Research Article

Characteristics of Drought Exposed Areas in Kradenan Village, Kradenan Sub-district, Grobogan Regency, Central Java Province, Indonesia

Puji Hardati*, Ananto Aji, Lukki Lukitawati, and Diyah Saputri Ayu Sartikasari

Universitas Negeri Semarang, Indonesia

ORCID
Puji Hardati: https://orcid.org/0000-0003-4023-2159

Abstract.
Drought is a reoccurring phenomenon, with its impact spreading to more areas each year. Preparedness efforts rely on available resources, both natural and human. This study examines the characteristics of areas exposed to drought, focusing on natural and human resource variables. The study covers villages and their residents, using descriptive analysis and frequency distribution tables for data interpretation. Findings show that in areas experiencing drought, land use is divided into 31.51% paddy fields, 51.98% dry land, and 16.51% residential yards. The average annual rainfall is 171 mm, with rainfall occurring on only eight days per year. Rice fields use water from semi-technical and rainfed irrigation. Human resources in these regions are limited, with most residents having only primary school education and agriculture as their main occupation. Over the past five years, these areas have consistently experienced drought, highlighting the need for targeted mitigation strategies.

Keywords: characteristics, drought, natural resources, human resources

Corresponding Author: Puji Hardati; email: puji.hardati@mail.unnes.ac.id

Published 16 May 2025

Publishing services provided by Knowledge E

Selection and Peer-review under the responsibility of the ICORSIA 2024 Conference Committee.

1. Introduction

The phenomenon of drought occurs globally, regionally and locally, its spread is increasingly widespread. Indonesia is a country with a wealth of resources, both resources and human resources. Indonesia's geographic and geodynamic position places it in one of the areas prone to natural hazards or natural disasters (1)(2). This situation was followed by an increasing number of people, namely 235 million, ranking fourth in the world's population, which has reached 7.7 billion (3).

The number of residents is increasing with increasingly complex life needs, especially water needs. During a pandemic, a health protocol is one that everyone should follow, and the three main pillars are wearing a mask, keeping your distance, washing your hands. Washing hands with clean water and soap is one of the jargon. This shows that

water is a human need that must be met. Meanwhile, the availability of water is increasingly limited, resulting in frequent droughts. Drought often causes a disturbance to all living things and industrial activities,and reaches the socio-economic conditions of the population (1)(3). The location and extent of areas exposed to drought are very dynamic from time to time. In Indonesia, the incidence intensity and area of areas experiencing drought have continued to increase, from 77 percent in 2002-2011 to 99 percent in 2014 (5). Research by Farah et.al. shows the pattern and distribution of drought potential with the results of drought potential in Grobogan dominated by medium class, in 2021 covering 81% and increasing to 82%. In 2021, the high class drought potential covers an area of 4.02% around Kedungjati and Grobogan sub-districts. In 2022, the potential for high class drought increased to 7.08% covering Kedungjati and Brati sub-districts. The results of 2021 and 2022 show that the distribution pattern of high-class drought potential is in the western and northern parts of Grobogan (6).

Research on drought has been carried out by various experts(1)(2)(5)(7), most of the research examines the natural physical conditions of the area, rarely studies the population. This research provides an assessment of natural resources and human resources, with a more dominant portion of the population in the analysis, so it is hoped that this research can complement existing research. This study aims to analyze the characteristics of areas exposed to drought.

2. Literature Review

Preparedness is a series of activities carried out as an effort to eliminate and or reduce the threat of disaster. The threat of disasters in Indonesia is earthquakes, tsunamis, floods, landslides, volcanic eruptions, drought, extreme waves and abrasion, extreme weather, forest fires, building fires, epidemics and disease outbreaks, technological failures, social conflicts (8).

Drought is a form of disaster, and is a condition or condition of insufficient water needs for daily living needs. Drought is characterized by a lack of water for basic daily needs. Regional conditions are one of the resources that determine the yield in areas where drought occurs. Drought is one of many forms of natural disaster. Drought is a natural phenomenon of water shortage by residents. Drought can be grouped into 4 (9), namely meteorological drought, hydrological drought, agricultural drought, socio-economic drought. Social economic drought occurs when the demand for an economic

good exceeds supply as a result of a weather-related shorfall in water supply. Socio-economic drought is a shortage of clean water supply that occurs on a household and non-household scale. This research focuses on socio-economic drought, namely the lack of clean water experienced by residents to meet their daily needs

Resources are something that can be used to support all activities, both natural and non-natural, both of which cannot be separated just like that, but interact with each other, are interrelated and there is interdependence between them.

2.1. Natural Resources Characteristic

Natural resources are everything that comes from nature and can be used for the fulfillment of human life. Natural resources can be divided into two, namely non-living natural resources and living natural resources. Non-living natural resources consist of land, land, water and air including sunlight and wind. Living natural resources consist of all types of plants and animals. Natural resources are very important in human life.

2.2. Human Resources Characteristics

Human resources are people, residents who are willing and able to contribute to efforts to achieve goals. Humans, residents in the concept of resources are very valuable assets for an area. Human resources are a form of capital just like any other form of capital (10). Human resources ar the people who are ready, willing and able to contribute to organizational goals (11). Human resources are assets that determine the success of a business in all lines and scopes.

Human resources can be assessed from two aspects, namely quantity and quality. The quantity aspect is the total population in an area, and the quality aspect is the ability of human resources, both physical and non-physical. The quality aspect of human resources is assessed from their education and work. With these two things, residents will be able to interact with the environment and use natural resources in improving their quality of life.

3. Research Methodology

The research was conducted in Kradenan Village, Kradenan District, Grobogan Regency. It is one of the villages of 280 villages in Grobogan Regency (12). The research location

was determined purposively, with the consideration that Kradenan Village was exposed to drought in 2019, which had occurred during the last 5 years. This research uses a quantitative approach. The study population was the Kradenan village area and the total population in the Kradenan village, this study was a population study. The research variable was characteristic with natural resources and human resources as sub-variables. Data analysis using descriptive percentage with frequency tables. The analysis step, namely identifying to make a percentage analysis, then described it narrative.

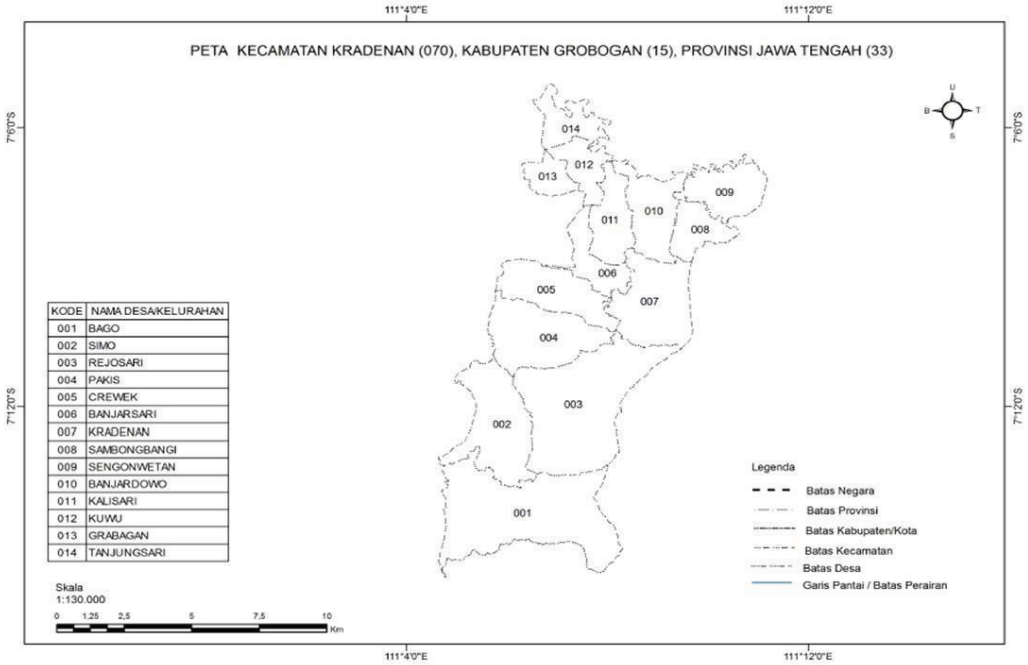

Figure 1: Map of Kradenan Village.

4. Research Result and Discussion

Kradenan Village is administratively included in the Kradenan District, Grobogan Regency, Central Java Province. In absolute terms, the coordinates of the village office are at 7,150113 South Latitude and 111,148660 East Longitude. Kradenan Village is bordered by several other villages around it, namely in the north of Sambongbangi Village, Banjardowo Village, Kalisari Village; in the west of Banjarsari Village, Crewek and Pakis Village; south of Rejosari Village; and in the eastern region of Gabus District. The characteristics of Kradenan Village are explained based on natural resources, human resources (12).

4.1. Characteristics of Natural Recources in Kradenan Village

The characteristics of natural resources that are studied include the area and use of land, dominant crops, dominant livestock, and rainfall. The land area in Kradenan Village is about 10, 93 percent of the total area of Kradenan District. Land in Kradenan Village is used for activities in the agricultural and non-agricultural sectors. The most dominant use of agricultural land is used for agricultural land use, reaching 68.51 percent of the village area. The use of land for rice fields reaches 31.49 percent of the total area, using semi-technical irrigation and rainfed, rainfed rice land reaches 41.78 percent. In addition, the dominant type of food crop other than rice is corn. The types of livestock that are mostly maintained by residents are cows, goats and local chickens or non-race chickens (12).

Table 1: Natural Resources in Kradenan Village.

No	Component	An Area (hectares)	Percentage
1	An Area	1.177,695	10,93
2	Agricultural Land use (paddy fields)	371,120	31,51
3	Dry land use	612,095	51,98
4	Yard land use	194,480	16,51
5	Semi tecnical irrigation	216	58,22
6	Rainfed	156	41,78
7	dominant food crops: rice and maize	209	17,74
8	livestock: cows (tails)	1.047	5,58
9	goats (tails)	117	7,61
10	domestic chickens (tails)	1,533	5,71

Source: Central Bureau of Statistics and UPTD Agricultural of Grobogan Regency, and analysis results

Rainfall in the Kradenan Village area is very low. The average monthly rainfall for a year is only 171 mm. The most rainfall occurs in December, namely 462 mm, and the lowest is in August, namely 35 mm, while in July there is no rain. The average rainy day per year is only 8 days per year. The rainiest days occur in February, reaching 12 days, and the least rainy days occur in August, which is only 2 days (10).

4.2. Caracteristic of Human Resouces

The population in Kredenan Village is dominated by the productive age population, reaching 69.07 percent, the number of children (aged 0-14 years) is only 23.02 percent, while the number of elderly people reaches 7.92 percent. The dependency ratio or dependency ratio reaches 45.10, meaning that in Kradenan Village, every 100 productive population accounts for 45 young and unproductive people. So that Kradenan Village has entered the demographic bonus process. This demographic bonus must be followed by a better quality population, because this demographic bonus will not have a better meaning if it is followed by a good quality population, the demographic bonus must be sought not to be taken for granted, the demographic bonus is both a hope and a challenge.

Table 2: Human Resourches in Kradenan Village.

No	Component	Frequency (Amount)
1	Population (souls)	8.284
2	Male (percent)	49,23
3	Female (percent)	50,77
4	Sex Ratio	97,89
5	0-14 (percent)	23,02
6	15-64 (percent)	69,07
7	>65 (percent)	7,92
8	Dependency Ratio	45,10
9	Demography Bonus	<50
10	Millenial Population (percent)	37,87
11	Working age population (percent)	69,07
12	Population dencity (souls/scuare)	703
13	Population growh (percent) (2011-2019)	-0,51

Source: Central Bureau of Statistics of Grobogan Regency and analysis results

In Kradenan Village, one-third of the population belongs to the millennial demographic group. This group has significant potential to drive development in various areas, particularly in addressing the challenge of drought. Millennials, as a generation more adept at utilizing information and communication technology, are expected to spearhead progress in the village. Their role is crucial in maximizing the benefits of the demographic bonus by introducing creative and innovative solutions to manage and mitigate the impacts of drought effectively.

Kradenan Village has a low population density of 703 people per square kilometer, which is categorized as arithmetic or gross population density. This measurement compares the total population to the total land area, including productive, less productive, and unproductive land. The total population figure also encompasses individuals across all age groups, from children to the elderly, reflecting a holistic view of the community's demographic structure.

Table 3: The Education Level Employment Structure of The Population in Kradenan Village.

No	Component	Frequency (percent)
1	Basic Education	63,33
2	Middle Education	26,77
3	Hight Education	0,00
4	Average long school	6,4

Source: Central Bureau of Statistics of Grobogan Regency and analysis results

Kradenan villagers, some of whom are already working, have jobs in the agricultural sector, either as farmers and farm laborers, or on-farm and off-farm. The population working in the agricultural sector is still dominant, reaching 90 percent and those working in the service sector only 6.67 percent (12).

Most of the people in Kradenan Village work in the agricultural sector, and their water needs every year using semi-technical and rainfed irrigation. Meanwhile, rainfall is very limited, far below normal. The activities of the population that become jobs in agriculture are a form of interaction between humans and the environment. Interactions that are carried out continuously can form dependency or interdependent relationships, the population depends on agricultural land. Land use overlay can be observed from the land use map.

5. Conclusion

The characteristics of Kradenan Village highlight its unique challenges and opportunities in managing drought. Natural resources are predominantly allocated to agricultural land, accounting for 68.51% of the village area, with 31.49% used as paddy fields under semi-technical irrigation (58.22%) and rainfed systems (41.78%). The average annual rainfall is only 171 mm, with rain occurring on an average of just 8 days per year. Human resources in Kradenan Village show that 69.07% of the population is of productive age, and 37.87% are millennials, reflecting potential for development initiatives. However,

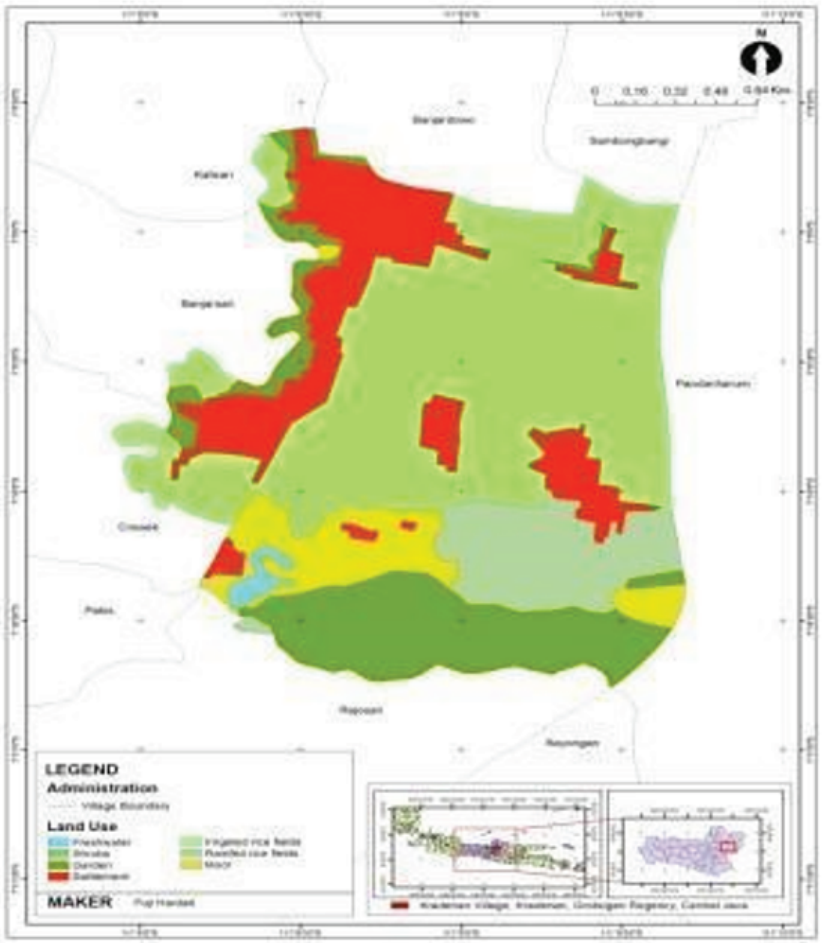

Figure 2: Land Use Map of Kradenan Village.

education levels remain a challenge, with 63.33% of the population having only basic education and 90% working in the agricultural sector, which depends heavily on the limited water resources. The village's demographic bonus, with a dependency ratio of 45.10, emphasizes the need for strategic interventions to enhance the quality of human resources and sustainable use of natural resources.

References

[1] Muryani C. Community Adaptation to Drought Disaster in Grobogan Regency. *Proceedings* of the National Geography Seminar of UMS 2016. Efforts to Reduce Disaster Risk Related to Climate Change. ISBN. 978-602-361-044-0. Pp. 348-355 (2016).

[2] Hastuti D. Sarwono, Chatarina Muryani. Mitigation, Preparedness, and Community Adaptation to the Danger of Drought, Grobogan District (Implementation as a Class

X Geography Learning Contextual Module High School Class X Subject of Disaster Mitigation). *Jurnal GeoEco*. 2017;Vol. 3, No. 1 (Januari 2017) Hal. 47-57. ISSN: 2460-0768 (2016).

[3] Mekuria, E.F. Spatial and Temporal Analisis Recent Drought Using Vegetation Temperature Condition Index *Case of Small Regional State of Ethiopia*. Jaume-1 Universitat (2-12) (2012).

[4] Population Reference Bureau. *World Population Data Sheet*. USAID. Washington, DC. USA.www.prb.org (2015).

[5] Tjakrawarsa, G., and Agung Budi Supangat. Characteristics of Drought in Gorbogan and Alternative Solutions. Article Proceeding of the National Seminar on Regional Independence in Disaster Mitigation Towards Sustainable Development. Surakarta 29 September 2015. PKLH UNS S2 Collaboration with IAKI and LAPAN (2015).

[6] Farah UN, Prasetyo Y, Bashit N. Monitoring Potensi Kekeringan di Kabupaten Grobogan Menggunakan Penginderaan Jauh dan Sistem Informasi Geografis. Media Komunikasi Geografi. 2024;25(1):97–119.

[7] Mujtahiddin MI. Drought Index Analysis in Indramayu Regency. *Jurnal Meteorologi dan Geofisika*. 2014;Vol. 15. No. 2. Pp. 99-107.

[8] Anonim. Undang-0undang Republik Indonesia Nomor 24 Tahun 2007 Tentang Penanggulangan Bencana. https://www.bnpb.go.id/ppid/file/UU_24_2007.pdf

[9] Mishra AK, Vijay P. Singh. A Review of Drought Consept. J Hydrol (Amst). 2010;2010(391):202–16. Available from: www.elsevier.com

[10] Schulzs TW. Investment in Human Capital. Am Econ Rev. 1961;5(1).

[11] Werther, William B & Keith Davis., Human Resources and Personnel Management. New York: Me Graw – Hill, Inc;1996.

[12] Central Bureau of Statistics. Kradenan District in Numbers. Central Bureau of Statistics. Grobogan Regency (2019).