The Economic Cascading Effect on Future Climate Change and Agriculture Economic in Indonesia

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Abstract

Indonesia is a country with a significant agricultural sector in its economy. Indonesia with a tropical climate is home to a variety of animals and plants. The diversity of flora and fauna in Indonesia can be threatened by climate change. In addition, the agricultural sector in Indonesia is also possible to receive the adverse effects of climate change.This study adapts the method from Hallegatte (2008) using the regional adaptive input-output (ARIO) method for assessing the economic and climate change in Indonesia.Indonesia is a country that has a fairly large agricultural sector so changes in temperature have a major impact on the economy in Indonesia. Changes in temperature greatly affect the economy and agriculture. Changes in temperature also have an impact on decreasing crop yields and decreasing community economic activity which has an impact on decreasing economic growth. Changes in temperature that are getting hotter in Indonesia within a certain degree range can result in natural and economic disasters, including famine.

Keywords: Economic Cascading Effect,Climate Change, Agriculture Economic, Indonesia

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Introduction

Climate and humans are part of nature. When climate change occurs, of course, it will affect human life. The current climate change occurs due to various factors on air quality and the greenhouse effect (Shakoor, Shakoor, Rehman, Ashraf, Abdullah, Shahzad, Farooq, Ashraf, Manzoor, Altaf, & Altaf, 2021).

Climate change can make farmers confused in determining the planting period and climate change can have an impact on decreasing agricultural yields (Wang, Tao, Chen, & Yin, 2022). The agricultural sector is a sector that is susceptible towards the consequences of climate change which causes agriculture to decline and if crop yields continue to decline, it can result in decreased food security and at a certain point an impact on hunger (Eichsteller, Njagi, & Nyukuri, 2021).

Climate change not only has a negative impact on the agricultural sector but can also hamper human activities which have an impact on economic activity. Global warming also has an effect on environmental sustainability and has a negative impact on environmental sustainability in addition to the animal and plant abilities to modify or can cause death in certain animals and plants (Gao, Tian, Zhang, & Xia, 2022).

Climate change has a negative impact on the economy systemically where climate change can cause a decline in economic productivity. In addition, changing climate has an impact on human life as well which in the end human productivity also decreases which has an impact on the economic decline. Climate change also has the potential to cause the threat of natural disasters which of course cause economic losses. In dealing with climate change, each country has its own strategy. Climate change must of course be considered and addressed to minimize the adverse effects of climate change. Climate change does not only have an impact on the economy but also human health. Climate change also has the potential to cause natural disasters (Ansah, Ankomah-Appiah, Amoadu, & Sarfo, 2021).

Climate change has an impact on the agricultural sector where the agricultural sector is a vital sector in maintaining food security. When the impact of climate change is not addressed, agricultural production will decline which in turn has an impact on food security so that famine cannot be avoided if this happens (Rasul, 2021).

Indonesia is a country with a significant agricultural sector in its economy. Indonesia with a tropical climate is home to a variety of animals and plants. The diversity of flora and fauna in Indonesia can be threatened by climate change. In addition, the agricultural sector in Indonesia is also possible to receive the adverse effects of climate change (Widarni & Drean, 2021).

Research Method

This study adapts the method from Hallegatte (2008) using the regional adaptive input-output (ARIO) method for assessing the economy and climate change in Indonesia. We use monthly measures to understand climate change's consequences in Indonesia about the economy, especially in the agriculture sector

Result and Discussion

We simulate the economic cascading effect (ECE) caused by Agriculture direct economic damage (ADED) using changes in the annual mean temperature (AMT) during 2020 with the results presented in the table. We find that an increase in the annual mean temperature (AMT) has a significant impact on the economic cascading effect (ECE) and Agriculture direct economic damage (ADED) in Indonesia.

AMT in Celsius	% of Indonesian GDP in 2020			
	Min ADED	ADED	Min ECE	ECE
1	0.69(0.24)	0.42(0.14)	4.05 (1.69)	1.79(0.49)
2	1.23 (0.35)	1.69(0.40)	7.69 (2.54)	2.59 (0.89)
3	2.39 (0.76)	2.78(0.91)	11.28(3.68)	3.25(1.12)
4	3.79 (1.38)	4.05 (1.59)	16.17(5.21)	4.76(1.71)
5	5.29(2.12)	6.21 (2.72)	21.12(7.21)	7.31(3.01)

Based on the estimation results in the table, it can be seen the impact of changes in each degree Celsius. When there is a 1% change in temperature, there will be an impact of 0.42-0.69% on Agriculture direct economic damage and 1.79 to 4.05% on the economic cascading effect.

When there is a temperature change of 2%, there will be an impact of 1.23-1.69% on Agriculture direct economic damage and 2.59 to 7.69% on the economic cascading effect. When there is a temperature change of 3% there will be an impact of 2.39-2.78% on Agriculture direct economic damage and 3.25 to 11.28% on the economic cascading effect. When there is a temperature change of 4%, there will be an impact of 3.79 - 4.05% on agriculture direct economic damage and 4.76 to 16.17% on the economic cascading effect. When there is a temperature change of 5% there will be an impact of 5.29-6.21% on Agriculture direct economic damage and 7.31 to 21.12% on the economic cascading effect.

From the results of the calculations in the table, of course, climate change really needs to be considered, including changes in annual temperature. This is important because based on the table which is a simulation when there is an increase of more than 5% in a year, it will have a very large impact on life and the national economy in Indonesia.

Conclusion

Indonesia is a country that has a fairly large agricultural sector so changes in temperature have a major impact on the economy in Indonesia. Changes in temperature greatly affect the economy and agriculture. Changes in temperature also have an impact on decreasing crop yields and decreasing community economic activity which has an impact on decreasing economic growth. Changes in temperature that are getting hotter in Indonesia within a certain degree range can result in natural and economic disasters, including famine.

References

Ansah,E.W., Ankomah-Appiah,E., Amoadu,M., Sarfo,J.O.(2021).Climate change, health and safety of workers in developing economies: A scoping review.The Journal of Climate Change and Health,3(1),1-12.https://doi.org/10.1016/j.joclim.2021.100034

Eichsteller,M., Njagi,T., Nyukuri,E. (2021).The role of agriculture in poverty escapes in Kenya – Developing a capabilities approach in the context of climate change.World Development,149(1),1-14.https://doi.org/10.1016/j.worlddev.2021.105705

Gao,H., Tian,H., Zhang,Z., Xia,X. (2022).Warming-induced greenhouse gas fluxes from global croplands modified by agricultural practices: A meta-analysis.Science of The Total Environment,820(1),1-15.https://doi.org/10.1016/j.scitotenv.2022.153288

Hallegatte, S., 2008. An adaptive regional input-output model and its application to the assessment of the economic cost of Katrina. Risk Anal. 28, 779e799. https://doi.org/10.1111/j.1539-6924.2008.01046.x.

Rasul,G.(2021).Twin challenges of COVID-19 pandemic and climate change for agriculture and food security in South Asia.Environmental Challenges,2(1),1-7.https://doi.org/10.1016/j.envc.2021.100027

Shakoor,A., Shakoor,S., Rehman,A., Ashraf,F., Abdullah,M., Shahzad,S.M., Farooq,T.H., Ashraf,M., Manzoor,M.A., Altaf,M.M., Altaf,M.A. (2021). Effect of animal manure, crop type, climate zone, and soil attributes on greenhouse gas emissions from agricultural soils—A global meta-analysis.Journal of Cleaner Production,278(1),1-12.https://doi.org/10.1016/j.jclepro.2020.124019

Wang,Y., Tao,F., Chen,Y., Yin,L. (2022).Interactive impacts of climate change and agricultural management on soil organic carbon sequestration potential of cropland in China over the coming decades. Science of The Total Environment,817(1),1-15.https://doi.org/10.1016/j.scitotenv.2022.153018

Widarni,E.L, Drean,B. (2021). Human Capital in Agribusiness and Agriculture: Human Capital Studies in Agribusiness and Agriculture in Asia, Europe, Australia, Africa and America.Malang : Janega Press