



Food security adaptation analysis to climate change in Bekasi District

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ABSTRACT

Background: Global climate change is a natural outcome of rising greenhouse gas concentrations in the atmosphere brought on by people's continued pursuit of activities that will meet their demands for food in order to support their lives (Wilis R., 2014). Food security is negatively impacted by climate change. Agricultural productivity will be hampered and food security disrupted by too much or too little rainfall. One of the region that indicated to have a crisis in food security in climate crisis. Bekasi is one of the city that located in West Java.

Methods: This study tried to employ a methodical literature review approach and analysis to the data that get from the literature review approach. **Finding:** There are some changes in the data from the rainfall average, and the productions of the plants commodity. **Conclusion:** The grown in food security that occurred was also influenced by the climate crisis that occurred in Bekasi Regency, where the average rainfall experienced increased and decreased. In the reality the development that is happening in Bekasi is also the driving force behind the crisis in the food security, because the land to grow the plant is already changing to factory and others.

KEYWORDS: Bekasi; climate change; food security.

1. Introduction

Global climate change is a natural outcome of rising greenhouse gas concentrations in the atmosphere brought on by people's continued pursuit of activities that will meet their demands for food in order to support their lives (Wilis, 2014). Food security is negatively impacted by climate change. Agricultural productivity will be hampered and food security disrupted by too much or too little rainfall. Therefore, adaptation is crucial (Harini et al., 2022). The agricultural sector was impacted by climate change because crops needed more water while there was less water available due to the rise in surface air temperature and changing rainfall patterns.

Indonesia has created a national food estate in response to the immediate prospect of a food catastrophe. One of the non-traditional risks is the food crisis since it significantly affects the lives of many people in a nation. Non-traditional threats are characterized as security risks that a nation faces that are not military in nature. These risks can take the shape of problems with the economy, the environment, resource scarcity, disease outbreaks, or food security (Lasminingrat & Efriza, 2020).

One indication that Indonesia's food security is still precarious is the fact that many people are still going hungry. Meeting the demand and needs for food in Indonesia is still

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hampered by a number of causes, one of which being natural forces, including climate change (Harvian & Yuhan, 2019). Indonesia's food security is getting worse after the Covid-19 pandemic hit, as a result, the chain distribution is hampered in all lines including food, several countries in the world including Indonesia are threatened by a food crisis due to the loss of balance or supply with this amount of consumption (Jusriadi et al., 2020). One of the region that indicated to have a crisis in food security in climate crisis. Bekasi is one of the city that located in West Java.

Astronomically, the City of Bekasi is between 106°48'28" E - 107°27'29" and 6°10'6"-6°30'6" LS. Bekasi City has an area of around 210.49 km² with Mustika Jaya District as the largest area (24.73 km²) while East Bekasi District as the smallest area (13.49 km²). Based on the 2016 population projection, the population of Bekasi City is 2.803.283 people consisting of 1.413.424 male residents and 1.389.859 female residents. The population density in Bekasi City in 2016 reached 11.413 people/km², the highest population density was located in East Bekasi sub-district with a density of 19.575 people/km² and the lowest was in the Bantargebang sub-district of 5.663 people/km². In order to address this, an adaptation plan is required in order to ensure food security throughout the current climate crisis.

2. Methods

The authors of this study tried to employ a methodical literature review approach. To ensure food security in the face of climate change, this strategy attempts to compile already-published books and papers, which are then analyzed in search of adaption solutions. The authors also do some analysis to the data that get from the literature review approach.

3. Results and Discussion

3.1 Analysis of climate change

Growth trend analysis is used to analyze climate change. The primary variable to identify patterns in climate change is the climatic variable (rainfall). A collection of data in graphical form called rainfall data is used to identify trends in climatic change. Climate is one of the factors that affect the level of plant production. In this case, an analysis of one of them is rainfall. The rainfall in Bekasi Regency in 2013-2017 is presented in Table 1.

Table 1. The rainfall average in Bekasi, 2013-2017

Month	Rainfall (mm)					Average/ month
	2013	2014	2015	2016	2017	
January	351,60	560,22	270,55	188,18	124,73	299,06
February	199,70	291,32	280,45	279,00	367,18	283,53
March	125,50	105,57	170,82	169,91	175,09	149,38
April	180,40	119,75	140,00	151,45	153,00	148,92
May	145,90	80,82	76,56	123,91	68,45	99,13
June	52,50	111,29	13,89	67,45	107,75	70,58
July	108,00	96,07	14,50	122,00	31,90	74,49
August	22,50	16,32	10,00	150,64	8,40	41,57
September	8,30	4,25	25,50	176,36	38,50	50,58
October	71,00	12,64	5,33	251,60	131,77	94,47
November	82,00	146,21	69,18	229,91	200,00	145,46
December	263,90	132,39	100,10	89,70	140,91	145,40

Total	1.611,30	1.676,85	1.176,88	2.000,11	1.547,68	133,55
Average/year	134,28	139,74	98,07	166,68	128,97	

In the Table 1 above, it can be seen that the rainfall in the Regency changes every year. One of them can be seen in 2014, in January the rainfall was 560.22 mm, and at the end of the year it decreased by 76.3% to 132.39 mm. with an average annual rainfall of 76.5 mm. The highest average rainfall occurred in 2016 with 166.68 mm of rainfall. But this figure decreased to 128.97 in the following year 2017. The lowest average rainfall occurred in 2015 with 98,07 mm of rainfall. This score is changing every year and cannot be predict (see the Figure 1).

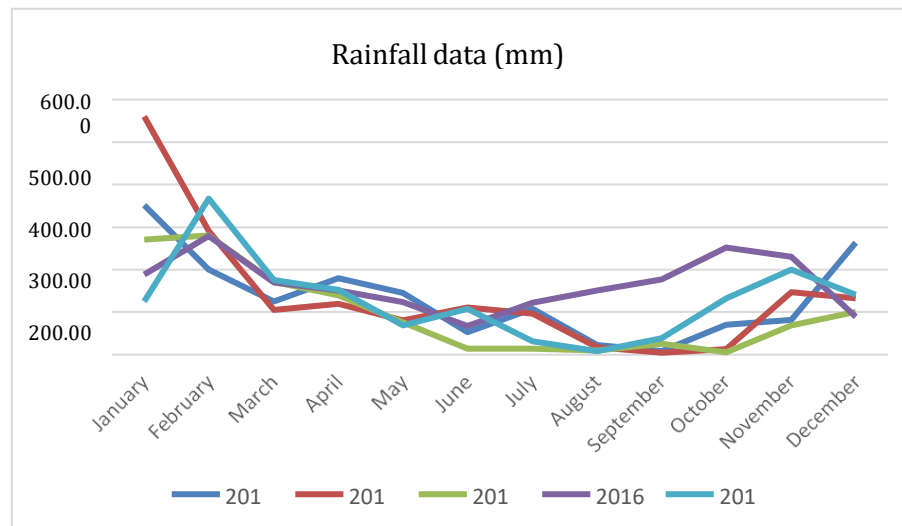


Fig. 1. The rainfall average in Bekasi, 2013-2017

3.2 Analysis of food security

The availability, access, and usage of food are the three main characteristics that make up the idea of food security. Only one aspect of food security will be examined in this study, namely availability. The ability of a region to supply food and cereals to fulfil the demands of its people is determined by calculating the ratio of consumption to net availability of cereals and tubers, which is supposed to represent the amount of cereal intake by the population. When food availability (supply) exceeds overall consumption (demand) in a region, that region is said to be in a state of food security. When the opposite is true, however, that region is considered to be in a state of food insecurity.

In the Table 2 and Figure 2 below, it can be seen that wet land paddy experienced a large reduction between 2010 and 2014. In 2010 the commodity produce 627.202 in a year 2014 the wet land paddy commodity only produced 469,776 tons.

Table 2. Production of wet land paddy and wet and dry paddy

Type of plants	Year				
	2010	2011	2012	2013	2014
Wet land paddy	627.202	636.093	597.027	609.585	496.776
Wet and dry paddy	628.939	636.572	597.939	610.203	516.982

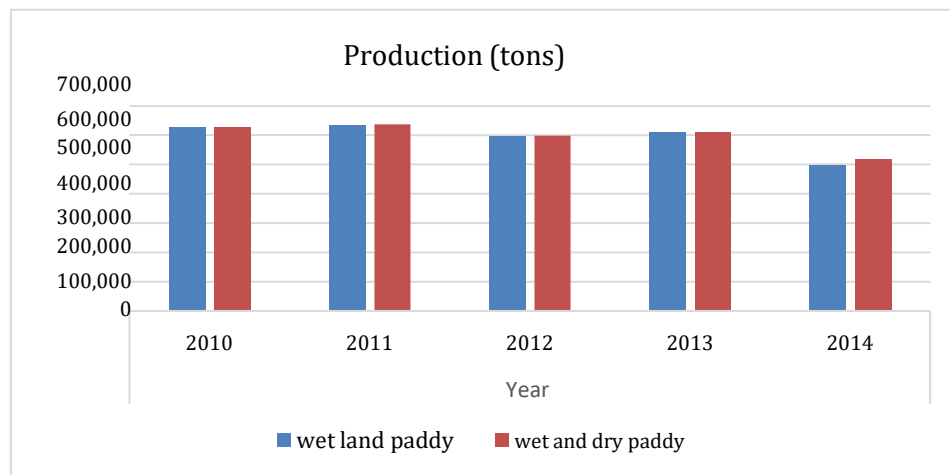


Fig. 2. Production of wet land paddy and wet and dry paddy

In the Table 3 and Figure 3 below, it can be seen that all the types of plants have experienced a reduction in their production. The biggest reduction occurred in corn commodity plants which in 2014 only produced 16 tons of corn. This decline proves that Bekasi district is experiencing a food crisis.

Table 3. Production of dry land paddy and corn

Type of plants	Year				
	2010	2011	2012	2013	2014
Dry land paddy	1.737	479	912	618	504
Corn	294	357	572	168	16

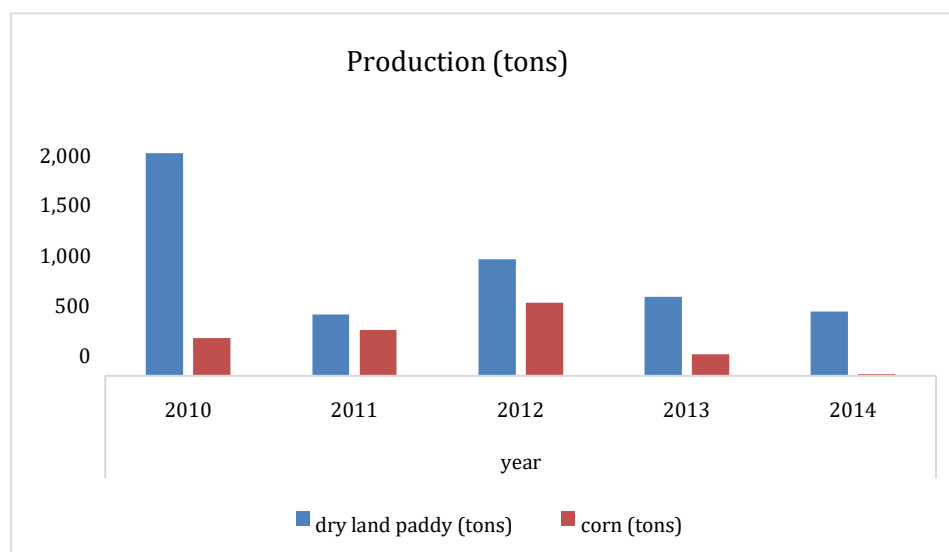


Fig. 3. Production of dry land paddy and corn

4. Conclusions

As climate change progresses, the population exposed to locations with a conducive environment for dengue transmission may shift. According to impact studies done using anticipated climate change scenarios, in many endemic and non-endemic places, dengue fever's infectiousness is predicted to rise; however, these estimates are vulnerable to changes in future greenhouse gases. It is crucial to note that the influence of climate on mosquito-borne disease is complicated by several factors other than temperature, including

precipitation, humidity, and population density. Furthermore, outbreak sizes may rise rather than decrease in various nations with differing climates or geographies. Future studies should go further into and explain these patterns to better understand not just the variability of dengue fever, but also its epidemic potential and spatial patterns. Furthermore, more research is needed to discover how the vectorial capacity characteristics are affected by temperature and how sensitive they are to diurnal changes, as well as to build on present research.

Based on the data presented, Bekasi Regency indicates a decline in food security. The grown in food security that occurred was also influenced by the climate crisis that occurred in Bekasi Regency, where the average rainfall experienced increased and decreased. In the reality the development that is happening in Bekasi is also the driving force behind the crisis in the food security, because the land to grow the plant is already changing to factory and others. To overcome this, there are some suggestions, such as (1) the government of Bekasi District need to have an adaptation strategy related to the food security in the climate crisis that happen right now; (2) after the strategy are created it is necessary to socialize the strategy to all the community; (3) development permits that use green land must be given more attention and strictly enforced.

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Conflicts of Interest

The authors declare no conflict of interest.

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