



Al-Quran and Science as Perspectives of Mitigation the Impact Climate Crisis on Indonesian Food Security in Pandemic Corona Virus-19

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Abstract. Climate change is a significant change in climate, air temperature, and rainfall over a long period. The climate crisis affects weather patterns, which will then impact planting and harvesting seasons, including for Indonesian farmers. This situation is exacerbated by the pandemic, the Covid-19 outbreak that hit the world in early 2020 has hampered many people's daily activities. Allah through His verses in the Qur'an has provided clear instructions for humans on how to use and protect nature, including disaster management such as the climate crisis and pandemics or disease outbreaks. Through literature review studies, research on the relationship between science and the Koran in disaster management aims to maintain food security so that it is always stable amidst climate crises and pandemic disasters. This study on solutions to the climate crisis, pandemics, and food security uses a qualitative method with a literature review type. This study uses phenomenological analysis and functionalism analysis with a hermeneutic approach. From various studies, it can be concluded that the solution to tackling the impact of the climate crisis on food security in the era of the Covid-19 pandemic from the perspective of the Quran and science includes, firstly, making environmental sustainability, climate change, and food security as a broadcast topic. Second, is the application of sustainable agriculture and food diversification, and third is urban farming..

Keywords: *Al-Qur'an; Science; Climate Crisis; food security;*

INTRODUCTION

Climate change is one of the biggest threats. The global average temperature continues to increase as predicted by scientists (Hiroshi, 2013). Climate change refers to long-term changes in temperature and weather patterns. These changes occur naturally such as sunlight, but in the 1800s human activity became the main driver of climate change, mainly due to the burning of fossil fuels such as oil, coal, and gas (United Nation). Burning fossil fuels produces Greenhouse Gases (GHG) that cover the atmosphere. The accumulation of GHG or greenhouse gases over a long period of time at high concentrations causes sunlight to be trapped in the atmosphere, this is what then causes an increase in the earth's temperature.

Since 2011, GHG concentrations in the atmosphere have continued to increase, with annual averages reaching 410 ppm for CO₂, 1886 ppb CH₄, and 332 ppb N₂O in 2019 (IPCC). The

surface temperature in the first two decades of the 21st century (2021-2020) was 0.99 (0.84-1.10) °C higher than 1850-1900. The global surface temperature of 1.09 (0.95 to 1.20) °C was higher in 2011–2020 than in 1850–1900 (IPCC). Climate change has an impact on the frequency and intensity of extreme weather events, changes in rain patterns, and increases in temperature and sea level (Elza, 2011). The consequences of current climate change include extreme drought, water scarcity, forest fires, rising sea levels, flooding, melting of polar ice caps, severe storms, and decreased biodiversity (United Nation). The UN OCHA report indicates that Indonesia is a country that is vulnerable to disasters due to climate change (Elza, 2011).

Climate change is predicted to cause more frequent disruptions to food production in various regions and increase overall food prices (USDA, 2015). Climate change is believed to have a negative impact on various aspects of life and the development sector, especially the agricultural sector, and is feared to bring new problems to the sustainability of agricultural production, especially food crops (Elza, 2011).

Politics and society focus on mitigating the impact of the pandemic on the health and economic sectors, but couldn't ignore the consequences of climate change. Climate change is very important because based on the UN Environment Program's Emission Gap Report 2020 published in December 2020, the global temperature rise in this century is leading to temperatures of more than 30 C. Climate change has a severe impact on our health (Editorial).

LITERATUR REVIEW

A new study published in the journal *Science of the Total Environment* provides the first evidence that climate change played a direct role in the emergence of the SARS-CoV-2 coronavirus, the virus that causes the current Covid-19 pandemic. The number of coronaviruses in a given area is closely related to the number of bat species present. The world's bat population carries around 3,000 types of coronavirus, with bat species carrying an average of 2.7 coronaviruses. As reported by Forbes, Monday (8/2/2021), the findings say that the increase in the number of bat species in certain areas is driven by climate change. This can increase the possibility of the coronavirus being transmitted to humans or mutating (Gloria, 2021).

The year 2020 has been dominated by the Covid-19 Pandemic, which has so far resulted in the deaths of over two million people worldwide. That year was also a sign that the impacts of climate change were becoming more evident, including forest fires, floods, and extreme temperatures. The impact of the two crises was the loss of life, which could have been prevented by global efforts. In addition, the pandemic has had an impact on livelihoods and resources that have also been affected by climate change, requiring swift action to prevent disaster risks to human health (Editorial).

The coronavirus (Covid-19) has disrupted many activities in the field of agriculture and food supply in South Asia, which further adds to the challenges of food and nutrition security and sustainable livelihoods (Gloria, 2021). Regional and global cooperation is needed to ensure food and nutrition security and save people's lives and livelihoods due to the Covid-19 pandemic and climate change. Currently, several methods are being carried out apart from in the context of

recovering from the impact of the pandemic as well as a form of mitigating the impacts of climate change by increasing sustainable food production.

The pandemic has developed into a multi-faceted crisis, the food industry is one of the aspects that has been seriously affected. Food security is an important aspect of the Sustainable Development Goals of the United Nations. The potential risk to offset the negative impact of the pandemic is global economic instability and uncertainty. With the increasing global population and the risk of climate change, food security is becoming a very difficult thing (Golam, 2021).

In accordance with this explanation, the aim of this research is to overcome the impact of the climate crisis on food security in the era of the Covid-19 pandemic from the perspective of the Koran and Science.

METHOD

The study uses a qualitative research method with the type of literature review to reveal how the Qur'an and Science as a Perspective for Mitigating the Impact of the climate crisis on Indonesia's Food Security in the Era of the Covid-19 Pandemic. The literature used includes the Al-Quran, hadith, and research articles as the main sources of research discussing food and excessive prohibitions, food waste, and hunger rates. This study uses phenomenological analysis and functionalism analysis with a hermeneutic approach. By comparing various exposures from the literature. The author analyzes, identifies, and examines to produce a more objective view of the perspectives of the Qur'an and Science on overcoming the impact of the climate crisis.

RESULT

The Linkage of Al-Quran and Science in Overcoming the Impact of the Climate Crisis for Food Security in the Era of the Covid-19 Pandemic

Allah SWT says in QS Al Hijr: 19, meaning:

"And We have spread out the earth and made it mountain and we have grown everything according to measure."

Allah has created the earth which is covered with an atmosphere to regulate the temperature on earth so that it is balanced and regular. Allah states that the atmosphere/sky is the roof, and as the function of the roof, the atmosphere protects the earth from various dangers as contained in QS Al Anbiya' verse 32 which means:

" And We made the sky a roof that is preserved, but they still turn away from the signs (the greatness of Allah) that (the sun, the moon, the wind, the clouds, etc.)

In addition to protecting the earth from harmful radiation, the atmosphere also serves to prevent large space objects from reaching the earth's surface. The existence of natural GHGs in the troposphere which traps/traps infrared light emitted by the earth's surface is able to maintain the temperature of the earth's surface within the range suitable for the growth of living things. Without these natural GHGs, the earth's surface would be very hot during the day and very cold at night. It is the decree of Allah SWT that the sky, with its natural GHG, is able to maintain the

temperature of the earth's surface within the range suitable for the life of His creatures (Xuecheng, 2021).

As a result of exploitative human behavior toward the earth, it has resulted in damage to the balance of the earth's ecosystem. This will have an impact on humans themselves because of increasing crop failures and the vulnerability of world water and food availability which will increase the potential for social unrest and the vulnerability of national and global security (Hayu, 2021). Allah SWT has warned,

"Eat and drink the sustenance (given) of Allah, and do not roam the earth doing mischief". (QS. Al-Baqarah: 60)

In Indonesia, extreme weather as a result of climate change can be seen from the trend of hydro-meteorological disasters which occurred in the period from January to April 2021. The National Disaster Management Agency (BNPB) recorded 1,205 disasters occurring from 1 January 2021 to 30 April 2021. Hydrometeorological disasters, such as floods, tornadoes, and landslides, dominantly occurred in that time period (Hayu, 2021).

In QS Ad-Dukhan verses 10-11, Allah SWT has warned about the coming of a real fog that will result in famine and drought. It means:

"Then wait for the day when the sky brings a clear mist. That includes humans, this is a painful doom". (QS. Ad-dukhan: 10-11).

The Urgency of Al-Quran and Science in Overcoming the Impact of the Climate Crisis for Food Security in the Era of the Covid-19 Pandemic

Islam is very concerned about handling climate change and all its impacts. There are approximately two hundred verses of the Qur'an that give messages about the environment and care for the earth. For example, putting awareness about warnings of damage to nature (QS Ar-Rum: 41) caused by humans and encouraging the need for efforts to repair the damage (QS Ar-Rahman: 7) (Raditya, 2021). The latest IPCC (Intergovernmental Panel on Climate Change) report in August 2021, emphatically states that humans are the main cause of climate change on earth. The report also explained that the earth's temperature will be able to reach more than 1.5 0 C in the next 20 years. The IPCC Report also states that since 1975, the earth has lost 40% of Antarctica's ice content, CO2 concentrations at present are the highest in earth's history.

Climate change is very influential on weather patterns and seasons, one of which is greatly affected is the agricultural sector. Changes in weather and erratic seasons greatly contribute to crop failure. If farmers fail to harvest, it will affect the quantity/amount of food stock available at the consumer level. During a pandemic, many areas implemented restrictions so that this would impact the distribution of the food itself. The quantity is reduced due to crop failure, in the distribution process it is also hampered by the existence of problem restrictions. With these two basic logics, it is not impossible that in the midst of the current climate and pandemic crisis, food security is becoming a major threat.

Food security will not be a major threat if you have abundant food supplies. The world's main food supply is grain. This causes grain storage to have a very important role in food security.

The concept of storing food ingredients as a solution to food security has been taught in Islamic law which is contained in its holy book, namely the Al-Quran, more specifically located in the 12th chapter verses 47-49,

Yūsuf said: “So that you plant seven years (length) as usual; so what you reap you should leave in the grain except a little for you to eat. Then after that will come seven very difficult years, which will consume what you have stored up for them (hard years), except for a little of the (wheat germ) that you have stored up. Then after that a year will come in which people will be given rain (with enough) and in that time they will press grapes.

The verse provides information that by letting the stalk still be connected with the seeds, it has the function of making the seeds last longer and preventing rot [a] the next explanation is that there are two conditions that rotate with each other in life in this world, namely the productive period and the unproductive period. When we are in a productive period, we have a lot of crops. Ibrah from the story of the Prophet Yusuf is, when you get a large harvest, don't consume all of it but consume it in a minimal amount and some of the others are stored for food supplies. Therefore, careful planning regarding the 'sowing period' and 'reaping period' is an important thing to pay attention to so that the future is better and prosperous.

The Application of Al-Quran and Science in Overcoming Impacts of Climate Crisis on Food Security in the Era of the Covid-19 Pandemic

Islam Food security according to the United Nations is the availability to avoid food shortages when a crop failure or disaster occurs while according to the FAO (Food and Agriculture Organization), food security is a condition in which every person/individual has access to meet consumption needs to always live a healthy and productive life. During a pandemic like now, food security has been seriously affected due to disruptions to the supply chain of food or agricultural products due to restriction policies (known as PPKM in Indonesia) in many areas, both locally, nationally, and internationally. This is exacerbated by the impact of climate change where agricultural productivity decreases due to uncertain seasons. Food insecurity can occur over and over again at any given time, so to overcome this kind of problem an appropriate and sustainable strategy is needed. Systems that are very important in food security include the processing, storage, transportation, and consumption of food. Rising temperatures, changes in the amount, timing, and intensity of rain, and water scarcity in dry areas are a number of things that affect production systems. Meanwhile, the processing, packaging and storage systems are also greatly affected by rising temperatures, where rising temperatures will have an effect on increasing costs and spoilage. Rising sea levels change the volume of rivers and lakes, as well as extreme heat that can hamper water, rail, and road transportation (Saiful, 2021)

Al Quran has warned about the dangers of climate change and global warming. At the time of the Pharaohs, thousands of years ago, there had been events as they are happening today (extreme weather, drought, etc.). QS. Al A'raf verse 130, Allah SWT says:

"And verily We have punished (Pharaoh and) his people with a long dry season and lack of fruit, so that they may take heed."

This verse teaches us a lesson pay attention to the weather and not upset the balance. The sentence "so that they may learn a lesson" is not only addressed to Pharaoh and his people, but also to all of us. After all, the story is told in the Al-Quran so that those of us who read it at a later date, will also take compassion or lessons (USDA, 2015).

The obligation to pay attention to the season is contained in QS. Quraysh verses 1-4, in which Allah tells the habits of the Quraysh people who like to travel in summer and winter to get food and feel safe. A sense of security in the verse because the seasons come regularly. Seasonal regularity makes it easier for us to determine when to plant, harvest, trade, and so on. While climate change makes everything change, so the season is hard to predict.

In Indonesia itself, a lot of food needs are still imported from abroad even though Indonesia is an agricultural country. There is still a lot of food management that is not quite right which has an impact on Indonesia's inability to become a country that has food sovereignty.

Environmental Sustainability, Climate Change, and Food Sovereignty are the Topic of Syiar

The essence of da'wah is to provide benefits and kindness to all aspects of human life and the universe. Da'wah in growing food security during the PPKM Emergency period is jihad in the economic field so that Indonesian people have strong food security. The Qur'an explains that food security stems from four very essential human needs, namely: grains (rice), vegetables, olives (oil), and dates (fruit). This is contained in QS. Abasa verses 24-32.

Faced with the problem of climate change, as an archipelagic country located on the equator, Indonesia is a country that is very vulnerable to being affected by the climate crisis. Meanwhile, the government's efforts to push Indonesia out of the climate crisis are considered by many to be not ambitious. Public encouragement and supervision is needed to continue to urge the government to act more quickly in efforts to overcome and mitigate disasters caused by climate change. In order to provide massive awareness to the public about the impact of climate change, socialization efforts are needed from various parties, one of which is Islamic boarding schools (kyai/ulama and santri). This refers to the total Muslim population in Indonesia which reaches 86.88%.

Religious figures (ulama') have a strategic role in campaigning (dakwah) to fight the climate crisis because kyai and santri are considered as trusted figures. They are expected to be able to raise public awareness of the impact of the climate crisis, especially in the face of the global Covid-19 pandemic. Islam as a religion of rahmatan lil 'alaamiin has very broad teachings including teachings regarding efforts to protect the environment. Scholars or religious leaders as propagators of da'wah are also considered to have mastered this area as material for their da'wah (Qaris, 2021).

Implementation of Sustainable Agriculture and Food Diversification

Humans must be able to manage and utilize natural resources based on conservation principles to achieve prosperity in fulfilling their needs, and this is a form of human responsibility

on earth. The expanse of the earth and everything in it was created by Allah for human needs, as stated in QS verses 19-20:

“And We have spread out the earth and made it mountains and We have grown everything according to measure. And We have made for you on earth the necessities of life, and (We also created) creatures for which you are not the provider of sustenance for them.”

Allah's Word in the Qur'an Surah Ar-rum verse 41:

"It has been seen (obviously) damage on land and at sea caused by the actions of human hands, so that Allah will feel for them some of the (results of) their actions, so that they return (to the straight path) ".

The commentators explained that the environmental damage and crisis is not actually human behavior directly, such as illegal logging and hunting, throwing garbage everywhere, and so on, but rather refers to non-physical behavior, such as polytheism, wickedness, hypocrisy, tyranny, and all forms of disobedience committed by the man himself. Even though only a few people take this action, the consequences are global in scale (Eko, 2018). Regarding the impacts of climate change and food security which are also faced with a pandemic, one of the conservation efforts that can be carried out by humans, especially Muslims, is sustainable agriculture.

Sustainable agriculture is a concept used by FAO (Food and Agriculture Organization), this concept is used to correlate food security with climate change. According to FAO, sustainable agriculture is a form of mitigation that can reduce carbon emissions. In sustainable agriculture, management of natural resources is needed to meet human needs without reducing or damaging the quality of the environment. The harmony of life between humans and nature is the moral basis for sustainable agriculture, which is what the ancestors of the Indonesian people have done in the past. Sustainable agriculture can provide guarantees for future generations to continue to be able to utilize natural resources as today's generation.

QS. Fatir: 39 indicates that every human being has been assigned to build the world and prosper it according to Allah's instructions. The problem that then arises in managing natural resources is that the human population continues to increase while the area of agricultural land and resources is fixed, so that there is a lot of struggle for control of natural resources, here too humans become very exploitative which in turn makes nature more and more damaged. The basic human need besides clothing is the fulfillment of food, with the dynamics of decreasing agricultural land, sustainable agriculture can be a solution so that nature is not further damaged while human needs are still being met.

Indonesia is an archipelago country that is rich in natural resources. Each region has its own natural wealth that can vary from one place to another. This is also reinforced by cultural richness. In various Indonesian cultures, one of which is in terms of food, not all Indonesian people make rice their staple food. Especially in the eastern region (Sulawesi, Nusa Tenggara, Maluku and Papua), sago, cassava, corn, and sweet potatoes are their staple foods that have been passed down from generation to generation. Judging from the geographical conditions, nature in these areas is also not suitable for planting rice apart from little rainfall, the dominant soil type is peat soil or limestone soil.

The Indonesian main food is different in each region of Indonesia and is what is called local food. It is important to optimize this local food wealth so that dependence on rice can be further reduced, and the most important thing is that forest sustainability is maintained. With a variety of staple foods, we no longer need to clear forests to convert them into agricultural land. Even today, Indonesia still imports rice from other countries, so by optimizing food diversification, the economic sector will save more on state spending. From a cultural mind, food diversification is a form of Indonesia's cultural wealth. As in the Qur'an, Allah made humans as caliphs on earth equipped with reason and thought. With this provision, humans have the responsibility to conceptualize, create, develop, and present ideas, as well as implement them. Not forcing rice as the main food is a form of human responsibility for the ability to think that the Creator has given them.

Urban Farming

There is an Arab proverb that says: "*Alfallaahu sayyidul bilaadi wa maalikuhu al-haqiiqi*," a farmer is the master of a country and the real owner of a territory. The agricultural sector is one of the halal work areas that is highly prioritized in Islam, as the verse of the Koran (Junanah, 2018) says,

"We have made (on this earth a suitable place to cultivate) fields of dates and grapes. We emit many springs (there). The goal is that they can get sustenance from the results of these plants and other plants that they cultivate. Do they feel there is no need to be grateful?" (QS. Yasin: 34-35)

Islam has provided a solution to the food crisis, including as stated in QS. Yusuf (12): 47-49. Learning from the story of the Prophet Yusuf who advised his government to build strong food quality, is a source of inspiration for food security (Said, 2011).

Urban farming is a term that refers to farming or raising livestock independently in urban areas. Usually, this activity utilizes limited land, such as the yard of a house. The results of this activity can usually be processed by yourself and then consumed or distributed elsewhere.

Based on Surya's research (2020) explains that the influence of urban farming increases people's welfare by 27.66%. Urban farming has an influence on increasing the positive welfare and independence of people in slum areas (Samsul, 2020).

CONCLUSION

Climate change and pandemics are interrelated. It is suspected that the destruction of nature has caused many animals, viruses, bacteria, and others to lose their habitat. This can provide the possibility for these species to re-adapt to their new environment. In the process of their adaptation, it is possible that their behavior/change in their way of life will have an impact on human life, for example, what is happening right now, the world is faced with the Covid-19 pandemic.

The climate crisis affects weather patterns which will then have an impact on planting and harvesting seasons, including for Indonesian farmers, where almost all Indonesian farmers still rely on the season to determine their planting and harvesting periods. This situation is exacerbated

by the existence of a pandemic, the Covid-19 outbreak that hit the world in early 2020 has hampered many people's daily activities. The distribution of goods and services is constrained by the existence of territorial restriction policies. The solutions offered in this research to overcome the climate crisis for food security in the era of the Covid-19 pandemic from the perspective of the Quran and Science are 1) Making environmental sustainability, climate change, and food security as a preaching topic; 2) Implementation of sustainable agriculture and food diversification. 3) Urban Farming.

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