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Economic Growth and Environmental Health: A Comparative Study of Java Island

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Abstract

This study aims to analyse the impact of environmental quality index, investment, and access to health services on economic growth in Java Island in the 2017-2021 period. Using secondary data and panel regression method with the Fixed Effect Model approach, the results showed that the Water Quality Index, Air Quality Index, and Investment have a significant influence on economic growth. However, the Land Cover Quality Index and Access to Health Services do not show a significant influence on economic growth. The study also noted limitations in obtaining a representative and unbiased data sample. This study underscores that improving environmental quality can drive economic growth. With its multidimensional approach, this study provides a more comprehensive picture of the factors affecting economic growth compared to previous studies. In addition, this study pays attention to regional variations within Java Island, which may have been overlooked in previous studies. Understanding regional differences allows this study to provide more specific and effective policy recommendations for each region, increasing the positive impact of such policies. This holistic approach also offers a more comprehensive view of environmental quality and its impact on economic growth, capturing more relevant factors, especially in the context of environmental policies that may lack vision.

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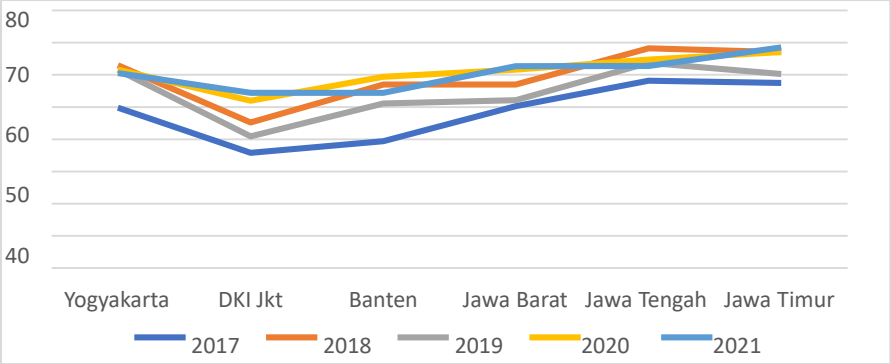
1. Introduction

Environmental quality and economic growth are important aspects of the country's economic development. Where, good environmental quality, has a positive impact on the welfare of society and the sustainability of economic growth in the long term. Vice versa, the increase in unsustainable economic activity leads to environmental degradation and has a negative influence on human welfare. Environmental degradation is a problem that must be faced by the state, it is critical issue for environmental problems to find solutions to reducing the quality of the environmental (Ghifary et al., 2022)

Based on results of the research found that linear economic growth has a positive but insignificant effect on environmental quality and non-linear economic growth has a negative but insignificant effect on environmental quality (Putra & Adry, 2022). Other research (Managi & Kaneko, 2015) found that an increase in national income was followed by a decrease in IKLH up to a certain limit. After a certain limit is reached, an increase in income will be followed by an increase in environmental quality. In addition, based on literature study related to economic development and environmental quality, it is explained that economic development activities have a negative influence on the quality of the environment in Indonesia, so efforts need to be made in dealing with environmental quality issues (Ghifary et al., 2022)



Source: Ministry of Environment Live, processed

Figure 1. Provincial Environmental Performance Index on Java Island

Data from the Indonesian Ministry of Environment and Forestry explains that in the period 2018– 2022, the Environmental Quality Index in Indonesia continues to increase. In 2018, the IKLH value was 65.14 percent and increased in 2019 to 66.55 percent. This increased until 2022 when it was 72.4 percent. The relationship between environmental quality and economic growth is the most important topic in the discussion of economics, the environment, and sustainable development. Development that does not pay attention to growth with environmental conservation efforts will cause problems in the future. Economic development that only aims to make a profit without considering the sustainability of the environment will have a negative effect on nature and humans. (Febriana et al., 2019).

Figure 1 explains that in 2017–2019, the environmental index on the island of Java experienced fluctuations with poor criteria in DKI Jakarta province, which averaged 45.66 percent. This can be caused by the low environmental quality in DKI Jakarta Province, such as relatively rapid urban growth, high levels of urbanization, and a lack of sustainable natural resource management. The high level of population density in Jakarta has an impact on increasing air pollution and the amount of waste that affects the quality of life. High levels of waste that cannot be managed efficiently result in environmental pollution. Air pollution in Jakarta is a major problem originating from transport, vehicles, industry, and construction. The decline in clean water quality is also a serious factor in DKI Jakarta, where diseases can be transmitted through water and frequent flooding. Meanwhile, the environmental index with fairly good criteria is in Central Java Province, with an average of 63.52 percent, and in East Java Province, with an average of 64.07 percent. This can be caused by the environmental index in Central Java and East Java Provinces having contributed to better quality in the region. Contributing factors can be the lack of excessive industrialization so that pollution that can damage the environment can be controlled and the good management of natural resources, such as forests and agricultural land, can contribute to the preservation of ecosystems and environmental quality.

Economic growth and environmental sustainability have a close relationship. Increased economic growth has an impact on the environment. When natural resources are exploited to support economic growth, this can increase Gross Domestic Product (GDP) and Gross Regional Domestic Product (GRDP) figures. However, consequently, such actions make the environment vulnerable to environmental problems. (Prameswari, 2021).

Research by Sinha Babu & Datta, (2013) shows a relationship between economic growth and environmental degradation, where economic growth increases, the environment will be damaged or environmental degradation increases due to increased industrial activity, energy consumption, and exploitation of natural resources. This is consistent with the pattern described in the "n" shaped curve, which shows that environmental degradation tends to increase in line with economic growth. Putra et al., (2022) explain that economic growth has a positive effect on environmental quality. This is in line with Kuznets' environmental theory which is described at a certain point an increase in economic growth will cause a decrease in environmental degradation or an increase in environmental quality. Meanwhile, Guo et al., (2024) explained that there is a relationship between environmental quality and economic growth. Where a clean and healthy environment can improve health and labour productivity, thereby increasing output and encouraging economic growth. Based on previous research, it can be found the novelty of research by comparing the relationship between IKLH and economic growth in certain regions.

This research also aims to understand the impact of environmental quality on economic growth, with the hope of contributing to the achievement of sustainable economic growth while taking into account environmental protection. This helps in understanding the linkage between environmental quality and economic growth, a crucial aspect given the importance

of harmony between economic growth and environmental sustainability. With this understanding, we can design policies that promote harmony between economic development and environmental preservation.

Based on the above background, the researcher will conduct empirical evidence, namely the analysis of the relationship between economic growth and environmental health quality in Java Island.

2. Literature Review

Economic growth means the increase in the value of prosperity or welfare in society caused by the high production or services produced in economic activities. Factors of production will continue to increase in quantity and quality, and the capability of a country to produce services and goods will continue to grow over time (Sukirno, 2013). According to (Todaro & Smith, 2003) in the growth theory of Harold Domar, the Neoclassical theory from Solow, and the endogenous theory by Romer, it can be concluded that there are three main factors or parameters in economic growth, including: (Adisasmita, 2013)

a. Capital accumulation includes all newly made investments in physical equipment and human capital.
b. High population growth can increase the size of the labor force in the coming year.
c. Technological progress in a country is calculated using Gross Domestic Product (GDP) and Gross Regional Domestic Product (GRDP) in a region continuously and becomes a parameter of economic growth
d. Growth population which height can raise sum force work on year which will come
e. Technological progress in a country is calculated using Domestic Product Gross (GDP) and Gross Regional Domestic Product (GRDP) in a region as a whole continuously and become parameters of economic growth

Sustainable economic growth is economic growth that can be maintained in the long term without damaging the environment and without sacrificing the needs of future generations based on three pillars, namely economic, social and environmental (Keeble, 1988). Gross Regional Domestic Product (GRDP) is the economic activity of a region that produces an increase in production value but does not estimate the factors of production owned by the community or private property (Sukirno, 2013). Meanwhile, according to (BPS, 2023) Gross Regional Domestic Product is the value added produced by all economic business units and is the accumulation of goods and services in a region. The continuous increase in the production of goods and services is obtained from the increase in GRDP at constant prices in a region.

The Kuznets Curve (EKC) theory describes the relationship between environmental degradation or damage and economic growth. The existence of a U-shaped relationship curve between environmental quality and per capita income is the opposite; the level of environmental degradation will decrease along with economic growth for a long time. This can be proven by the fact that technological progress can damage environmental and natural

sustainability in developing countries, while in developed countries, technological progress can improve environmental sustainability (Idris, 2020).

The Environmental Kuznet Curve is divided into several steps, including (Shaharir & Alinor, 2013); a) the process of economic development will begin with environmental degradation or damage, usually called pre-industrial economics, where industrialization becomes stronger in producing domestic products when natural resources and environmental degradation increase; b) the industrial economic stage, at which investment drives the economic shift from agriculture to industry. c) the post-industrial economic or post-industrial stage, when the economy shifts from industry to the service sector, where increased income and decreased air pollution follow the movement. In addition, the increase in income is positive with the demand for environmental quality, and society begins to be able to pay for the deficit of losses caused by economic activities on the environment (Febriana et al., 2019).

The Environmental Quality Index (IKLH) is a processing parameter of environmental quality in Indonesia that combines the concepts of environmental quality index (EQI) and environmental performance index (EPI). IKLH is a national environmental work performance parameter so that the policy-making process related to environmental management and protection can be implemented properly. Water Quality Index (WQI), Air Quality Index (AQI), and Land Quality Index (LQI) are the indicators used to calculate LQI (Syakina, 2022);(Putra et al., (2022)

> H1: Water Quality Index has a positive effect on the achievement of Economic Growth in Java Island

This hypothesis comes from the theory of sustainable economics, which emphasises the importance of water quality in supporting production and industrial activities. According to this theory, good water quality is essential as water is used for various purposes, such as in the production process, transport and recreation. Therefore, when water quality reaches a high level, it is believed to promote economic growth. This concept is also reinforced by the findings from research conducted by (Chen et al., 2018) and (Khan et al., 2022)

> H2: Air Quality Index has a positive effect on the achievement of Economic Growth in Java Island.

This hypothesis is based on sustainable economic theory which suggests that good air quality can reduce public health costs, thereby increasing people's purchasing power and contributing to economic growth. In addition, good air quality can encourage the development of clean industries and innovation, as well as create new economic opportunities and improve regional competitiveness. These findings are supported by research conducted by. (Shahbaz et al., 2019) and (Ding et al., 2019). Meanwhile, based on research conducted by According to ((Idris, 2020); (Adu & Denkyirah, 2019); (Jeetoo & Chinyanga, (2023) and (Yu et al., 2022) stated that IKA and IKU have no impact on economic growth.

H3: Land Cover Quality Index has a positive effect on the achievement of Economic Growth in Java Island.

This hypothesis is based on the theory of sustainable economy which states that a good land cover quality index indicates the maintained quality of land cover in a region, which supports ecological functions such as flood control, water availability, and carbon sequestration. These good ecological functions will support sustainable economic growth. This finding is also supported by research conducted by (Ajanaku & Collins, 2021). Meanwhile, research (Li, Yang, & Zhao, 2010) states that there is no relationship between economic growth and environmental (Li et al., 2010) quality and even the two describe different characteristics. This is in line with research conducted by (Putriani et al., 2018) which states that economic growth has a significant negative impact on environmental quality, because it illustrates the U-turn which shows that pollution levels will increase as GDP per capita increases.

According to Mulyanto (Pujoalwanto, 2014) investment is the placement of a number of funds or other resources with commitments made in the present that are expected to benefit in the future. Investment is considered to be spending, purchasing, or spending from individuals or companies in buying goods, capital, and production equipment in order to increase the ability to produce goods and services contained in the economy (Sukirno, 2013)

H4: Investment has a positive effect on the achievement of economic growth in Java Island.

This hypothesis is based on the theory of sustainable economic growth and the Harrod-Domar model, which states that high investment can create a favourable environment for the growth of various economic sectors. Investment can increase productivity, develop infrastructure, encourage innovation, and create capital that supports the economic growth of a region. This research is supported by findings that have been conducted by (Nizar et al., 2013) and Luo et al., (2021). While (Sulistiawati, 2012);(Ogujiuba & Mngometulu, 2022) state that investment does not have a significant positive impact and because investment causes degradation or a decrease in economic growth..

Health is an important part of well-being and is one of the indicators of economic growth. At this time, people really need access to health services. Therefore, the government has a role and responsibility in providing healthcare facilities that can be reached and utilized by all levels of society. Health care service is the right of every person to make efforts to improve overall health to maintain and improve public health, prevent and cure diseases, and restore the health of individuals, families, groups, and communities (Komalawati, 1999)

H4: It is suspected that access to health services has a positive effect on the achievement of economic growth in Java Island.

This hypothesis is based on sustainable economic theory, which states that better access to health services can improve the overall welfare of society. People who feel secure about their health tend to be more competitive, participate more actively in economic activities,

and contribute to regional economic development. This is in line with research conducted by (Li et al., 2019) and (Shi et al., 2021).

3. Research Methods

This study analyses the effect of environmental quality health on economic growth on the island of Java during the period 2017–2021. The approach used in the research is quantitative, with a research method based on data in the form of numbers and statistical regression analysis, and only analyses the relationship between variables that have been determined without discussing the relationship between variables in depth.

The data sources obtained in this study were obtained from online sources or websites of the Central Bureau of Statistics (www.bps.go.id), the Ministry of Environment and Forestry (http://menlhk.go.id), and literature studies related to the required data, publications in numbers, and online for each province in Java Island using panel data regression analysis, which is a combination of time series data and cross-section data formed in annual data during a predetermined period.

The following is the data in question:

Table 1. Research Variables

No	Variable	Indicator variable	Unit	Source
1	Economic Growth	GDRP	Rupiah	Central Statistics Agency
2	Environmental Quality Index	Water Quality Index	Index	Ministry of Environment and Forestry
		Air Quality Index	Index	Ministry of Environment and Forestry
		Land Cover Quality Index	Index	Ministry of Environment and Forestry
3	Investment	Investment rate	Percent	Central Statistics Agency
4	Access to Health Services	Health Services	Index	Central Statistics Agency

Source: Author 2023

The dependent variable in this study is GRDP, which is the total calculation of expenditure on final goods and services produced in a region. The calculation of GRDP is done as follows:

$$GRDP = Consumption + Investment + Government\ Expenditure + (Export - Import)$$

Meanwhile, the independent variables in this study include Water Quality Index, Air Quality Index, Land Cover Quality Index, Investment, and Access to Health Services.

The calculation of the Water Quality Index (WQI) is done by formulating the combined value of these parameters using a certain formula that considers the relative weight and value of each parameter.

$$IKA = \left(pH\ Weight\ x\ pH\ Value\ +\ \frac{BOD\ Weight\ x\ BOD\ Value}{Total\ Weight}\right) X\ 100$$

Water quality classification is determined based on the established IKA scale: ≥ 80 is considered good, 50-79 is considered moderate, and < 50 is considered poor.

The calculation of the Air Quality Index (AQI) is done by formulating the combined value of these parameters using a certain formula that takes into account the weight and relative value of each parameter.

$$Parameter\ Index = Normalised\ Values \times Relative\ Weights$$

The qualification of the air quality level is based on the range of KPI values as follows: ≤ 50 is considered good, 51-100 is considered moderate, 101-150 is considered unhealthy, 151-200 is considered very unhealthy, and ≥ 200 is considered hazardous.

IKTL Calculation:

$$IKTL = \sum(Parameter\ Index)$$

This process produces a value that reflects the overall quality of land cover in the study area.

The investment growth rate is the percentage change in the total value of investment from one period to the next. It is an important indicator as it shows how fast or slow investment in an economy is growing over time.

The investment rate can be calculated using the following formula:

$$Investment\ Rate = (Current\ Period\ Investment\ Value - Previous\ Period\ Investment\ Value - Previous\ Period\ Investment\ Value) \times 100\%$$

Health service accessibility is a measure used to measure the ease with which people can obtain health services. This measure can be used to compare the accessibility of health services in different regions or at different times (Laksono, 2018).

To measure the accessibility of health services, the following calculation needs to be done:

$$Accessibility\ of\ Health\ Services\ =\ \frac{Number\ of\ Health\ Facilities}{Total\ Population} \times 1000$$

Health service accessibility is one of the important indicators in assessing the quality of health services in an area and is used to measure the availability and affordability of health services for the community.

In this study, to explain the relationship between the dependent variable and the independent variable with panel data regression systematically, the following estimator was used:

$$\mathbf{PDRB}it = \beta 0 + \beta 1 IKAit + \beta 2\ IKUit + \beta 3\ IKTKit + \beta 4\ INVit + \beta 5\ LKes\ it + eit$$

Data analysis uses the help of Eviews 10 software and uses a significance value of 0.05 for the research analysis steps as follows:

Panel Data Estimation Model Selection

In selecting the panel data regression estimation model, there are three approaches which include 1) small square (Pooled Least Square) 2) fixed effect approach (Fixed Effect Model) 3) random effect approach (Random Effect Model). To determine the best model, previously the model accuracy test was carried out including: Chow Test or Likelihood Test and Hausman test .

Statistical Test of Panel Data Analysis

T-test

This test is conducted to analyze how strong the independent variable is in partially impacting the dependent variable. H0 is rejected when the p-value is less than 0.05, indicating that the independent variable has a notable impact on the dependent variable. Conversely, H0 is accepted when the p-value exceeds 0.05, indicating that the independent variable does not significantly influence the dependent variable.

F tes

This test is conducted to analyze whether the dependent variable has a simultaneous impact on the independent variable.

Test Coefficient of Determination (R2)

This test is conducted to analyze how strong the ability of the independent variables is in explaining various models of the dependent variable in the study.

4. Results

In this study, a model selection was carried out to select the best model between CEM, FEM, or REM with the first test, namely the Chow test, to select the best model between CEM and FEM, followed by the second test with the Hausman test to select the best model between FEM and REM, following the estimations

Table 2 Test Chouw

Effects Test	Statistics	df	Prob.
Cross-section F	192.485176	(5.13)	0.0000
Cross-section Chi-square	103.630196	5	0.0000

Source: Eviews

Based on the Chow Test, the F-statistic value is 192.485 and the probability value is 0.0000. This shows that the probability value of 0.0000 <0.05

Table 3. Hausman test

Test Summary	Chi-Sq. Statistics	Chi-Sq. df	Prob.
Cross-section random	962.425880	5	0.0000

Source: Eviews

Based on the Hausman test, the F-statistic value is 962.425 and the probability value is 0.0000. This shows that the probability value of 0.0000 <0.05 It can be concluded that the model accuracy test shows the empirical probability value of the Chow test 0.0000 (<1%) and the Hausman test 0.0000 (<1%) this indicates that the best-estimated model is the Fixed Effect Model (FEM) test.

Table 4. FEM Regression Analysis

Variables	Coefficient	Std. Error	t-Statistic	Prob.
C	784101.4	607855.0	1.289948	0.2195
IKA	52228.69	22522.72	2.318933	0.0324
IKU	-106120.3	25336.50	-4.188436	0.0006
IKTL	-6490.940	9246.230	-0.702009	0.4951
INV	4.285997	1.809893	2.368094	0.0341
LKES	-7322.182	19568.96	-0.374173	0.7143
	Effects Specification			
Cross-section fixed (dummy variables)				
R-squared	0.997042	Mean dependent var		1434979.
Adjusted R-squared	0.994539	S.D. dependent var		1046637.
S.E. of regression	77346.65	Akaike info criterion		25.65606
Sum squared resid	7.78E+10	Schwarz criterion		26.24112
Log-likelihood	-308.7007	Hannan-Quinn criteria.		25.81833
F-statistic	398.3285	Durbin-Watson stat		2.656854
Prob(F-statistic)	0.000000			

Source: Eviews

Based on the estimated relationship between the water quality index and economic growth, the t-statistic value of 2.3218 and a probability value of 0.0324 illustrate that the probability value of 0.0324 <0.05, so it can be concluded that H0 is rejected, where the t-statistic value of the water quality index has a significant impact on economic growth in Java. Based on

the estimation of the relationship between the air quality index and economic growth, a t-statistic value of -4.188 and a probability value of 0.006 illustrate that the probability value of 0.006 <0.05, so it can be concluded that H0 is rejected, where the t-statistic value of the air quality index has a significant impact on economic growth in Java.

Based on the estimated relationship between the land cover quality index and economic growth, a t-statistic value of -0.7020 and a probability value of 0.4951 illustrate that the probability value of 0.04951 <0.05, so it can be concluded that H0 is accepted, where the t-statistic value of the land cover quality index does not have a significant impact on economic growth in Java.

Based on the estimated relationship between investment and economic growth, which shows a tstatistic value of 2.368 and a probability value of 0.0341, it can be concluded that H0 is rejected where the t-statistic value of the investment has a significant impact on economic growth in Java. Based on the estimated relationship between access to health services and economic growth, which shows a t-statistic value of -3.741 and a probability value of 0.7143, this illustrates that the probability value of 0.7143 <0.05, it can be concluded that H0 is accepted, where the t-statistic value of access to health services has no significant impact on economic growth in Java. Based on the estimated relationship in the study, the f-statistic value of 0.2195 ≤ 0.05 can be used to conclude that H0 is accepted. This means that the variables of water quality index, air quality index, land cover quality index, investment, and access to health services together have no impact on the economic growth variable.

The results showed that the R-square (R2) value was 0.997042. This value shows that the capability of the Water Quality Index, Air Quality Index, Land Cover Quality Index, Investment, and Access to Health Services variables can describe the economic growth variable by 99.70%, while the remaining 0.30% is explained by other variables other than the variables used in this study. In this study, panel data estimation with the Fixed Effect Model (FEM) regression model can be explained regarding the variables used to describe the effect of the Water Quality Index, Air Quality Index, Land Cover Quality Index, Investment, and Access to Health Services on the Economic Growth variable. Panel data estimation shows that the Water Quality Index, Air Quality
Index, and Investment had a significant impact on economic growth on the island of Java in the 2017 period.

5. Conclusion and Suggestion

The results show that water quality, air quality, and investment variables have a significant role in accelerating economic growth in Java. Good water and air quality contribute to improved public health, labour productivity, industrial development, agriculture, and investment attractiveness. On the other hand, investment directly affects job creation, infrastructure development, innovation, and the development of economic sectors.

However, the variables of land cover quality and access to health services do not show a significant impact in the period 2017 to 2021. This is due to the decreased reliance on soil quality caused by the use of modern agricultural technologies and practices. In addition, high levels of urbanisation and economic diversification towards industry and services have reduced dependence on land. Developed infrastructure and high population density have also limited accessibility to health services. As a result, the impact of land quality and healthcare access on economic growth in Java is limited.

This study also highlights the importance of considering the impact of health facilities on economic growth and shows that there is no complex correlation between economic growth and environmental quality. In this case, an increase in health facilities such as hospitals and health centres may lead to a decrease in economic growth in Java and affect economic welfare and productivity.

The Environmental Kuznets Curve (EKC) hypothesis also provides implications by stating that in the early phase of economic growth, environmental quality tends to worsen, but after reaching a certain point, economic growth will be followed by an improvement in environmental quality. This is consistent with the finding that the Water Quality Index and Air Quality Index have a positive impact on economic growth, indicating the importance of maintaining and improving environmental quality and promoting sustainable economic growth. Although the access to health services factor does not have a significant positive impact on economic growth, health is still an important factor in community welfare and must be considered properly.

With this understanding, the government and stakeholders can design more effective policies to achieve sustainable economic growth in the region and are expected to complement and complement better research, and some suggestions in this study include:

1. Government regulations are needed regarding the development of infrastructure to manage wastewater, utilise water resources, and ensure the availability of clean water for the daily welfare of the community.
2. Government regulations are needed to address pollution caused by the industrial sector and supervise industries that have the potential to pollute the air.
3. Government policies need to support the development of agritourism areas and local agricultural products to increase the income and welfare of farmers and rural residents. This involves promoting the use of organic farming techniques and soil conservation, as well as the development of green open spaces to improve the quality of life for urban dwellers.
4. The need for government regulations that support investment in various sectors of the economy to increase production capacity, infrastructure and technology. This also opens up opportunities for sustainable growth, job creation, and access to finance for Micro, Small, and Medium Enterprises (MSMEs).

5. Efforts to improve health facilities include the optimisation of telemedicine technology, public education on healthy lifestyles, and accreditation of health facilities to ensure high-quality services.
6. Expansion of research to specific regions in Java is also important to understand regional differences in the impact of water quality, air, and investment on economic growth, so as to formulate more region-specific policy recommendations.
7. A deeper understanding of environmental quality can be achieved by including other relevant variables such as soil pollution, biodiversity, or climate change to provide a more complete picture of the impact of the environment on economic growth.

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References

1. Adisasmita, R. (2013). *Teori-Teori Pembangunan Ekonomi , Pertumbuhan Ekonomi dan Pertumbuhan Wilayah* (1st ed.). Yogyakarta: Graha Ilmu.
2. Adu, D. T., & Denkyirah, E. K. (2019). Economic growth and environmental pollution in West Africa:
   Testing the environmental Kuznets curve hypothesis. *Kasetsart Journal of Social Sciences*, *40*(2), 281– 288. https://doi.org/10.1016/j.kjss.2017.12.008
3. Ajanaku, B. A., & Collins, A. R. (2021). Economic growth and deforestation in African countries: Is the environmental Kuznets curve hypothesis applicable? *Forest Policy and Economics*, *129*(May). https://doi.org/10.1016/j.forpol.2021.102488
4. BPS. (2023). Badan Pusat Statistik.
5. Deng, D., Dong, J., Zhang, Y., Liang, W., Liu, K., & Li, L. (2023). Analysis of the environmental Kuznets curve for forest fragmentation: The case of Beijing-Tianjin-Hebei region in China. *Forest Policy and Economics*, *151*(March). https://doi.org/10.1016/j.forpol.2023.102970
6. Febriana, S., Diartho, H. C., & Istiyani, N. (2019). Hubungan pembangunan ekonomi terhadap kualitas lingkungan hidup di provinsi jawa timur. *Jurnal Dinamika Ekonomi Pembangunan*, *2*(2), 58–70.
7. Ghifary, H., Pramudyawardani, F. D., Annisa, S. R., & Setiyawati, M. E. (2022). Jurnal Pendidikan dan Konseling Lingkungan Hidup di Indonesia. *Jurnal Pendidikan Dan Konseling*, *4*, 4409–4414.
8. Idris. (2020). Environmental Kuznets Curve: Bukti Empirid Hubungan Antara Pertumbuhan Ekonomi dan Kualitas Lingkungan di Indonesia. *FE UNP*, 2–5. https://doi.org/10.4337/9781849803434.00008
9. Komalawati, V. (1999). *Hukum dan Etika Dalam Praktik Dokter*. Bandung: Sinar Harapan Pustaka.

10. Li, W., Yang, D., & Zhao, G. (2010). Research on the relationship between economic growth and environment quality in the west region - Based on the method of environmental kuznet. *2010 International Conference on Management and Service Science, MASS 2010*, 2–5. https://doi.org/10.1109/ICMSS.2010.5577407
11. Li, Y., Chiu, Y. H., & Lin, T. Y. (2019). The impact of economic growth and air pollution on public health in 31 Chinese cities. *International Journal of Environmental Research and Public Health*, *16*(3). https://doi.org/10.3390/ijerph16030393
12. Luo, R., Ullah, S., & Ali, K. (2021). Pathway towards sustainability in selected asian countries: Influence of green investment, technology innovations, and economic growth on CO2 emission. *Sustainability (Switzerland)*, *13*(22). https://doi.org/10.3390/su132212873
13. Managi, S., & Shinji Kaneko. (2015). Environmental Kuznets Curve,. *Chinese Economic Development and the Environment*, 1–17. Retrieved from https://doi.org/10.4337/9781849803434.00008
14. Nizar, C., Hamzah, A., & Syahnur, S. (2013). Pengaruh Investasi Dan Tenaga Kerja Terhadap Pertumbuhan Ekonomi Serta Hubungannya Terhadap Tingkat Kemiskinan Di Indonesia. *Jurnal Ilmu Ekonomi*, *1*(2), 1–8.
15. Ogujiuba, K., & Mngometulu, N. (2022). Does Social Investment Influence Poverty and Economic Growth in South Africa: A Cointegration Analysis? *Economies*, *10*(9). https://doi.org/10.3390/economies10090226
16. Pablo-Romero, M. P., Sánchez-Braza, A., & Gil-Pérez, J. (2023). Is deforestation needed for growth? Testing the EKC hypothesis for Latin America. *Forest Policy and Economics*, *148*(January). https://doi.org/10.1016/j.forpol.2023.102915
17. Putra, A., Adry, & Roza, M. (2022). Pengaruh Pertumbuhan Ekonomi terhadap Kualitas Lingkungan di 6 Negara Asean. *Ecosains: Jurnal Ilmiah Ekonomi Dan Pembangunan*, *11*(2), 120. https://doi.org/10.24036/ecosains.12073357.00
18. Putriani, P., Idris, I., & Adry, M. R. (2018). Pengaruh Pertumbuhan Ekonomi, Penggunaan Energi Dan Ekspor Terhadap Kualitas Lingkungan Di Indonesia. *Ecosains: Jurnal Ilmiah Ekonomi Dan Pembangunan*, *7*(2), 99. https://doi.org/10.24036/ecosains.11066357.00
19. Shi, Z., Huang, H., Chiu, Y. ho, Zhang, B., & Zhang, C. (2021). Linkage analysis of water resources, wastewater pollution, and health for regional sustainable development—using undesirable three-stage dynamic data envelopment analysis. *Environmental Science and Pollution Research*, *28*(15), 19325– 19350. https://doi.org/10.1007/s11356-020-12067-
20. Sukirno, S. (1998). *Pengantar Teori Makroekonomi* (10th ed.). Jakarta: Raja Grafindo Persada.
21. Sukirno, S. (2013). *Makroekonomi : Teori Pengantar* (Edisi keem). Jakarta: Raja Grafindo Persada.
22. Sulistiawati, R. (2012). Puteraperdana, Bagas Rahmat Pengaruh Investasi terhadap Pertumbuhan Ekonomi dan Penyerapan Tenaga Kerja Serta Kesejahteraan Masyarakat di Pr ... *Jurnal Ekonomi Bisnis Dan Kewirausahaan*, *3*(1), 29–50. Retrieved from https://www.neliti.com/publications/10500/pengaruh-investasi-terhadap-pertumbuhan-ekonomi-danpenyerapan-tenaga-kerja-sert
23. Syakina, H. (2022). Ekspose Indeks Kualitas Lingkungan Hidup Tahun 2022: “Kinerja Pemantauan dan

Pengendalian Kualitas Lingkungan Meningkat. Retrieved September 1, 2023, from ppkl.menlhk.go.id
24. Todaro, M. P., & Smith, S. C. (2003). *Pembangunan Ekonomi di Dunia Ketiga* (8th ed.). Jakarta: Erlangga.
25. Yu, Y., Duan, C., Li, S., Peng, C., Yang, J., Yan, K., … Zou, P. (2022). Relationship between environmental pollution and economic development in late-developing regions shows an inverted V. *Science of the Total Environment*, *838*(May), 1–10. https://doi.org/10.1016/j.scitotenv.2022.156295