International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Relation Between Environmental Degradation and Economic Growth in Context of Indian Economy from 2010 to 2020

Kinjal Kaondal[1], Sanjeet Singh[2]

[1]PhD, RD Scholar, Department of Economics, Central University of Himachal Pradesh, Sapt Sindhu Parisar – I, Dehra, Gopipur (177101)
[2]Professor, Head of Department, Department of Economics, Central University of Himachal Pradesh, Sapt Sindhu Parisar – I, Dehra, Gopipur (177101)

Abstract
Today most of the nations are aiming for higher and stable economic growth but this is simultaneously leading to environment degradation and hence each country has to face a trade-off where they have to maintain the fine balance between both the variables.
The major purpose of the existing study is to find the degree of association between environmental deterioration and economic prosperity for India. Further, this study helps in framing policies related to environment as it considers the extent of trade off that India faces between growth and environmental degradation.

Keywords: Economic Growth, CO_2 emissions, India

INTRODUCTION

In the present era, humanity faces one of the biggest ecological challenge of Global warming. The escalating concentration of carbon dioxide (CO_2), recognized as the primary contributor of the greenhouse effect, seems to intensify this problem. Primarily driven by human-generated emissions of greenhouse gases (GHGs), the greenhouse effect's impacts are profound. The annual increase in carbon dioxide release has a significant influence on global warming, leading to immediate consequences for human life, development, and the survival of various biological species. Additionally, it poses a serious threat to certain plant and animal populations. In 2018, the United Nations warned that the world would face catastrophic consequences by 2040 if global warming surpasses 1.5 degree Celsius. Consequently, there has been a growing global focus on environmental pollution control and the need for more efficient carbon emission practices. According to the report of world economic forum, environmental risks make up four of the top five risks that world is experiencing (WEF,2021) which reflects the gravity of the problem of environmental degradation.
In terminology of economics, the relation between environment degradation and economic growth is shown by Kuznet through environmental Kuznet curve which is inverted U shaped which shows that in the beginning, economic development leads to environment deterioration but after a specific level of economic development, level of environmental deterioration reduces.

Literature Review

This section briefs about the latest research work done in this field and discusses the major findings of those studies, which in turn shows the importance of studying this topic.

Parikh J. et al. (2009) analysed CO_2 emissions generated by major sectors in India for the year 2003–04 using a Social Accounting Matrix (SAM) that incorporates the Input–Output (IO) table. The SAM was aggregated into 25 sectors representing the entire economy, with specific emphasis on key energy-producing and energy-consuming industries. Their estimation indicates that total CO_2 emissions in 2003–04 amounted to 1217 million metric tons (MT). A substantial portion of these emissions (57%) resulted from coal and lignite consumption, whereas direct emissions from households constituted only about 7%. At the sectoral level, the electricity sector exhibited the highest direct CO_2 output. The evaluation of both direct and indirect emissions required to satisfy final demand highlights the important role of indirect emissions in the production system. The five sectors with the highest on-site emissions were electricity, manufacturing, steel, other transport, and cement. However, when both direct and indirect emissions are considered together, construction, manufacturing, other services, other transport, and agro-processing emerge as the top contributors. The study also shows notable lifestyle-related disparities across household expenditure groups: the highest-spending 10% of urban households emit around 4099 kg of CO_2 per capita per year, while the lowest-spending 10% of rural households emit only about 150 kg per capita annually.

Ghouse G et al[2]., (2021) conducted a study with the objective to investigate how the causal connections between CO_2 release, FDI and trade openness influence the economic prosperity of Pakistan using FMOLS model. This study has shown that trade openness and labour force individually have a direct and statistically significant influence on GDP of Pakistan while CO_2 emission has positive and statistically insignificant impact on it's GDP whereas FDI has negligible impact on it's GDP. The results of this research validate the influence of the interconnected association between trade openness and foreign direct investment (FDI) on economic prosperity, along with its effect on CO2 emissions.

Rana R et al[3]., (2020) conducted the research which delves into the causal connections among FDI, economic growth as measured by GDP and the ecological landscape encompassing CO_2 emissions and energy consumption. Additionally, it considers two other noteworthy variables: trade openness and the technology gap. The study is conducted for India from 1980 to 2014 by utilising dynamic multivariate Toda Yamamoto (TY) approach which utilises modified WALD test.

Alvarez. M et al[4]., (2023), in this study, an examination was conducted to assess the stability of the interconnection among CO2 release, energy usage and economic prosperity across a selection of 31 nations0.

The findings unveiled the existence of structural shifts within this relationship and this relationship was not stable, with the Great Recession exerting a significant influence.

Research Methodology

Due to continuous degradation of environment and its harmful impact on all the economies of the world there is dire need to find the association between growth and environmental degradation as this would suggest the reforms needed and the extent of trade off that a country has to face between both the variables and that would help the policy makers to make policies accordingly.

Majority of the past study on this topic has been done considering the impact of number of variables i.e., multivariable analysis with group of countries, very few studies had explored this topic from the

viewpoint of India alone so by taking into account this **research gap**, this study explores this topic from the viewpoint of India alone and considers only bivariate relationship.

This study emphasises on to find the association between economic prosperity and environmental degradation and to achieve this objective GDP per capita and $C0_2$ emission is taken as the proxy for economic growth and environment degradation respectively. Further, data is taken from world bank reports for India from 2010-2020. Correlation is computed to achieve the objective of finding the extent of association between both variables specified above.

Time series graph shows the extent of fluctuations in variables with respect to time. Graph showing the trends in CO_2 emissions and GDP per capita over time are shown below:

Figure 1

Figure 1 shows that CO_2 emission curve is non stationary and hence it's fluctuating with respect to time and these emissions experienced a good decline after 2019.

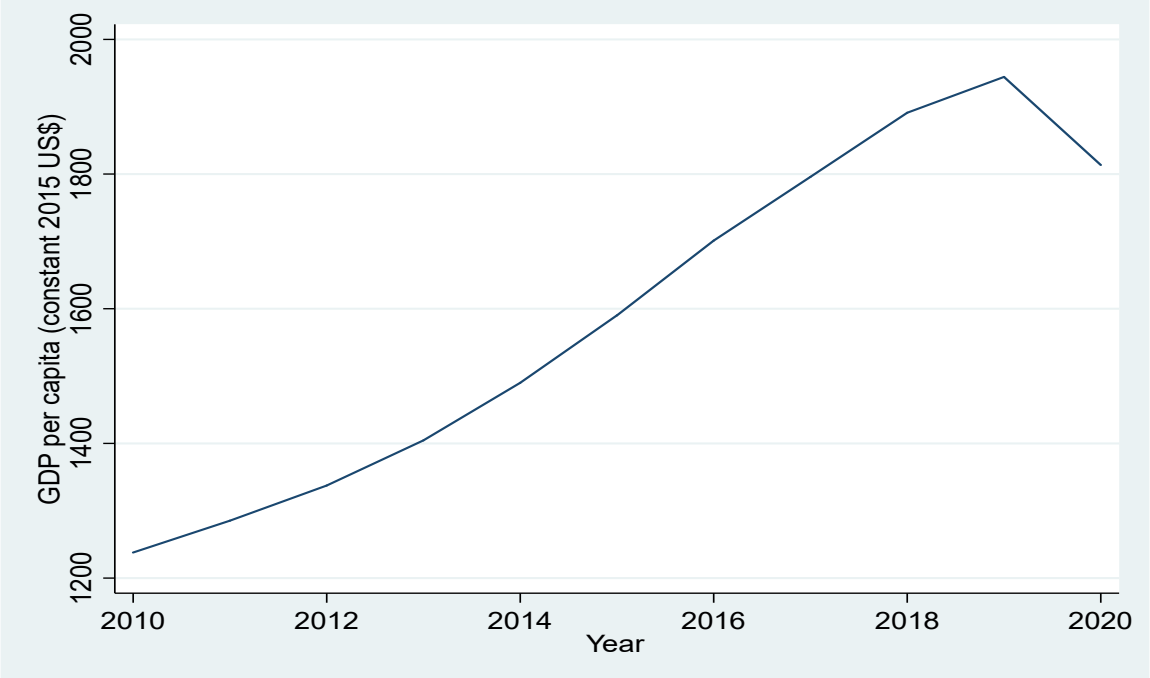

Figure 2

Figure 2 reflects that GDP per capita is continuously increasing till 2019 then this curve falls which shows that GDP falls and it was also evident from COVID 19 situation prevailing at that time.

Descriptive statistics serve as a means to examine the patterns and initial comprehension of variables. They offer insights into average tendencies and data distributions, which can be instrumental in enhancing your research and making more informed projections about future behaviour so descriptive statistics for both the variables are computed, the results of which are shown below:

Table:1 Descriptive Statistics

Statistics	CO_2 emissions	GDP per capita
N	11	11
Mean	1.59124	1590.146
Median	1.63132	1590.174
Interquartile range	0.2067226	476.0585
Range	0.4575615	706.3
Standard deviation	0.1421678	254.1367
Skewness	-0.369677	-0.0166294
Kurtosis	2.216582	1.522988
P50	1.631323	1590.174
P75	1.704927	1813.535
P25	1.498204	1337.476
Min	1.338034	1238.015
Max	1.795595	1944.315

The above analysis is based on 11 observations. The average, commonly known as the mean, represents the central value of a dataset. To gauge the central trend of the data, both the mean and median are utilized. While the mean provides the arithmetic centre, the median serves as a representation of the midpoint within the analysed data. The average value of GDP is 1590.146 and the median is 1590.174, the maximum and minimum value of GDP data is 1944.315 and 1238.015 respectively. The skewness value which is used to measure data trends is -0.0166294 for GDP and it's showing negative asymmetry. Standard deviation quantifies the extent of variability among values within a dataset. It functions as a metric of dispersion, revealing the degree to which data points are dispersed or scattered around the mean. Standard deviation for GDP is 254.1367.

The average value for CO_2 emissions is 1.59124 and the median is 1.63132 whereas the maximum and minimum values are 1.795595 and 1.338034 respectively. The skewness value for this variable is -0.369677 which is also negative and standard deviation is 0.1421678.

After descriptive analysis we compute correlation between CO_2 emission and GDP per capita which is 0.8930 which shows high positive correlation between both the variables and this implies that both economic growth and CO_2 emissions go hand in hand i.e. economic growth and environment degradation leads to one another.

Conclusion

There is high positive correlation between economic prosperity and CO_2 emissions which shows that there is trade-off between both the variables and government has to make policies keeping in view this trade off.

Policymakers can utilise these findings to formulate strategies related to both environment and growth, taking into account the preservation of environmental expenses. However, a limitation of this study is its focus only on present values. To address this limitation in the future, researchers could expand their approach by utilizing simultaneous equation modelling to establish more accurate relationships among the variables.

References

1. Parikh, Jyoti, Panda, Manoj, Kumar, A Ganesh & Singh, Vinay (2009). CO2 emissions structure of Indian economy, doi:10.1016/j.energy.2009.02.014
2. Ghouse, Ghulam, Hashmat, Afsheen & Athar Adeela (2021). Causal Economic Interactions between CO2 emissions and economic growth.
3. Rana Ritu & Sharma Manoj (2020) Dynamic Causality Among FDI, Economic Growth and CO2 Emissions in India with Open Markets and Technology Gap
4. Alvarez, Maria A. Gonzalez & Bernal, Antonio Montanes. (2023). CO2 emissions, energy consumption, and economic growth: Determining the stability of the 3E relationship.
5. World Economic Forum (2021). Global Risks 2021: Fractured Future.
6. Acheampong, Alex O. & Opoku, Eric Evans Osei (2023). Environmental degradation and economic growth: Investigating linkages and potential pathways.