Becoming a Resilient Community Fighting the Drought Disaster

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Abstract: Several areas in Tanah Datar Regency, including Rangkat and Lima Kaum Districts, are beginning to experience drought, threatening crop failure due to the extreme heat. This situation is further aggravated by the Galodo disaster that occurred in 2024. The purpose of this study is to transform Lima Kaum Village into a community resilient to drought disasters. The methods employed include counseling, training, workshops, and field practice assistance. The outcomes of the study are as follows: 1) an increase in community knowledge and skills to effectively address drought disasters, 2) improved understanding and skills in maintaining and restoring the fertility of rice fields, particularly after the Galodo disaster, 3) enhanced knowledge in managing planting patterns to adapt to the unbalanced dry and rainy seasons, and 4) an increase in farmers' knowledge of producing eco-enzyme as a sustainable solution for improving agricultural productivity.

1 INTRODUCTION

Global warming due to increasing concentrations of greenhouse gases (GHG) in the atmosphere has caused climate change. Changes in rainfall patterns, seasonal shifts, increasing temperatures, and rising sea levels that are currently occurring have impacted various sectors and human life. Crop failures due to extreme climate events are increasingly frequent and widespread. Water availability is also decreasing because the dry season tends to be drier. The explosion of pest/disease cases in plants and humans also tends to increase which is thought to be related to global warming and climate change (Ministry of Environment 2015). Drought is one of the natural disasters caused by uneven distribution of rainwater, which causes the volume of surface water such as rivers, lakes, reservoirs, and others in several areas in Indonesia to fall below the minimum threshold or even due to prolonged drought which causes depletion of groundwater reserves due to evaporation and transpiration (Surmaini, 2016). Drought can be a natural disaster if an area loses its source of income due to disruption of the agricultural sector, in this case in the form of land conversion such as rice fields. However, it is not known for sure when this disaster begins and ends. In general, people only realize when the water in the well runs out, when the Regional Drinking Water Company (PDAM) or Regional Drinking Water Company experiences congestion, and even when the river experiences seasonal drought (Syamsuri, 2021).

In accordance with the RPJMD Mission of Tanah Datar Regency and City 2021-2026 in mission 2, namely Improving the economy of the Tanah Datar Regency community and expanding employment opportunities based on agriculture, industry and MSMEs. This mission aims to realize community welfare as described through increasing GRDP per capita, reducing unemployment rates and increasing the rate of economic growth by developing more productive economic activities based on the people, encouraging the region's leading sectors [RPJMD Tanah Datar Regency 2021-2026 (BPPP, 2021). Agricultural drought is defined as the lack of groundwater availability to support the growth of food crops and livestock from normal rainfall over a certain period of time. This agricultural drought occurs after symptoms of meteorological drought. The dry season is identical to conditions of decreasing rainfall, or rainfall below normal, so it is certain that a number of areas experience drought.

The agricultural sector requires more than 70% of water for consumption crops (Pratiwi, 2020). Water is a natural resource that is very much needed by humans. During the rainy season, water in several

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regions of Indonesia tends to be excessive and in several regions there is a shortage of water during the dry season (Veni, 2021). Drought disasters have a negative impact on the agricultural sector and crop production. Drought is a global challenge for the world community and has occurred in all countries (Widyastuti, 2020). Drought is basically caused by hydrological conditions in areas with unbalanced water conditions. Drought occurs due to uneven distribution of rainfall. Occurs in an area. This imbalance in rainfall causes an imbalance between water supply and rice field production in several areas with low rainfall. The existence of irregular changes in seasons such as a prolonged dry season causes drought in agricultural land, thus affecting agricultural crop production such as decreasing production and even experiencing crop failure (Veni, 2021).

Several areas in Tanah Datar Regency, West Sumatra are starting to experience drought and are threatened with crop failure due to hot weather and damaged agricultural irrigation channels in the area, such as areas in Tanjung Baru, Rambatan and Lima Kaum Districts. The impact is that if this dry season lasts a long time, around tens of hectares of rice fields in the area will be affected by the threat of crop failure (Faiza, 2020). Around 150 hectares of rice fields owned by farmers in Jorong Sungai Salak, Tanjung Oh My District, Tanah Datar Regency, West Sumatra, experienced drought after more than a month of no rain in the area. Most of the rice fields in Jorong Sungai Salak are rain-fed land. Residents only expect rainwater when they want to go to the rice fields, if it is hot like this, they are forced to leave it until the rainy season arrives. As a result of these conditions, around 150 hectares of agricultural land in the area have been abandoned. unemployed. There are even residents' lands that have been forced to be left unplanted for a year, because farmers cannot force themselves to plant rice if they do not have access to water (Rahman, 2012). The agricultural lands owned by residents in Rambatan and Lima Kauman Districts are now starting to turn yellow due to not receiving water supply. In addition, the rice fields are also cracked due to the lack of sufficient water supply. Even though they have taken turns channeling water to their rice fields at night with a queuing system, it is still not enough for their rice. Farmers in the district really hope for rain, so that the rice plants do not die (Padang Regional Regulation, 2019).

In general, the specific problems of farmers in Lima Kecamatan Village related to the problem of drought are: Farmers' knowledge in saving is still low. water during the rainy season, droughts still often occur which cause crop failures, Farmers' knowledge in increasing agricultural productivity is still lacking, Farmers' knowledge in utilizing land according to the potential and limitations of the land is still lacking, They have not been able to develop farming patterns to increase entrepreneurial spirit and improve farmers' economy, and farmers' knowledge in managing farmer group organizations is still limited. For this reason, it is necessary to create a disaster-resilient community. A disaster-resilient community is a community that is responsive, trained, steadfast and resilient to all forms of potential disasters that occur, including drought. In accordance with the Padang City RPJMD Mission 2019-2024 in the 6th mission, namely to create a community that is aware, caring and resilient to disasters. A disaster-resilient community is a community that is responsive, trained, steadfast and resilient to all forms of potential disasters that occur, including drought (BPPP, 2021). In accordance with the 2021-2026 Tanah Datar Regency RPJMD Mission in mission 2, namely Improving the economy of the Tanah Datar Regency community and expanding employment opportunities based on agriculture, industry and SMEs. This mission aims to realize community welfare which is described through increasing GRDP per capita, reducing unemployment rates and increasing the rate of economic growth by developing more productive economic activities based on the people, encouraging the region's leading sectors [Tanah Datar Regency RPJMD, 2021].

2 RESEARCH METHODS

This research is a qualitative research where to obtain data must go into the field with discussions with the community. The approach methods offered in solving partner problems are as follows: 1) Direct discussion with the Lima Kaum community and with village heads and farmer groups experiencing drought, what factors hinder the implementation of adaptation and mitigation in dealing with this drought disaster, preparing farmers to be resilient in saving water and overcoming this drought, 2) Community service at the irrigation location for their rice fields so that tertiary channels can flow directly to their rice fields, 3) Training on adaptation and mitigation of drought disasters, The targeted output is the birth of a community that is aware, cares and resilient to drought and other disasters can carry out the planting patterns that have been prepared, 4) Training on the use of vegetable and fruit waste for the manufacture

of eco-enzymes, 5) Utilization of natural materials for the manufacture of botanical pesticides.

The most appropriate and frequently used approach method in this study is related to training. This training is most appropriate for activities with this theme.

3 RESULTS AND DISCUSSION

Lima Kaum Village is a nagari with an area of 2,300 Ha and consists of 8 jorong, namely Jorong Dusun Tuo, Koto Gadih, Balai Batu, Tigo Tumpuak, Balai Labu Oh, Balai Labu Bawah, Kubu Rajo, and Piliang. Its astronomical location is 100 o 28 '19" - 100 o 37' 24" East Longitude, 0 o 26' 42" - 0 o 31' 01" South Latitude. The topography of Limo Kaum Village is at an altitude of ± 400 M above sea level with topographic conditions in the form of highlands and undulating, an average temperature of 25 to 32 ° C. Administratively, Limo Village borders 4 other villages, namely to the north it borders Baringin Village, to the south it borders Rambatan Nagari, to the east it borders Beringin Nagari, and to the west it borders Cubadak Village (BPPP, 2021). The research location can be seen in Figure 1 below.

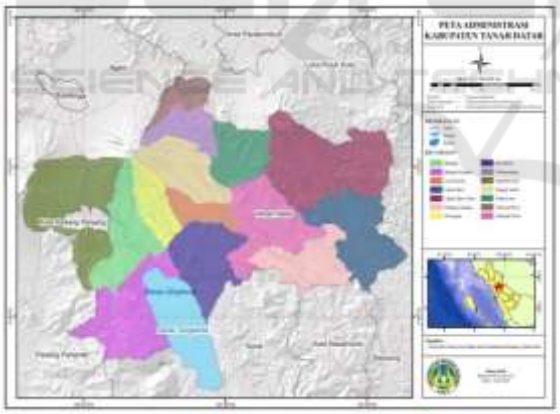

Figure 1: Research Location Map.

The results of research activities related to efforts to realize a Drought Resilient Society are presented in this chapter. The following will describe the implementation of research activities that have been carried out:

3.1 Discussion

This discussion was directly with the apparatus in Lima Kaum sub-district regarding the disaster that occurred, namely the galodo which buried agricultural land in this sub-district. Farmers experienced crop failure because the galodo disaster first destroyed their rice fields. We discussed the form of devotion that we could do here, especially to restore the fertility of their agricultural land. Our team explained that our theme was actually related to drought, but because this area had just experienced a galodo disaster, with the approval of the village head, Mr. Fadhli Tarmizi SH, we hoped that we would focus more on helping to increase the fertility of farmers' land, especially in 2 jorong, namely Balai Labuh Atas and Balai Labuh Bawah.

3.2 Survey Activities to Galodo Disaster Location in Rice Fields

The research was conducted on August 12, 2024, as well as discussions and reviews of the galodo disaster site that had buried the community's rice fields in Lima Kauman Village. All rice fields on the left and right sides of Batang Malana were buried and were confirmed to have failed harvests.

Figure 2**:** Condition of Rice Fields after the Galodo Disaster.

The Galodo disaster that hit West Sumatra, especially the Lima Kaum Village in Tanah Datar Regency on May 11, 2024, has had an impact on the loss of human lives and agricultural land as well. Muddy rivers formed in the tributaries with wider sizes. Several residents cried over their livestock that were in pens that had disappeared. The green expanse of rice fields and chili and other vegetable gardens in several areas in Tanah Datar had turned black, covered in mud that formed the river. Complete with large rocks and large trees that had been cut into pieces. Head of the Tanah Datar Communication and Information Service Yusrizal, Monday (05/20/24) in Batusangkar. He added that the flood that occurred on Sunday (05/12/24) occurred in 6 Districts and 13 Nagari in Tanah Datar, and the most severe occurred in the Lima Kaum and X Koto Districts. This disaster has killed 32 Tanah Datar residents and 10 others are still missing, 13 were slightly injured and 7 were seriously injured. Not only that, as many as 15,032 livestock (cows, buffaloes, ducks) were swept away by the flood. And more than 200 two-wheeled and four-wheeled vehicles belonging to Tanah Datar residents were damaged and lost.

Many farmers are pensive with the disaster that befell their land, most of the rice fields will face the rice harvest season, but what happens is that their land is covered in mud, they do not know when they will cultivate the land to plant rice again. The process of land clearing and removing sand material that has accumulated on their land is still long. It is necessary to carry out land potential assessment activities and land fertility evaluations to increase sustainable land productivity (Wilis, 2024). Land capability evaluation is an effort to utilize land according to its potential (Wilis, 2020).

3.3 Socialization and FGD (Focus Group Discussion) Regarding Drought Resilient Disaster

Drought is a type of complex natural disaster characterized by a long-term water shortage. Drought occurs slowly (slow on-set) with a duration until the rainy season arrives, and has a very broad impact and is cross-sectoral (economic, social, health, and education) (IRBI, 2015). Drought can be caused because an area does not experience a rainy season or dry season for a long period of time or rainfall is below normal, so that the water content in the soil decreases or even disappears. According to Indarto et al., (2014) in general, the beginning of a drought disaster cannot be known, but it can be said that drought occurs when the available water is no longer sufficient for daily needs. Land damage and the impact of losses caused by drought are very extensive and the economic value of the losses is quite large. Drought can be classified based on the characteristics and impacts caused. The FGD related to drought was held on Wednesday, September 19, 2024 at the office of the Head of Limo Kaum Village, which was attended by representatives of farmer groups, village heads and village officials. The resource person other than the UNP team led by Mrs. Dr. Ratna Wils, S.Pd, MP was also present, the Head of BMKG Bukit Koto Tabang, namely GAW Station, Mr. Dr. Sugeng Nugroho, S.Si, M.Si. He provided material related to drought and disasters that often hit the Limo Kaum village area, especially the galodo disaster.

Community resilience strategies for drought can be done by: 1) Saving water during the dry season, accompanied by making water storage containers when it rains and very useful for farmers during the dry season later, 2) Farmers are disciplined in following the planting patterns prepared by the agricultural service and are on the website siaptanam.bsipkementan.id, 3) Utilization of agricultural waste to make compost, 4) utilization of fruit and vegetable waste to make eco-enzymes.

The FGD event was opened by the Mayor of Limo Kaum Village | Group Photo of FGD Participants

Figure 3: Socialization and FGD on drought management with the community and farmer group members.

The long-term strategy that must be done is to prepare activities for the coming year, coincidentally this will continue for the next 2 years with continued activities to increase farmers' knowledge in overcoming drought.

Specifically, there are four types of drought (Wilhite, 2010), namely:

a. Meteorological Drought This type of drought refers to a lack of rainfall compared to average

conditions, over a long period of time. The intensity of the drought is determined by meteorology.

b. Agricultural Drought Agricultural drought is defined as a decrease in the availability of groundwater below the optimum level required by rice plants at any stage of their growth and reduces crop yields. The intensity of drought according to the agricultural definition is assessed by the percentage of dry leaves. area for rice plants.
c. Hydrological Drought Drought occurs when there is a decrease in the availability of water on the surface and underground due to reduced rainfall, which is characterized by a significant reduction in surface water flow to below normal conditions or the cessation of groundwater recharge.
d. Socio-economic drought This type of drought occurs when there is a disruption in human activities due to reduced rainfall and water availability. This form of socio-economic drought links human activities with meteorological, agricultural, and hydrological drought elements.

Our planting pattern provides solutions to farmers by guiding them to the planting pattern that has been prepared by the government. We provide socialization based on the computer-based ready-to-plant web on the siaptanam.bsipkementan.id web. From the web results for the Lima Kaum Regency area, the planting pattern for October-March 2025 is Paddy-Paddy-Paddy, since it is still in the rainy season. The farming community was very enthusiastic in following the training provided, in the socialization session, 25 farmers who were invited were all present. During the training on making eco-zymes and arranging planting patterns, all the invited farmers also came, coincidentally representatives from the invited group members. The village head was always present and gave full support to this activity.

3.4 Making *Eco-Enzymes* to Increase the Utilization of Vegetable and Fruit Waste

Ecoenzyme is a dark brown complex organic substance solution with a strong fresh sour aroma, produced from the fermentation of vegetable and fruit waste with the addition of sugar and water. In general, ecoenzyme can be used as a multipurpose cleaning fluid for household purposes such as washing dishes, mopping, cleaning bathrooms, and so on. *Ecoenzyme Enzyme* is fluid dark chocolate fermented from water, fruit and vegetable skins, and brown sugar in a ratio of 10 : 3 : 1. *Eco Enzyme* is very easy to make, especially for mothers who have a lot of fruit and vegetable waste. This liquid can be *used as a* household cleaner and as fertilizer and also pesticide experience which is effective. *Eco Enzyme* can also reduce the greenhouse effect and global warming, provide benefits to marine plants and marine biota, and reduce pollution. *Eco Enzyme* is solution substance organic complex made from the fermentation process of organic residue, sugar, and water. (Nisawati and Yahya, 2020).

One of the efforts to boost agricultural productivity is by applying Eco enzyme to plants that can be used as natural pesticides and also as organic fertilizers and bio fertilizers, by using eco enzymes will also reduce the use of chemical fertilizers sustainably. The benefits of eco enzymes for agriculture are as air filters, natural herbicides and pesticides, reducing indoor smoke, water filters, natural fertilizers for plants and reducing the greenhouse effect. How to apply eco enzymes to rice fields as fertilizer is by spilling eco enzymes into rice field irrigation. Eco enzymes can also be used as compost by mixing other ingredients and adding eco-enzyme liquid. Hopefully eco-enzymes can be useful for overcoming drought in agricultural land because the soil will be more fertile and the organic matter of the soil will increase.

Types of Waste can be grouped into several categories, namely: 1) based on origin suggestion, 2) characteristics, And 3) Form. Types of waste are divided into 2 (two) types. as follow: 1) rubbish organic and 2) rubbish inorganic. Rubbish organic is a type of waste that can be broken down into other items compost, like remainder food, dry leaves, vegetables. (Prasetio *et al* ., 2021). Inorganic waste is waste that cannot be regenerated and takes a long time to decompose. However, inorganic waste inorganic Can recycled repeat into something useful. For example, plastic bottles, used paper, boxes, and used cans. Inorganic waste difficult to process into environmentally friendly materials so that it becomes an environmental problem. (Muarief *et al* ., 2023). Processing of vegetable and fruit waste includes activities that apply a technoecological agricultural model, namely utilizing waste from the surrounding environment and including efforts to increase farmer productivity in cultivating their land (Wilis, 2017). This research can increase farmers' knowledge in overcoming drought by regulating planting patterns, as well as knowledge in overcoming galodo disasters, namely by increasing land fertility and making eco-enzymes, namely multi-purpose solutions. As many as 80% of the farming community can already do this.

In the future, in addition to several stages to deal with the drought above, we also need to do several things to prepare for drought with broader disaster management in order to overcome the various risks faced by farming communities, namely 1) Complying with and being alert to weather information from BMKG, 2) Making water containers, especially used during the rainy season and sangar means used in the dry season, 3) Complying with the planting patterns that have been prepared by the relevant agencies and trying to plant simultaneously, 4) Increasing land productivity after the galodo disaster by utilizing agricultural waste such as making compost, eco-enzymes, botanical pesticides, processing agricultural products and others, 5) Land management based on conservation because nature in this location tends to be rough.

4 CONCLUSION

Drought can have very broad, complex and long-term impacts after the drought ends. This broad and long-term impact is because air is a basic and vital need for all living things that cannot be replaced by other resources. The impact on the agricultural sector is limited irrigation water, reduced planting area, decreased land productivity, decreased food crop production, and decreased farmer income. Meanwhile, from the social sector, drought disasters can cause widespread division and conflict, including conflicts between water users and between governments. The results of this study are: 1) increased community knowledge and skills in dealing with drought disasters, 2) increased community knowledge and skills in maintaining and restoring the fertility of their rice fields, especially after the Galodo disaster, 3) increased knowledge and skills in dealing with drought disasters, regulating planting patterns especially in adapting to unbalanced dry and rainy season conditions, 4) increased farmer knowledge in making Eco Enzyme.

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