

## COMMUNITY'S OPTIMISM IN THE UTILIZATION OF KARST AREA IN THE FRAMEWORK OF AGRARIAN REFORM (STUDY IN PUCUNG VILLAGE, GIRISUBO DISTRICT, GUNUNG KIDUL DISTRICT)

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**Abstract:** Pucung Village, Girisubo District, Gunung Kidul Regency, is located in a karst area which requires a certain method to make the best use of it. The karst area, which is often considered by some people in other areas as an obstacle, is actually considered a blessing by the community and the Pucung Village Government. This attitude arose as part of the optimism of the community and the Pucung Village Government in the karst area within the framework of agrarian reform. This study uses qualitative research methods, with a rationalistic approach. The number of informants was 10 people, who were selected purposively. The data consists of: (1) Primary data, obtained from interviews with informants; (2) Secondary data, in the form of Pucung Village population data. Meanwhile, data analysis was carried out by utilizing Qualitative Analysis Techniques. The results of this study indicate that the optimism of the community and Pucung Village Government in the utilization of the karst area within the framework of agrarian reform is manifested in the form of: First, the seriousness of the community and Pucung Village Government, when collaborating with the National Land College (STPN) to carry out participatory research activities and community empowerment ; Second, the sincerity of the community and the Pucung Village Government when working hard to develop agriculture, animal husbandry, small businesses and tourism; Third, the seriousness of the community and the Pucung Village Government when carrying out repairs and arrangements for physical, intellectual, human, financial and technological facilities; Fourth, the seriousness of the community and Pucung Village Government, when improving people's welfare independently and peacefully by utilizing the iconic potential of Pucung Village, namely: Bengawan Solo Purba; Fifth, the seriousness of the community and Pucung Village Government when carrying out land use and utilization activities.

Keywords: Optimism, Region, Karst, Reform, Agrarian

## INTRODUCTION

Agrarian reform is a program that can be implemented in both rural and urban areas. In fact, philosophically, agrarian reform aims to achieve justice, welfare and social harmony in the context of control, ownership, use and utilization of land through the arrangement of assets and access to land. One of the villages that is practicing agrarian reform, namely: Pucung Village, Girisubo District, Gunung Kidul Regency, which has regional boundaries, as follows: (1) in the North, namely Wonogiri Regency, (2) in the East, namely the Kalurahan Songbanyu, (3) to the south, namely the Indonesian Ocean, and (4) to the east, namely Jerukwudel Village (on the North side) and Tileng Village (on the South side).

Pucung Village is located in a karst area which requires a certain way to make the best use of it. The karst area, which is often considered by some people in other areas as an obstacle, is actually considered a blessing by the community and the Pucung Village Government. This attitude arose as part of the optimism of the community and the Pucung Village Government in the karst area within the framework of agrarian reform. The optimism of the community and Pucung Village Government is a unique reality, because in several other places, karst areas are often interpreted as a "curse" of nature. This uniqueness raises the question: "How do the people and the Pucung Village Government realize their optimism in the use of karst areas within the framework of agrarian reform?".

## RESEARCH METHODS

The participatory paradigm is the main format of this research, as a form of respect for society. Research is carried out by positioning the researcher and the researcher (the party being studied) on equal terms or subject-subject relationships, especially in terms of data collection and decision making. Action and reflection are important stages of this research. The researcher participates in the emancipation (liberation) frame, so that the data matches the actual conditions. Research that uses a participatory paradigm has the tagline "research with people" or "research with the community", and is classified as a Qualitative Research Method.<sup>1</sup>

This research is classified as a type of qualitative research, which focuses attention or studies on the uniqueness of existing phenomena, using

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<sup>1</sup> Aristiono Nugroho, *Metode Penelitian Kualitatif Untuk Riset Agraria* (Yogyakarta, Gramasurya, 2020) p. 6



scientific logic<sup>2</sup>. Meanwhile, the Rationalistic Approach is used in this study, because it is a research approach that is built on Rational Philosophy, which states that knowledge originates from intellectual understanding that can be constructed through the ability to argue logically.<sup>3</sup> Qualitative research with a rationalistic approach in this study provides an opportunity for researchers to obtain qualitative data from informants.<sup>4</sup>

## RESEARCH RESULT

### Karst Area

Karst is often interpreted as rocky arid soil or land. Sometimes karst is also interpreted as an area with limestone, which is characterized by rare surface drainage, a thin and only localized soil solum, and closed basins (dolines) and underground drainage systems. Because of its natural conditions, the Pawonsari Region is seen as an area with physical (natural) problems, namely in the form of agricultural land that is less fertile and prone to drought. But actually the karst area is not a cursed area, but an area blessed by God Almighty. Karst is an area with unique hydrological conditions as a result of rocks that are easily soluble and have well-developed secondary porosity. Therefore, karst areas have the following characteristics: (1) there are closed basins and/or dry valleys of various sizes and shapes, (2) there is scarce or no drainage and rivers on the ground surface, and (3) there are caves in the karst system. underground drainage. In addition, it is known that karst does not only occur in carbonate rocky areas, but also occurs in other rocks that are easily soluble and have secondary porosity (joints and intensive faults), such as gypsum rock and salt rock. However,

In the karst area there is a process called karstification, which is influenced by two groups of factors, namely: controlling factors and driving factors. The controlling factor determines whether or not the karstification process can take place, while the driving factor determines the speed and perfection of the karstification process. Control factors, consisting of: (1) rocks that are easily soluble, compact, thick, and have lots of fractures; (2) adequate rainfall (>250 mm/year); and (3) exposed rock at elevations that allow the vertical development of water circulation and drainage. Meanwhile, the driving factors consist of: (1) temperature, and (2) land cover. Rocks containing high CaCO<sub>3</sub> will dissolve easily. The higher the

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<sup>2</sup> Ibid. p. 52

<sup>3</sup> Ibid. p. 54

<sup>4</sup> Ibid. p. 63



content of  $\text{CaCO}_3$ , the more developed the karst landform in the area. Rock compactness determines the stability of karst morphology after dissolution. If the rock is soft, then any karst features that are formed such as karsts and hills will quickly disappear due to the dissolving process itself as well as the erosion process and rock mass movement, so that the karst appearance cannot develop properly. Thickness determines the formation of vertical water circulation, and without a thick layer, vertical water circulation, which is a condition of karstification, can take place. Without vertical circulation, the process that occurs is lateral flow as in surface rivers and closed basins cannot form.

Rainfall is the main solvent medium in the karstification process. The greater the rainfall, the greater the solvent medium, so that the level of dissolution that occurs in carbonate rocks is also greater. The height of the exposed limestone on the surface determines vertical circulation and drainage. Even though limestone has thick layers, if it is only exposed a few meters above sea level, karstification will not occur. Meanwhile, vertical drainage will occur if the range or distance between the surface of the limestone and the groundwater table or the bedrock of the limestone becomes larger. The higher the exposed limestone surface, the greater the range between the limestone surface and the groundwater table and the better the vertical water circulation. Another factor is temperature, which drives the karstification process, especially in relation to the activities of organisms. Areas with warm temperatures such as in the tropics are ideal places for the development of organisms which in turn produce  $\text{CO}_2$  in the abundant soil. Temperature also determines evaporation, i.e. the higher the temperature, the greater the evaporation, which will eventually lead to recrystallization of carbonate solutions on the surface and near the soil surface. The existence of this recrystallization will make the surface hardening (case hardening) so that the karst landform that has been formed can be maintained from other denudation processes (erosion and rock mass movement).

The actual reaction rate is greater in the low temperature region, because the concentration of  $\text{CO}_2$  is greater at low temperature. However, the level of dissolution in the tropics is higher due to the availability of abundant rainwater and greater activity of organisms. Land cover is also a factor driving development, because land covered with plants will have abundant  $\text{CO}_2$  content in the soil as a result of the breakdown of organic remains (branches, twigs, leaves, animal carcasses) by micro-organisms. The greater the concentration of  $\text{CO}_2$  in water, the higher the level of water



solubility of limestone. CO<sub>2</sub> in the atmosphere does not vary significantly, so that variations in the karstification process are largely determined by CO<sub>2</sub> from the activities of organisms.

### **Karst Classification**

Karst is found in many places in the world with various types, which in general can be categorized into three groups, namely: (1) a classification based on development, called cvijic classification; (2), a classification based on morphology, called gvozdeckij; and (3) a classification based on climate, called sweeting. For more details, please note the description, as follows:

First, the cvijic classification, which consists of three groups, namely: (1) Holokarst is the karst with the most perfect development, both from the standpoint of the landform and subsurface hydrology. This type of karst can occur when: (a) horizontal and vertical karst development is not limited; (b) pure, massive carbonate rock with continuous vertical fractures from the surface to the bedrock; and (c) there is no significant impermeable rock. This type of karst is found in Gunung Sewu Karst (Gunungkidul, Wonogiri, and Pacitan), Karangbolong Karst (Gombong), and Maros Karst (South Sulawesi); (2) Merokarst is karst with the following main characteristics: (a) incomplete or partial development with only some characteristics of karst landforms; (b) Develops on relatively thin and impure limestones, especially in limestone interspersed by layers of marl (c) Vertical development is not as deep as holokarst development with rapid relief evolution; (d) Erosion is more dominant than dissolution and surface rivers develop; (e) Generally covered by soil, karen, dolin and cave are not found, while swallow holes develop only locally; (f) The hydrological system is not complex, surface and subsurface river channels can be easily identified; (g) Underground drainage impeded by an impermeable layer. This type of karst is found in the territory of Indonesia, to be precise around Rengel, Tuban Regency; (3) Transitional karst develops in relatively thick carbonate rocks which allow the development of underground karst formations, but impermeable bedrock is not as deep as in holokarst.

Second, gvozdeckij classification, which consists of: (1) Bare karst more or less the same as dinaric karst (holokarst); (2) Covered karst is karst that is formed when carbonate rocks are covered by a layer of alluvium, fluvio-glacial material, or other rocks such as sandstone; (3) Soddy karst or soil covered karst is karst that develops in limestone which is covered by soil or terra rosa which originates from the dissolution of limestone; (4) Buried karst is karst that has been covered by other rocks, so that karst





evidence can only be recognized from drill data; (5) Tropical karst of cone karst is karst that is formed in the tropics; (6) Permafrost karst is karst that forms in snowy areas.

Third, sweetening classification, which is in the form of true karst, namely karst with perfect development (holokarst). Actual karst must be doline karst caused by vertical dissolving. All karsts that are not of the doline karst type are said to be deviant. Meanwhile, fluviokarst is formed by a combination of fluvial processes and dissolution processes. Fluviokarst generally occurs in limestone areas that are traversed by allogeneic rivers (rivers that flow downstream in non-karst areas). The distribution of limestone, both laterally and vertically, is much smaller than true karst. The development of the underground circulation is also limited, caused by the local groundwater table. Springs emerge from an impermeable layer under the limestone or near the local groundwater table. Surface river valleys and gorges are common. Formation resulting from the entry of surface rivers into the underground and discharge of lower rivers back to the surface such as blind valleys and pocket valleys is a common phenomenon that is often encountered. Caves in fluviokarst are formed at the boundary between limestone and underlying impermeable rock by allogeneic rivers and are associated with river development in karst areas. The limestone surface in fluviokarst is generally covered by soil formed by erosion and sedimentation of fluvial processes. Limestone outcrops (bare karst) are found when erosion has occurred which is generally caused by deforestation. Caves in fluviokarst are formed at the boundary between limestone and underlying impermeable rock by allogeneic rivers and are associated with river development in karst areas. The limestone surface in fluviokarst is generally covered by soil formed by erosion and sedimentation of fluvial processes. Limestone outcrops (bare karst) are found when erosion has occurred which is generally caused by deforestation. Caves in fluviokarst are formed at the boundary between limestone and underlying impermeable rock by allogeneic rivers and are associated with river development in karst areas. The limestone surface in fluviokarst is generally covered by soil formed by erosion and sedimentation of fluvial processes. Limestone outcrops (bare karst) are found when erosion has occurred which is generally caused by deforestation.

Glasiokarst is a karst that is formed because karstification is dominated by glaciation processes and glacial processes in areas with limestone rocks. Nival karst is karst that is formed due to the process of



karstification by snowfall in glacial and periglacial environments. Glasiokarst is found in limestone areas that have experienced glaciation or have experienced glaciation. Glasiokarst is characterized by features resulting from the grinding, erosion and sedimentation of glaciers. Glacier erosion results generally form limestone pavement. More intensive erosion occurs around the joint resulting in a basin with steep slopes separating the pavement from one another. Dolins are formed mainly by snowfall. Melting ice creates canyons, potholes and caves. Another characteristic of glaciokarst is the caves filled with ice and snow. Tropical karst differs from karst in temperate and arctic climates mainly due to large amounts of precipitation and evaporation. Large precipitation results in a greater instantaneous surface runoff, while evaporation results in recrystallization of the carbonate solution forming a hard layer on the surface. This causes the rounded dolines such as those in temperate climates to be rarely found being replaced by irregular star-shaped dolines. This type of dolin is often called a cockpit. Among the dolines found irregular hills called cone hills. Tropical karst is further divided into two groups, namely: (1) kegelkarst, namely sinoid karst, cone karst, or apiton karst; (2) turnkarst, namely karst tower, pinnacle karst,

Kegelkarst is characterized by a series of continuous conical hills. The gaps between the conical hills form a basin with a star-like shape known as the cockpit, and often form a lineament pattern as a result of joint or fault control. Lemann controlled depressions or cockpits that are controlled by joints or faults called gerichteter karst (karst oriente). Examples of kegelkarst in Indonesia include Gunungsewu Karst and Karangbolong Karst. Meanwhile, turmkarst/tower karst/pinnacle karst is the second type of karst which is often found in the tropics. This type of karst is characterized by hills with steep slopes, usually found in groups separated from each other by rivers or alluvial plains. In addition, turmkarst is formed when it is lateral dissolving by a very shallow groundwater table or by allogeneic rivers that pass through limestone outcrops. Some experts think that turmkarst is a further development of kegelkarst due to certain hydrological conditions. The distribution and distribution of tower hills is generally controlled by joints or faults.

### **Karst Hydrology**

Karst hydrology has logical consequences which can be divided into two main topics of discussion, namely: hydrology and karst. Hydrology is a branch of physical geography that deals with the water on Earth with



particular attention to the properties, phenomena and distribution of water on land. In addition, hydrology is specifically categorized as a science that studies the occurrence of water on land/earth, descriptions of the effect of land properties on water, the physical effect of water on land and studies the relationship between water and life. On the other hand, karst is known as a unique area and is characterized by exokarst topography such as karst valleys, dolines, uvala, polje, karren, karst cones and the development of a subsurface drainage system which is far more dominant than the surface flow system.

In hydrology it is also known that there is a hydrologic cycle, namely the circulation of water in the earth, both in the atmosphere, on the surface of the earth and under the surface of the earth. During this cycle, water can change its form, namely solid, liquid or gas depending on the environmental conditions of the hydrological cycle. The amount of water in the hydrologic cycle is always constant and its distribution only changes from time to time due to the influence of certain factors. Karst hydrology does not focus on surface water, but on water stored underground or in drainage systems beneath the karst surface. Due to the nature of carbonate rock which has many cavities and is easily soluble in water, the surface drainage system does not develop and is more dominated by the subsurface drainage system. An example is a cave system which is sometimes runny and known as an underground river. Subsurface karst hydrology is usually referred to as "karst groundwater", namely water that fills rock/fissures that are abundant in this area, although its characteristics are very different compared to groundwater characteristics in other areas.

Meanwhile, in non-karst areas, we can easily distinguish between surface and subsurface hydrological systems. In simple terms, the concept of watersheds (DAS) can be considered as a unit for studying hydrological systems, both surface and subsurface. Watersheds are often also known as drainage basins (basins that have a flow system) which have surface and subsurface flow characteristics and exit through one outlet limited by topographical boundaries in the form of rifts. The boundaries of the watershed can be said to be constant and unchanged over time, especially when we talk about surface water. Meanwhile, the groundwater system (aquifer) can cut the topographical boundaries of the watershed and become part of several watersheds. On the contrary, The concept of surface watershed in karst areas is difficult to recognize because of the more developed subsurface. The reality is that there are many paths resulting from solution processes and very little surface runoff. There are three main





components in the karst hydrological system, namely: aquifers, surface hydrological systems, and subsurface hydrological systems. In karsts, subsurface basins can be identified by looking for connections between swallow holes and springs. This subsurface basin can be correlated with surface runoff basins (DAS) if the solution pathways in the subsurface are mainly sourced from surface rivers that enter through the ponor. However, in general the boundaries between surface and subsurface watersheds are not the same. subsurface System, especially those with a low slope of the groundwater table can have many pathways and outlets (springs). Furthermore, due to the continuous development of dissolution processes, groundwater levels, springs and underground river channels in karst aquifers can also change according to time.

After understanding watersheds, another important thing is understanding karst aquifers, which can be interpreted as a geological formation capable of storing and flowing groundwater in sufficient quantities under certain gradient hydraulic conditions. Adequate means being able to supply a well or spring for a certain period. Can a karst formation dominated by carbonate rocks be called an aquifer? We can return the answer to this question from the definition of aquifer as mentioned above. If a karst formation can store and drain it so that a well or spring has a significant water discharge, then it is legitimate for the karst formation to be called an aquifer. Debate on this matter has occurred especially in the past and the solutions that exist usually depend on the hydrogeological angle from which we look at it. Furthermore, the two extreme things in karst aquifers are the conduit and diffuse systems which are almost not found in other types of aquifers. There are times when a karst formation is dominated by a conduit system and there are times when there are no conduit passages but rather a diffuse system develops, so that it only has a very small influence on karst groundwater circulation. However, in general a well-developed karst area has a combination of these two elements. In addition, there is another drainage system in the karst area, namely: the fissure system. Two extreme things in karst aquifers are the conduit and diffuse systems which are almost not found in other types of aquifers. There are times when a karst formation is dominated by a conduit system and there are times when there are no conduit passages but rather a diffuse system develops, so that it only has a very small influence on karst groundwater circulation. However, in general a well-developed karst area has a combination of these two elements. In addition, there is another drainage system in the karst area, namely: the fissure system. Two extreme



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### **Village Physical Potential**

Pucung Village has the following physical potential: First, rock formations, which the BPBD (Regional Disaster Management Agency) DIY (Special Region of Yogyakarta) states on its website, <https://www.bpbd.jogjapro.go.id>, in the DIBI 2018\_BPBD DIY.pdf file it is revealed that several rock formations exist in Gunung Kidul Regency, namely the Kepek Formation, the Wonosari Formation, the Sambipitu Formation, the Nglanggeran Formation, the Semilir Formation and the Kebobutak Formation. The Wonosari Formation is composed of limestone, although not all of them develop into karst formations, for example around Wonosari City. Meanwhile, for the Girisubo District, Gunung Kidul Regency, the rock formations are the Wonosari Formation, the parent material of which is microdiorite, breccia, and karst. Soils with microdiorite parent material will develop into alfisols, Mediterranean and luvisols. Soils with breccia parent material will develop into entisols, arenosols, inceptisols, and cambisols. Soils with karst parent material will develop into alfisols, Mediterranean, luvisols, vertisols, and grumusols.<sup>5</sup>

As part of the Girisubo District area, Pucung Village is located in an area with rock formations in the form of the Wonosari Formation, particularly from the Middle Miocene to the Pliocene. This formation is composed of limestone, tuffaceous limestone, conglomerate limestone,

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<sup>5</sup> Oka Indrawati, *Genesis Tanah Banjar Batuan Pada Formasi Wuni dan Wonosari Punung di Girisubo, Gunung Kidul* (Yogyakarta, Universitas Gadjah Mada, 2016) p. 88



tuffaceous sandstone, and siltstone. Like the other South Zones, in Pucung Village you can also find limestone coral reefs with reef cores that still form hundreds of small hills. The characteristics of the rocks in Pucung Village are as follows: (1) limestone, which has poreus or nest characteristics, making it difficult to hold water; (2) clay deposits, characterized by difficulty retaining water; (3) limestone and clay deposits, which are porous and difficult to hold water; (4) a complex of limestone and limestone, which has poreus characteristics, making it difficult to retain water; and (5) limestone and limestone complex, which has porous characteristics making it difficult to hold water. Second, the type of soil, which in the context of Pucung Village consists of litosol and red Mediterranean. As the name implies, this limestone or Mediterranean soil is the result of weathering of limestone rocks. Because it is formed from limestone soil, this soil is not fertile and cannot be planted with plants that require a lot of water. It should be noted that limestone soil is soil derived from limestone rocks, so it is poor in nutrients and less fertile.

In addition, it is known that litosol soil is rocky soil with a layer of soil that is not too thick. This soil comes from a type of hard rock that has not experienced complete weathering. Therefore, this type of soil is difficult to grow plants. Litosol soil also has the characteristic of having a variety of textures, and because it comes from hard rocks, it has a low nutrient content. Even though it has unique characteristics, it is known that lithosol soil can still be used to grow crops, perennials, and grass (fodder). The same thing can also be observed in red Mediterranean soil, especially for growing crops, perennials, and grasses. Pucung Village is a karst area where surface water is rarely found, but there are seasonal lakes that are multi-purpose for the surrounding population. Based on the Decree of the Minister of Energy and Mineral Resources Number 1659 K/40/MEN/2004 dated December 1, 2004 concerning the Designation of the Gunungsewu and East Pacitan Karst Areas, Pucung Village is referred to as a karst area, which is an area of limestone hills. This area needs to be managed in accordance with the carrying capacity of the environment in an effort to optimize the utilization of the potential of the karst area, which is sustainable and environmentally sound.

Third, slope, the conditions vary, ranging from sloping (flat) to vertical (forming a slope angle of 90 degrees). Even so, the average slope condition in Pucung Village is an area that forms a slope angle of 45 degrees. Categorically it is known that the slope conditions in Pucung Village consist of: flat, rather flat, slightly sloping, rather steep, and steep. Based on this



category, in Pucung Village there are steep slopes of 52.56% of the area, and only 23.02% of the area of Pucung Village are flat. Although in general the Pucung Village area has steep slopes, there are also parts of the village area with flat slopes, which are scattered in various directions (north, east, south, west and center) of Pucung Village. It should be noted, that based on the calculation of the percent figure, slopes can be grouped into 5 classes or 5 categories, with the following classifications: (1) flat, if the slope is 0 – 4%; (2) rather flat, if the slope is 4 – 8%; (3) slightly sloping, if the slope is 8 – 15%; (4) rather steep, if the slope is 15 – 45%; (5) steep, if the slope is more than 45%. In addition, slopes can also be grouped into 7 categories (in more detail), with the following classifications: (1) flat, if the slope is 0 – 4%; (2) rather flat, if the slope is 4 – 8%; (3) sloping, if the slope is 8 – 12%; (4) slightly sloping, if the slope is 12 – 15%; (5) rather steep, if the slope is 15 – 25%; (6) steep, if the slope is 25 – 45%; and (7) very steep, if the slope is more than 45%.

Fourth, hydrogeology, this is a combination of hydrology and geology. Part of hydrogeology includes the role and function of groundwater, which is a resource. Hydrology studies water as a whole, both on the earth's surface and below the earth's surface, whose main substance is the water cycle, while hydrogeology is more concerned with the movement of water beneath the surface of the earth (groundwater). Mastery of substantive hydrogeology can help humans, in managing the supply of water to residential areas, by making use of knowledge about the water cycle, and the presence of groundwater, including underground rivers. In addition, knowledge of hydrogeology is very useful when making efforts to prevent water and groundwater pollution.

The hydrogeological condition of Pucung Villages shows that Pucung Village has 13 dug wells that are in good condition, and has 3 ponds (small rainwater lakes), and 818 rainwater storage tanks which are utilized by 813 families. Clean water in Pucung Village is served by: (1) PAMSIMAS, namely PAM (Drinking Water Company) managed by the community, which is capable of serving 3 hamlets; and (2) PDAM (Regional Water Company) of Gunung Kidul Regency, which is capable of serving 5 hamlets. One of the water sources in Pucung Village, namely the Trayu water source, which, due to its urgency, has built a water pump house by the Gunung Kidul Regency Public Works Service, in September 2021. This water pump house is equipped with an electricity network from the PLN (State Electricity Company)., which is further equipped with a distribution pipeline network and installation of household channels, which total up to



150 points in 8 hamlets. With the installation of this household channel, Pucung Village is free from drought, because 10 hamlets have clean water.

In the context of groundwater, it is necessary to know that groundwater is stored in aquifers, or layers in the ground that can store and transmit water. Aquifer layers contain rock formations capable of releasing large amounts of water. Water that comes out in large quantities is able to form springs. Based on the hydrogeological conditions, it is known that the Pucung Village area is included in the high rift aquifer, which has the following characteristics: First, there are faults associated with folds and fractures, so that in this area there is groundwater trapped in these fractures. Second, these fractures are connected to one another, so that water can continue to flow even during the dry season, and when there is no rain.

In the hydrogeological context, the people of Pucung Village: (1) try to find a source of water, because they need water, and at the same time (2) control rainwater stagnation, because they don't want flooding to occur in their area. To control rainwater stagnation, the people of Pucung Village work together or work together to clean the luweng channel (infiltration) from all blockages, for example from clogged garbage, leaves, twigs, rocks and soil. For example, the Clean-up activity in Luweng which was carried out by the people of Dukuh Pucung and Dukuh Pakelkopek in Pucung Village on June 13 2021.

### **Village Non-Physical Potential**

Pucung Village has the following physical potential: First, productive age, which in the book "Girisubo District in Figures 2020" states that there are 2,305 people who are of productive age. Meanwhile, there are 494 people whose age is classified as children, while those who are classified as old are 584 people, so the dependency ratio is 46.77%, or every 2 people of productive age bear 1 person of non-productive age. Second, gender composition, which in the book "District of Girisubo in Figures 2020" states that there are 1,656 men (male) in Pucung Village, while 1,819 women (female). Thus it can be said that the gender composition in Pucung Village is relatively balanced, which statistically forms a ratio of 1 : 1.09. The book "District of Girisubo in Figures 2020" also reveals that in Pucung Village there are 849 male family heads and 115 female family heads, out of 964 family heads. This data needs attention when community empowerment is going to be carried out, especially to encourage commercial activities that are suitable for male family heads and suitable for female family heads.





Third, the level of education of the population, which in fact varies. As is known, the population of Pucung Village is 3,475 people, who have the following levels of education: (1) not going to school, as many as 581 people; (2) did not finish elementary school (elementary school), as many as 383 people; (3) graduated from elementary school, as many as 1,348 people; (4) graduated from junior high school (junior high school), as many as 682 people; (5) graduated from high school (upper level), as many as 441 people; (6) graduated from Diploma-1 to Diploma-3, 9 people; (7) graduated from Strata-1, as many as 26 people; (8) graduated from Strata-2 to Strata-3, as many as 5 people.<sup>6</sup> This education level data has a high urgency, if used as a basis for determining commercial activities during the implementation of community empowerment. For example, the existence of residents with junior high school education and high school graduation who dominate the Pucung Village, so that if you want to determine commercial activities in this village, you have to do activities that can be carried out by residents with junior high school education and high school graduation.

Fourth, resident profession, which by the Pucung Website (<https://www.pucunggiri-subo.desa.id>) revealed that various professions in Pucung Village were occupied by the community, with the following details: (1) farmers, totaling 1,703 people; (2) farm laborers, as many as 10 people; (3) migrant workers, as many as 32 people; (4) state civil apparatus, as many as 21 people; (5) retired, 1 person; and (6) home industry, as many as 57 people. The data shows that there are 1,824 people from Pucung Village who have certain professions. This figure is smaller than the number of productive age population in Pucung Village. Because the book "Girisubo District in Figures 2020" states that there are 2,305 people who are of productive age; it is known that there are 481 people of productive age who do not pursue a particular profession. uniquely,

### **Agrarian Reform**

Agrarian reform is not a new issue in Indonesia, but an old issue that has existed since the 1960s. Agrarian experts at that time stated that agrarian reform was land reform in a broader sense. Agrarian reform includes regulatory reform, asset reform (land reform/land redistribution and asset legalization), and access reform which aims to create welfare and social justice. In this regard, there are several studies that discuss agrarian reform from various perspectives that are of interest, such as: First, Nobuhiko Fuwa's research entitled "Politics And Economics Of Landreform In The

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<sup>6</sup> BPS Kabupaten Gunung Kidul. "Kecamatan Girisubo Dalam Angka 2020."



Philippines"<sup>7</sup> This research has succeeded in uncovering the fact that although policy makers are involved in land reform, their contribution is relatively small to this program. This is because the regulations they make actually make land reform inefficient, even giving negative consequences in its implementation.

Second, Jason Heit's research entitled "Rural Development And Agrarian Reform Process in Chile"<sup>8</sup>. This research succeeded in uncovering the fact that regulations can accelerate agrarian reform, especially in gaining comparative advantage, in the form of strengthening the agricultural sector. Third, research by Ronaldo F. Frufonga, Vilma S. Sulleza, and Roel A. Alli entitled "The Impact Of Comprehensive Agrarian Reform Program On Farmer Beneficiaries In The 3rd Congressional District Of Iloilo, Philippines"<sup>9</sup> This research succeeded in uncovering the fact that agrarian reform had a positive impact on farmers, through increasing farmers' income and reducing poverty among farmers.

In these three studies there are important conclusions, which can be used as a source of inspiration for implementers, activists, and agrarian reform movers, while still showing the focus contained in the research. In the first study (2000), it was shown about the role of policy makers. Furthermore, in the second study (2005), it was shown about regulations that can accelerate agrarian reform. Then in the third study (2016), it showed the positive impact of agrarian reform on farmers. Thus the research that has been carried out shows the attention of experts to the role of policy makers, the benefits of regulation, and the positive impact of agrarian reform for increasing people's income (farmers) and reducing poverty. Agrarian Reform has the following objectives: (1) to reduce inequality in land tenure and ownership as a manifestation of the application of justice; (2) dealing with agrarian disputes and conflicts; (3) creating agrarian-based sources of prosperity and social welfare, through regulation of control, ownership, use and utilization of land; (4) create jobs to reduce poverty; (5) improving people's access to economic resources; (6) increasing food security and sovereignty; and (7) improve and maintain

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<sup>7</sup> Nobuhiko Fuwa, *Politics And Economics Of Landreform In The Philippines*, (Matsudo, Chiba University, 2000) p. 73

<sup>8</sup> Jason Heit, "Rural Development And The Agrarian Reform Process in Chile." *Saskatchewan Economics Journal*, 2005. p. 71-82. Canada, University of Saskatchewan.

<sup>9</sup> Frufonga, Ronaldo F., Vilma S. Sulleza dan Roel A. Alli. 2016. "The Impact of Comprehensive Agrarian Reform Program on Farmer Beneficiaries in The 3rd Congressional District of Iloilo, Philippines." *Asia Pacific Journal of Multidisciplinary Research*, Vol.4, No.1, February 2016. Halaman 81-90



environmental quality. Nugroho<sup>10</sup> explains that structuring access in the context of agrarian reform will have a strong impact if an action plan is prepared, so that it is able to realize community welfare, which includes: (1) economic welfare; (2) psychological welfare or psychological welfare; (3) social welfare or social welfare; and (4) cultural welfare or cultural welfare.

### Community Optimism

Optimism has various meanings which are interrelated and mutually supportive, such as: First, Shapiro<sup>11</sup> states that optimism is a tendency to look at everything something in good terms and conditions, and expect satisfactory results; Second, Nurtjahjanti<sup>12</sup> explains that those who are optimistic in their work tend to expect good things to happen to them, while those who are pessimistic tend to imagine bad things will happen to them; Third, Seligman<sup>13</sup> reveals, that optimism relates to those who can best take advantage of success and continue to move forward once things start going well, and those who are optimistic are able to produce something better than before, and try to keep getting up trying again when facing failure; Fourth, Ghufon<sup>14</sup> explains that optimism is an expectation that they have about everything that will go towards good. Those who have optimistic feelings bring it to the desired goal, because they believe in themselves and their abilities, and make them get out quickly from the problems they are facing; Fifth, Kurniawan<sup>15</sup> states, that in the perspective of emotional intelligence, optimism is seen as a form of self-defense for those who are struggling, so as not to fall into stupidity, despair, and depression when faced with difficulties.

When optimism is placed in the context of Pucung Village, it is known that there are attitudes of the people and the Pucung Village Government,

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<sup>10</sup> Nugroho, Aristiono. 2023. "Community Business Action Plan Based On Regional Potential In The Framework Of Agrarian Reform." *Injuriy: Interdisciplinary Journal And Humanity*, Volume 2, Number 4, April 2023, Page 332-344.

<sup>11</sup> L.E. Shapiro, *Mengajarkan Emotional Intelligence Pada Anak* (Jakarta, Gramedia Pustaka Utama, 1997) p. 100

<sup>12</sup> Nurtjahjanti, H. dan Ratnaningsih, Ika Z. 2011. "Hubungan Kepribadian Hardiness Dengan Optimisme Pada Calon Tenaga Kerja Indonesia Wanita di BLKLN Disnakertrans Jawa Tengah." *Jurnal Psikologi Undip*, Volume 10, Nomor 2, Tahun 2011, p.5

<sup>13</sup> Martin Seligman, *Menciptakan Kebahagiaan Dengan Psikologi Positif Authentic Happiness* (Bandung, Mizan Utama, 2005), p. 117

<sup>14</sup> M. Nur Ghufon dan Rini Risnawati S. *Teori-Teori Psikologi*. (Yogyakarta, Ar-Rua Media, 2010) p. 95

<sup>15</sup> S. Kurniawan, Priyatama A.D., dan Karyanta N.A. "Hubungan Konsep Diri Dengan Optimisme." *Jurnal Ilmiah Indigenous*, 2015) p. 34



as follows: First, viewing the karst area of Pucung Village as something good, and will give goodness. This is done by identifying all potential areas, then planning the best management, and carrying out activities according to a predetermined plan. This was shown by the community and the Pucung Village Government when they collaborated with the National Land College (STPN) to carry out: (1) Participatory Research on the Potential of the Pucung Village Area, Girisubo District, Gunung Kidul Regency, in 2021; (2) Preparation of a Participatory Master Plan for Pucung Village, Girisubo District, Gunung Kidul Regency, in 2021; (3) Agrarian-Based Leadership Training for Pucung Village Government Employees, Girisubo District, Gunung Kidul Regency, in 2022; (4) Participatory Research on the Development of Agrarian Resource-Based Tour Packages in Pucung Village, Girisubo District, Gunung Kidul Regency, in 2023; (5) Agrarian Resource-Based Tourism Package Development Training for Tourists in Pucung Village, Girisubo District, Gunung Kidul Regency, in 2023.

Second, views the karst area of Pucung Village as a spirit generator for the community and the Pucung Village Government, to work hard to fight for their welfare. This was shown by the community and the Pucung Village Government, when: (1) Working hard to develop agriculture, which dominated by the use of mixed garden land, followed by dry land and rainfed rice fields, in the following order: (a) mixed garden, covering an area of 600.47 hectares; (b) Moorlands, covering an area of 138.00 hectares; (c) Rainfed rice fields, covering an area of 44.33 hectares; (2) Work hard to develop the farm, which consists of: (a) The number of cattle breeders, as many as 682 people, with 1,023 cows; (b) Number of goat breeders, 731 people, with 1,462 goats; (c) Number of chicken breeders, 802 people, with 4,030 chickens; (3) Working hard to develop small businesses (home industries), such as: (a) Wotawati's signature cassava chips, which are produced without MSG, without preservatives, and without coloring by UMKM Padukuhan Wotawati, and consist of four flavors, namely: original flavor, salty, balado flavor, and roasted corn flavor; (2) Soybean crackers, banana chips, purple sweet potato sticks, coconut roots produced by UMKM Dewi Chips. Specifically for soybean cake and coconut root products, they have been certified halal from the Ministry of Religion; (3) The home product of the Pucung Padukuhan community, Pucung Village, is in the form of "bendrad", which is fried cassava leaves neatly woven and topped with sufficient flour.



(4) Working hard to develop tourism, in the form of tour packages: (a) staying at a homestay in Wotawati Hamlet, to enjoy the atmosphere and culinary and cultural treats in Wotawati Hamlet; (b) exploring the ancient Bengawan Solo, by exploring the Wotawati Hamlet, Ngreyung Hamlet, Traju Hamlet, Karang Tengah Hamlet, Benge Hamlet, and Pakel Kopek Hamlet, to find out the geological, geographical, sociological and cultural aspects of the community; (c) visiting Srakung Beach, to enjoy the beach tourism area which is quiet and gives a private impression; (d) exploring Nujo Hamlet and Wonotoro Hamlet, to enjoy the natural beauty and agricultural situation in the two hamlets; (e) visiting Nungap Beach, to find out about the swallow's habitat on the coastal cliffs, which in the past was a source of income for the local community; (f) exploring Kandri Hamlet, Pucung Hamlet, Karang Tengah Hamlet, Traju Hamlet, and Ngereyung Hamlet, to enjoy the natural beauty and agricultural situation in these hamlets; and (g) return to the homestay in Dusun Wotawati.

Third, views the karst area of Pucung Village as an agrarian resource that can be utilized for the development of Pucung Village, by utilizing all the potential of the karst area in this region as the basis for organizing tour packages. This is demonstrated by the community and the Pucung Village Government through the improvement and arrangement of: (1) Physical facilities, such as infrastructure that supports the Pucung Village tour package, such as the safety fence for Nungap Beach and stone roads which are spread evenly throughout Pucung Village. (2) Intellectual, such as knowledge of the Ancient Bengawan Solo and the landscape of Pucung Village, as well as the brand and tagline of Pucung Mandara (Mandiri Damai Sejahtera) and Dewi Purbo (Pucung Girisubo Tourism Village). (3) Human resources in the form of available manpower, such as those who are members of the Pokdarwis (Tourism Awareness Group). (4) Financial, such as credit and cash that can support Pucung Village tour packages. (5) Technology, especially related to promotional media through social media, such as websites, Facebook, Instagram, and Twitter.

Fourth, views that the karst area of Pucung Village can be used to achieve the goal of creating an independent, peaceful and prosperous Pucung Village. This is shown by the community and the Pucung Village Government through attitudes and concrete actions in improving the welfare of the community independently and peacefully by utilizing the iconic potential of Pucung Village, namely: Bengawan Solo Purba. As it is known Bengawan Solo is the longest river on the island of Java, which is 548.53 km long and crosses two provinces (Central Java Province and East





Java Province). The headwaters of this river are on the slopes of Mount Lawu, then it flows through various areas, such as: Wonogiri, Solo, Ngawi and Bojonegoro, and finally empties into the Java Sea. But in the past, Bengawan Solo had a different flow from the current flow.

As is well known, currently the Bengawan Solo flows north, whereas four million years ago this river flowed south and emptied into the Indian Ocean. However, this condition has changed, due to the movement of the Indo-Australian plate. The Ancient Bengawan Solo (Bengawan Solo in four million years ago) stretches for 20 kilometers. The movement of the Indo-Australian plate has caused the Ancient Bengawan Solo to dry up, and then disappear. However, traces of the ancient Bengawan Solo sect can still be found today. One area that shows evidence of the legacy of the Ancient Bengawan Solo is the Gunung Sewu area, to be precise in the Pucung Village, Kapanewon Girisubo, Gunung Kidul Regency. In this area there is a basin which is the former flow of the Ancient Bengawan Solo. This basin then ends at Sadeng Beach which is now the Sadeng Fish Landing Port (PPI) area, and is the largest PPI in the Special Region of Yogyakarta.

The basin that shows traces of the Ancient Bengawan Solo is known by the public as the Baturetno Basin, which extends from Sadeng Beach to the area around the Gajah Mungkur Reservoir, with an undulating plain topography and an altitude of 150-175 meters above sea level. The Geo.web.id site reveals that the Baturetno Basin is a cross between fragmental limestone and calcarenite and calcilutite rocks. Currently, the area in the former Bengawan Solo Purba flow is fertile land, capable of supporting farming families. This can be seen in the large number of residents who use this land for farming. Meanwhile, the Historicalunik.net site reported that the change in the flow of the Ancient Bengawan Solo was due to a tectonic uplift, four million years ago, when the Australian Plate pushed under the Eurasian Plate. This is because the density of the Australian Plate is heavier than the Eurasian Plate, resulting in a subduction zone or subduction zone. As a result, the Eurasian Plate, which is lighter in density, is lifted to the surface. The subduction process causes the lifting of areas of shallow sea waters which are full of coral reefs and corals. It is this sea area that later forms the Gunung Sewu Karst area which stretches from Gunung Kidul Regency and Wonogiri Regency, to Pacitan Regency.

The elevation of this tectonic area has caused the Bengawan Solo River, which is heading south, to be dammed. The flow changes to the north towards the Java Sea by crossing the folds of the Kendeng Mountains and the Rembang Mountains. That river was later known as the Bengawan Solo.



Based on the results of research on ancient human life, it is known that in the area which in the past was the flow of the Ancient Bengawan River, many prehistoric relics were found, such as fossils of marine animals and food remains of early humans, as well as the caves where they lived.

Administratively, Bengawan Solo Purba is located in 3 (three) hamlets (hamlets) in Pucung Village, Kapanewon Girisubo, Gunung Kidul Regency. These hamlets consist of: (1) Wota Wati Hamlet; (2) Ngreyung Paddock; and (3) Padukuhan Benge. Meanwhile, as a tourist attraction, the Ancient Bengawan Solo requires adequate stop sights, and requires wide roads, so that passing vehicles can be safer and more comfortable when they pass each other. Fifth, views the karst area of Pucung Village as something that must be handled intelligently and must not be discouraged or give up. This was shown by the community and the Pucung Village Government in the form of use and utilization of land. The book "District of Girisubo in Figures 2020" states that land use in Pucung Village is dominated by the use of non-rice farming land, which covers an area of 961.00 Ha. Meanwhile, the non-agricultural land area is 481.60 Ha, or 33.38% of the total area of Pucung Village which reaches 1,442.60 Ha (Gunung Kidul Regency BPS, 2020: 7).

The 2020 Pucung Village Monograph criticizes the data in the book "Girisubo District in Figures 2020" which does not mention the area of rainfed rice fields, amounting to 44.33 Ha. Therefore, the use of land in Pucung Village is no longer limited to non-rice and non-agricultural agriculture, but also the use of paddy fields (rainfed). Thus, the land use of Pucung Village consists of: (1) rain-fed rice fields, covering an area of 44.33 Ha, or 3.07%; (2) dry land area of 138.00 Ha, or 9.57%; (3) mixed gardens, covering an area of 600.47 Ha, or 41.62%; (4) settlements, covering an area of 462.47 Ha, or 32.06%; and (5) public facilities, covering an area of 197.33 Ha, or 13.68%. The 2020 Pucung Village Monograph Criticism of the data in the book, "Girisubo District in Figures 2020," does not change the dominance of the use of non-paddy agricultural land in Pucung Village; rather it emphasizes that the dominant use of non-wetland agricultural land is mixed gardens, namely an area of 600.47 Ha, or 41.62%. Meanwhile, Pucung's website shows data on land use, as follows: (1) corn, covering an area of 12 hectares; (2) peanuts, 30 Ha; (3) lowland rice (rainfed), covering an area of 44.33 Ha; (4) cassava, covering an area of 15 Ha; (5) coconut, covering an area of 5 Ha; and (6) elephant grass, covering an area of 13 Ha.



## CONCLUSION

The optimism of the community and Pucung Village Government in the utilization of the karst area within the framework of agrarian reform is marked by: First, the sincerity of the community and Pucung Village Government, when working with the National Land College (STPN) to carry out participatory research activities and community empowerment; Second, the sincerity of the community and the Pucung Village Government when working hard to develop agriculture, animal husbandry, small businesses and tourism; Third, the seriousness of the community and Pucung Village Government, when carrying out repairs and arrangements for physical, intellectual, human resource, financial, and technological facilities; Fourth, the seriousness of the community and Pucung Village Government when improving the welfare of the community independently and peacefully by utilizing the iconic potential of Pucung Village, namely: Bengawan Solo Ancient; Fifth, the seriousness of the community and Pucung Village Government when carrying out land use and utilization activities.

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