.5834 mm/day, so the volume of water that enters Quarry C itself is 5,836.2024 m3/day and this has not been calculated with the flow rate. ground water. Meanwhile, groundwater discharge and evapotranspiration discharge were obtained at 81,218,1967 m3/day with maximum rainfall for a period of 2 years. The availability of water in the factory complex through the sediment pond is around 270,000 m3, while surface water is 790.046 m3 and rainwater is 19,440 m3.

The dimensions of the open channel in quarry C consist of 3 trapezoidal channels with earth walls with open channels in order to drain water properly and add 2 channels to quarry C. The closed channel in quarry C has 3 culverts and the inlet culvert is located at bottom end of the channel. It is planned that the temporary sump will be 36 m long, 18 m wide and 2.8 m deep. The dimensions of the setting pond of the Dalam cave itself are estimated to have a volume of 40,000 m3, but it turns out that the inner cave only has 4,350 m3 of water reserves. This setting pond functions as a reservoir for mine water and settles solid particles that come with water from the mine site. From these data, if calculated,

3.1.3 Land Acquisition

In the past there were people who planted in the Perhutani area, usually people grew plants such as chili, forest rice, bananas, papaya and many more. Until now, the activities to plant in mountainous areas are still continuing, but that is also what most of the elderly people who cultivate crops there. According to local residents, there were those who lived in mountainous areas, about 13 of their houses lived in the mountains. They build houses there, because there they make a living by mining stones and growing crops. Indeed, there is evidence that there are also the tombs of their ancestors. When PT. The Indosemen appeared before them, inevitably they had to move and sell their house on the grounds that the area would be used as a mining area [12].

In 1982, PT. Indocement Tunggal Prakarsa (Tbk) entered and established a factory in the Cirebon area which was inaugurated directly by the then President of the Republic of Indonesia Suharto in 1985 and the Kromong mountains became the first mining area to be mined by the company. As the mining area expands, the company needs new land for road access needs. PT. Indocement Tunggal Prakarsa (Tbk) only touched the Cikeusal village area in 1991, resulting in the first land acquisition in the Cikeusal village area. The first liberation carried out in Cikeusal village covered the Curi hill area and several community gardens in the Curi hill area. In the acquisition process, according to company residents, the clearing of land was carried out without coercion but there were threats. When there are residents who still want to stay, the company is not responsible for rock slides or other accidents. The amount of dust, the sound of bomb explosions, and rock avalanches will certainly make the people who live in the vicinity feel uncomfortable, so that like it or not, residents are forced to sell their land for security. Those who want to sell their land because other neighbors are also selling it, they don't want to live alone in the mining area. Actually, they regret and don't want the land to be sold, but what can they do if it's not sold, the residents have to bear the risk. so that like it or not, residents are forced to sell their land for security. Those who want to sell their land because other neighbors are also selling it, they don't want to live alone in the mining area. Actually, they regret and don't want the land to be sold, but what can they do if it's not sold, the residents have to bear the risk. so that like it or not, residents are forced to sell their land for security. Those who want to sell their land because other neighbors are also selling it, they don't want to live alone in the mining area. Actually, they regret and don't want the land to be sold, but what can they do if it's not sold, the residents have to bear the risk.

In 1999 there was a dispute between PT. Indocement Tunggal Prakarsa (Tbk) with the Cikesal Village government[1] (Jano, 2021). The dispute was caused by PT. Indocement Tunggal Prakarsa (Tbk) is suspected of carrying out mining work on land owned by the Cikeusal village government without clear legality of permits. This dispute was ultimately won by the residents by proving the mining permit of PT. Illegal Indocement. PT. Indocement, which lost in the legal process, received pressure and provided people's mines as a form of compensation for illegal mining actions carried out by PT. Indocement in the Cikeusal village area in 2000. It does not stop there, the wider the mining area makes the need for road access certainly expands so that in 2007 there was a second land acquisition

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by PT. Indocement in Cikeusal Village, which acquired land in the Citotok block and the Ciriyu Islamic Boarding School,

Residents affected by the land acquisition of the Citotok block and the Ciriyu Islamic Boarding School block moved to the plot block and some moved outside the Cikeusal village. In the land acquisition, PT. Indocement provides compensation of Rp. 100,000/m2 for building land, for vacant land on which there are no buildings and land in the form of rice fields Rp. 50,000.00/m2 and Rp. 30,000.00/m2 for dry land. The residents who moved made a new settlement which is currently called a block lot. People who move, occupy land owned by the village. The residents who have moved cannot make the land their property, they can only have an SPPT certificate. If they were to be evicted again, they would not want to move and could only just surrender [13].

From 2017 to 2019 there was an attempt to move Mulangi's great-grandmother's tomb where there was turmoil in society with Indocement. This land acquisition is in the form of land acquisition for makhbarah, namely Mulangi's great-grandmother's grave located in the Ciriyu Block area. The reason for moving the location of the tomb is that the location contains high-quality karst stones. The community, especially the descendants of Mulangi's great-grandfather, did not accept the transfer of tombs which included ancestral graves. Although various efforts have been made to defend Mulangi's great-grandmother's tomb. However, due to insufficient evidence in the completion process, Buyut Mulangi's tomb was still relocated in 2019.

3.2 Impact of Karst Damage on Socio-Ecological Changes in Society

3.2.1 Reduced Water Quantity and Quality

The most pronounced impact on karst damage, of course, results in reduced water sources. In this condition of water shortage, residents must be able to adapt to these conditions. In the past, before the Indocement company, the water quality in Cikeusal village was fairly good and the water was drinkable. However, when it is mined the current water becomes less. According to parents, there used to be such a thing as an absorption area that allowed all of the water to enter. In the past, there was a lot of water in Cikeusal village and even floods, but the water can enter the trough, but for now all the water enters the PT Indocement Tunggal Prakarsa (Tbk) area[14].

When the karst has been damaged, the absorption area will decrease or even disappear. When the dry season arrives, the community will be really dry where the land can no longer store water reserves. Now residents have to use cloudy water that contains lime, so it must be precipitated overnight before use. Especially when the water begins to recede, the lime content in the water increases. The water is usually not used for drinking purposes but is used for washing, bathing and defecating only. For drinking and cooking purposes, people usually use gallon water.

Ecologically, the ability to recharge aquiver in karst areas is highly dependent on the existing karst conditions. The recharge condition will decrease by 88.40% over the next 35 years. The loss of potential karst land of 500 ha will eliminate the recharge ability of the aquiver by 1 million m3. In 2013 to 2014 water decreased from 5,325,876.99 m3 to 5,285,111.21 m3 and will lose water supply from the soil aquiver in 2026-2027. Changes

in land potential for karst land occur due to mining activities from PT. Indocement Tunggal Prakarsa Tbk. Will change the function and cover of karst land. Exploitation carried out cannot restore its function, because the karst land which is naturally limestone hill will be lost [15].

The loss of the ability to recharge the karst aquifer will have an impact on the social and economic activities of the community. This influence will not only have an impact on Cikeusal village and the surrounding villages, but will also affect the existing water conditions in Cirebon, especially on the water supply for the community. Seeing water as a very important and big need, socially the community will experience various impacts, ranging from health, economy and daily activities.

3.2.2 Decreasing air quality

In the summer, dust from the mines is often scattered everywhere, making it hard to breathe. The spread of dust in the air disturbs people's activities, besides making the air unhealthy, it also hurts the eyes. People who have just come there will feel the same situation. Then what about the people who lived there from birth and lived there for years. Everyone is forced to stay and breathe dust from the mines which is not good for health. So far, there have been no residents who are sick with shortness of breath due to dust from mining activities. Not only on the streets, the dust also reaches people's homes, to the point that they have to sweep and wipe the floors and glass every day, because dust often sticks, especially during the dry season [16].

In reducing dust the company utilizes water around the mine area. In addition, the company has also tried to reduce dust emissions by using bag filters to 20 mg/Nm2. However, whether the intended filter bag is used for the factory area or the mining area, this is clearly different. In fact, the amount of dust in the mining area is still large today, especially during the dry season.

Not only is dust scattered, CO2 levels are also increasing. This is due to the reduced function of karst in absorbing carbon. One of the functions of karst is to absorb CO2. CO2 absorption is one of the natural processes that can prevent or reduce global warming. This is because CO2 is one of the causes of global warming. CO2 is used as a comparison against the increase in temperature due to the increase in greenhouse gasses because it contributes the largest 50% in global warming [15]. If a rough calculation, for example, the karst area that has been mined is 500 hectares and for example the absorption capacity is 100 m3/year/km2, then the loss of karst absorption of CO2 is 500 m3/year, which means that each year it will contribute that amount of CO2. Moreover, the company still uses coal as fuel. The use of coal is still quite large, which is around 87.8% and 12.2% of alternative fuels. In 2025 the company plans to continue to increase the use of alternative fuels by 25%.

3.2.3 The Sound of Explosions that Disturb Comfort and Make Buildings Crack

The sound of explosions and the sound of engines will certainly disturb the comfort of residents. Moreover, this often happens at night, thus disturbing the comfort of local residents. The sound of explosions from mining activities was so loud that it made the glass vibrate even though the location between the mine and residential areas was 1 to 2

kilometers away, but the sound still sounded loud. In addition, the sound of cement factory activities is also often heard at night which always disturbs the comfort of sleep. There are also some houses that were cracked due to the loud sound of the explosion, especially those who were victims were houses that were directly adjacent to the mining area.

It's hard to imagine living in the midst of damage, they must be able to adapt to their environment. Even if you want to move, it's difficult because you want to live anywhere else. If you move, of course you have to adjust to a new place plus it requires quite a large amount of money.

3.2.4 Decreasing Community Social Relations

The occurrence of land acquisition only has an impact on reduced social relations. When evictions occur, what happens is that many residents are then scattered to look for new settlements. Some moved to the plot block, some moved to the village block and some moved outside the village. As a result of land acquisition, people who used to interact with each other are now far from each other because they live in different places.

The narrower the land for livelihood, the fewer jobs in their place of origin, so people have to choose to work outside the village or migrate out of the city. They make their residence only as a place of rest, not as a social space. As a result, social relations diminish and become increasingly separated, making mutual cooperation activities even more difficult to do [18]. Whereas in the past their social life was very close, especially for farming communities, they planted crops together in the forest and then harvested it together. Before there was an irrigation system for every house, the community used to do bathing and washing activities together, but when there was, these activities are rarely seen now.

3.2.5 Fewer Farmers and Stone Miners

These farmers and stone miners used to be professions that were mostly practiced by the people of Cikeusal village and the community has been involved in these two professions for a long time. The existence of this profession has something to do with its natural conditions, where people live surrounded by karst. This karst is used by the community, the lime is taken for home needs or for the needs of cottage industries. And the condition of the water is still abundant and the soil is fertile, suitable for farming activities. Not only planting in rural areas but they also plant in mountainous areas in the Perhutani area.

Cikeusal village itself is a rainfed area so they will farm in the rainy season. During the rainy season, residents work as farmers because the water at that time was abundant. Meanwhile, during the dry season, they switch professions to become laborers, whether it be as stone miners, rattan craftsmen or other laborers. Their produce is usually not for sale but for personal consumption. If they are forced to because they are pressed for needs, then they will sell it [19].

Many of them make houses in the mountains so that their location by mining for rocks is close. For women, they can plant in mountainous areas. Mountain communities usually grow crops such as chili, forest rice, bananas, papaya and many more. Until now, the activity to plant in mountainous areas is still visible, but most of the parents are planting in the area.

The presence of PT. Indocement Tunggal Prakarsa (Tbk) has slightly changed the natural and social conditions of the community. The presence of this company in fact does not make the condition of the community more prosperous, it actually makes the community more miserable. In the past, the residents of Cikeusal used to mine stone and it must be admitted that it was also destructive, but the damage caused was certainly not as massive as that done by PT. Indocement Tunggal Prakarsa (Tbk).

As the mining area expands, the community's home range decreases, making the tradition of planting in the mountains less and less. When their cultivated land is mined, people can only surrender when they see the situation. They assume that the land does not belong to them but belongs to the state. Indeed, not all of the land is mined, there are several hills that are still saved, such as Hanjuang Hill and Petot Hill. But when they want to grow crops in the hills, they have to pass through the mining access road which is about 2 kilometers from the village while inhaling mining dust. Currently, there are very few people who plant in the mountains, even among young people, almost no one is interested, because they think that this planting tradition is a tiring tradition.

Long before the existence of PT. Indocement, precisely in 1930, in the Kromong mountains, including in the Cikeusal Village area, there were traditional mining activities carried out by the community. The Cikesal people mine limestone to be sold to collectors which is then processed as raw material for making toothpaste and building materials. The Cikesal people usually sell their mining products to Chinese-owned companies, this activity continued until 1970. The end of the operations of the Chinese-owned companies was because the owner of the company had died and no one continued. In addition, the limestone industry is increasingly marginalized due to loss of market share [20]. In the past, limestone was widely used for building mixtures, but since the advent of cement,

For the stone miners, they have to go to another mine site. Usually they mine in the horse hill area in the Bobos area, Dukuntang sub-district and some even mine stones outside the island of Java. Currently the stone miners are not mining limestone but they are mining natural stone. The cost of the stone miners themselves is around Rp. 50,000 to Rp. 100,000. However, the results obtained are not commensurate with the risks involved. Miners must face danger when falling or being hit by a boulder. If the accident occurs, the company does not want to be responsible [21].

Based on the narratives of the village head and the head of the youth organization, most of the people in Cikeusal village, especially young people, prefer to migrate abroad. The lack of work there makes them prefer to work outside because they get promising results. Reduced land productivity will certainly reduce the productivity of farmers and stone miners. The land is getting narrower and its natural conditions that have been damaged are certainly not possible to meet the needs of life, only a few people still survive to carry out these activities. In addition, the few results obtained make the job less desirable.

The presence of the company PT. Indocement Tunggal Prakarsa (Tbk), then did not provide a solution and allowed the community to work there. Even though having mining skills does not mean you can immediately be accepted, of course what is accepted at the company is only educated workers. There are very few villagers who are accepted into the company, namely about 2 people and that is also non-permanent contract workers. In the period before the current village head government, no village community was welcome

there. In 2000 the village community with a combination of other villages staged a big protest because there were no local residents working there, they held demonstrations and set fire to the guard post. Most employees at PT. Indocement Tunggal Prakarsa (Tbk), actually not from Cikeusal village residents but from outside.

3.3 Adaptation of People in the Middle of Exploitation

3.3.1 Utilizing Existing Water Resources and Land

After the arrival of PT. Indocement Tunggal Prakarsa (Tbk) the availability of water is greatly reduced. Although many water sources are reduced or even disappeared, there are still some springs that still exist. Then the community uses water that is in the mountain that has not been mined for use. The current springs are Petot hills, Kidang hills and Hanjuang hills which are located on the border with Cikeusal village and Cupang village, where the area is the Perhutani area. If there are residents who want to collect water or plant there, then they must first ask for permission. The springs used today are Curug Cihaneut which is located on Hanjuang hill, Cikadoya spring is located between Kidang hill and Hanjuang hill which flows to the Desa block (RW 2) and Karang Anyar block (RW 3).

PT. Indocement Tunggal Prakarsa (Tbk) once provided assistance in the form of hoses for drainage and the reservoir, then the water was collected into a large reservoir of 3 water reservoirs, then flowed again to a smaller reservoir which after that the reservoir would be flowed directly to every household. Each house in Cikeusal village usually has a large water reservoir measuring approximately 2 m long, 1 m wide, and 70 cm. The tub is made large so that water can be accommodated and not wasted. The water in this village does contain lime, cloudy white in color. If you want to use it, it must be deposited before using it. The water is usually used for bathing, washing, and defecating, while for drinking and cooking, gallons of water are usually used.

The Cihaneut waterfall is not actually used because it contains sulfur. The current Cikadoya spring is also not good because the tub was destroyed so that all the water fell, but now it is taken again for the Karang Baru area. Ki Kewuk spring is a source of rice fields where this water source is used for irrigating rice fields. The Tiwlandu spring is the border between Mount Hanjuang, Gunung Kidang, which flows into the Asin River. All these sources exist only during the rainy season, because during the dry season the water in the springs shrinks so that it is not enough for the needs of the residents. While in the dry season, they have to buy water for Rp. 200,000 per 8,000 liters. Although there is water assistance from the company, this assistance is not sufficient for daily needs.

In addition, the community also makes reservoirs, so that when in the dry season the reservoirs can be used. Embung is a basin that is shaped like a kulah. Reservoirs are used to maintain groundwater quality, prevent flood, until irrigation. The dam holds water in the rainy season then later used in the dry season for consumption and for irrigation of rice fields. Embung itself was made about 4 years ago. The condition of the soil that contains a lot of rocks and water easily seeps into the ground, so it is not possible to build a well. There are also two flowing rivers, namely the salty river which is used for irrigating rice

fields. The water itself comes from Petot Hill and the surrounding hills, usually the river is used for irrigating rice fields.

There are also people who use the area of PT. Indocement Tunggal Prakarsa (Tbk) to be used as land for farming. The land used for farming is usually located far away in the mining area where the land is still fertile and still suitable for farming. The land is located around the mine road area, if it is estimated from the village border to the mining road it is about 20 meters. Because the land is not used by PT. Indocement Tunggal Prakarsa (Tbk), the community uses it for farming. As long as the land has not been used by the company, the community is free to use it.

3.3.2 Water Management with Non-Governmental Organization

Water management in Cikeusal Village is carried out by means of community self-help, and there is also assistance from PT. Indocement Tunggal Prakarsa (Tbk). The community began to build this water reservoir around the 1990s. Before there was an irrigation system for homes, people used to bathe, wash and defecate in the salty river area. It is located in the rice fields south of the village. Water management in this village is indeed quite difficult and inconvenient, such as technical conditions in the event of a leak and a fairly large maintenance cost. This is certainly not comparable to the work experienced by the water major. The main job of water is usually to check for leaks or stagnation of water. In addition, the mayor must arrange a schedule for the entry and exit of water. If there is damage to the irrigation center, the water major must of course go to the springs.

Currently the number of water users is 327 houses, from the springs it flows into 3 main reservoirs, from the main reservoir then flows into 9 small reservoirs, from each small reservoir it has 30 to 50 hoses, one hose is usually fed to one house and every house of residents usually have a wide reservoir. He made this wide bank so that when the water flows into the reservoir, the water will not be wasted. Every three hours, the water major must open and close the faucet so that the water is evenly distributed in each RT. Every day the water major must arrange a water schedule and there is no day off even during Eid he still does the work.

Currently, it is only Pak Mis with his son who is in charge of water, because no one else wants to do the task as a water major. Pak Mis also likes to be in debt because it is to pay for the needs of his children. In the early days of becoming a water major around the 1990s, the major's salary was only 300 thousand per month, for now it depends on income. If many people give, then Pak Mis can get one million rupiah, sometimes he can get 900 thousand rupiah or 800 thousand rupiah, this depends on the people who give. For the payment itself, each house has to pay 4,000 per month, this billing is usually done by his son. Currently, Mr. Mis is still working on this work as a charity and his service to the community [24].

Besides Pak Mis and his son, there are also other water majors such as Pak Yayan. Pak Yayan is the water manager from the Kuwu well where the Kuwu well is located in hamlet one RT 3. For the schedule the Kuwu well itself is usually used from 8 am to 11 pm, but it depends on the residents' requests. Pak Yayan himself only takes care of water in the RT

3 section. Indeed, in the RT 3 area itself, it is different from other RTs where in RT 3 it has 2 sources of water, namely from springs and Kuwu wells. The Kuwu well is used because instead of just being left alone, instead of waiting in mountain water, it is better to take advantage of existing water sources. According to the perspective of other RT residents, RT 3 is lucky because it has 2 water sources so there is no need to wait for the night so it is always full. According to Pak Yayan, the residents in RT 3 are actually the same because of the lack of water. The drainage of water in the spring itself is carried out for 3 to 4 hours from 10 pm at the same time as the flow of water in the prayer room [25].

Then there are other water majors like Pak Jaya. Pak Jaya is the water major in Dusun 1, where Dusun 1 itself derives its water source from Telargaga. Pak Jaya explained that the water from the Telar Gaga reservoir first goes through filtering and then is collected in a holding tank before it is actually channeled into people's homes. In each reservoir, water can be distributed from 19 to 25 houses and the flow is closed every 11 hours. Meanwhile, if there is a new house that wants to connect the water flow to the reservoir, it is no longer possible, because from the reservoir itself, iron pipes have been provided. for irrigation. So that new houses that want water to flow can only connect to the pipes belonging to residents.

As time goes by, the irrigation system in the past and now from the reservoir has changed. The irrigation used to be distributed non-stop because there was no automatic equipment, so there were only residents' houses that were fulfilled and there were also people's houses that were not fulfilled. At present, irrigation is distributed on a scheduled basis, so that the distribution is quite even. The irrigation process from the Telar Gaga reservoir will be automatically sucked in and then passed through filtering, after which the water is collected in the main reservoir, then distributed to the scattered reservoirs.

Embug Telar Gaga was built in 2014 with a depth of 7 meters and an area of 5 thousand square meters. Telar Gaga itself is the name of one of the blocks included in Cikeusal Village. Meanwhile, right next to the reservoir there is a madrasa. Whereas in the past, from the village hall, the water suction machine from the reservoir was still there, but because the cost factor was too large, it was discontinued and was no longer used. Then on the left side of the main reservoir there is an infiltration device that is used to flow throughout Cikeusal Village and then disconnected because the residents cannot afford to bear the cost. Because it uses two machines with a large capacity. Prior to the existence of the dam, there was sufficient water for the RT 01 area. And the distribution of water that is accommodated in the main tank also often leaks.

Of the three water majors, namely Pak Mis, Pak Yayan and Pak Jaya, they are responsible for distributing, maintaining and maintaining water sources. They are paid independently by the community, with a simple water distribution system, and most importantly the water needs can be met where the community can survive in the midst of the onslaught of exploitation by the Indocement company. Such a system must indeed be maintained and must be cared for properly, lest anyone take advantage of it for personal gain.

4. Conclusion

From the results of the discussion and discussion above, it can be concluded that the mining activities carried out by PT. Indocement Tunggal Prakarsa (Tbk) over the past decades has had a very detrimental impact on both the environment and humans. The damage to the karst ecosystem makes the surrounding community also feel the impact. Impacts such as lack of water, scattered dust, increasingly marginalized living spaces become a phenomenon that has long been experienced by the community. The longer the community is separated from nature so they have to work elsewhere outside their village. They have to endure all the difficult conditions, indeed this is a consequence that must be accepted. Although much has been damaged and lost, people can still survive by utilizing available water sources. Even though the quality and quantity is below the quality of water in general, at least the community maintains their survival. By means of an equitable and systematic irrigation system, this is the adaptation carried out by the community.

The impact of karst damage has become an illustration for all of us that the presence of mining cannot improve the welfare of the community, instead it will further damage the living space and make it more miserable. Seeing the damage that has been caused, apparently does not make PT. Indocement Tunggal Prakarsa (Tbk) to stop exploitation but instead increase cement production. The company is not aware that what it has been doing so far seems to have harmed many people, especially the surrounding community. Unfortunately, with this worrying condition, no environmental activists have been moved to stop this exploitation or perhaps not many people know about it. Even though their presence is really needed by the community, especially those directly affected.

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