

# Sustainable development in Pakistan in the context of energy consumption demand and environmental degradation

Shaista Alam<sup>\*</sup>, Ambreen Fatima<sup>1</sup>, Muhammad S. Butt<sup>1</sup>

*Applied Economics Research Centre, University of Karachi, Karachi-75270, Pakistan*

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## Abstract

The aim of this paper is to analyze the impact of population growth, economic growth, energy intensity (EI) growth and urbanization growth on environmental degradation in Pakistan. The paper will investigate simultaneously the effect of population growth, urbanization, energy consumption and environmental degradation on the sustainable economic growth as well. To ensure the sustainable development of the economy environmental degradation should not increase with time but be reduced or at least remain constant. If it increases, we will move further away for sustainability, while if it decreases, we will move closer towards it. The results indicate that 1% increase in GDP growth leads to 0.84% increase in growth rate of carbon dioxide emissions, and an increase of 1% in the energy intensity growth rate causes almost 0.24% increases in growth rate of CO<sub>2</sub> emissions. As far as results of co-integrating vector normalized on GDP growth is concerned, the coefficients of EI growth and CO<sub>2</sub> emissions growth are found to be affecting the level of development significantly and positively by 0.3% and 1.2%, respectively. This indicates that in Pakistan process of economic development is dependent on the level of energy use and the resultant of this energy use, CO<sub>2</sub> emissions caused economic growth significantly and positively. In addition to the rapid urbanization and increased population growth affect positively to environmental degradation while negatively and significantly to the economic development in the long run.

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<sup>\*</sup> Corresponding author. Tel.: +92 21 9243168/9243175; fax: +92 21 4829730.

*E-mail addresses*: [shaista\\_ala@hotmail.com](mailto:shaista_ala@hotmail.com), [Shaista\\_aq@yahoo.com](mailto:Shaista_aq@yahoo.com), [aerc@cyber.net.pk](mailto:aerc@cyber.net.pk), [aerc@super.net.pk](mailto:aerc@super.net.pk) (S. Alam), [amber\\_asghar@hotmail.com](mailto:amber_asghar@hotmail.com), [aerc@super.net.pk](mailto:aerc@super.net.pk) (A. Fatima), [aerc@cyber.net.pk](mailto:aerc@cyber.net.pk), [aerc@super.net.pk](mailto:aerc@super.net.pk) (M.S. Butt).

<sup>1</sup> Tel.: +92 21 9243168/9243175; fax: +92 21 4829730.

## 1. Introduction

Human-induced environmental degradation is the most troubling and complex global issue facing the world as a whole. The Earth's climate is changing at an unprecedented rate, and its future implications are wide-ranging, particularly, the security implications of changes in the natural environment. Environmental degradation is expected to have considerable impacts on natural resource systems, and thereby changes in the natural environment can affect human sustenance and economic activities. The unique combination of environmental, economic and human security concerns embodied in the environmental damage. A growing body of research has developed to explore the concept of vulnerability and its link to recent environmental degradation. The question of link or the relationship between the global environmental degradation and the sustainable economic development becomes the major issue and comes to the focal point of research. In this study we try to find out the linkage between environmental degradation and economic growth.

Let us consider a certain level of income, up to which one may reasonably expect high green house gas-intensive income growth to affect adversely the environment globally. But beyond a critical level, climatic degradation may, in principle, reach a stage where further income growth becomes difficult. Thus, the people face the economic as well as social insecurity due to climate change. Climate may act as a constraint to income growth at this latter stage if the green house gas-intensive income growth process is continued. Thus, the global economy faces a serious challenge from the global climate change. To save the world economy or in other way to protect humanity, proper environmental policy should be adopted at appropriate time.

Economic activity promotes wealth creation but has negative effects on the environment. The production systems currently used in industrialized countries generate vast quantities of waste and contamination, causing degradation to natural resources. These impacts are more severe when accompanied by demographic growth, as long as population increases lead to increases in energy consumption and, consequently, to greater atmospheric pollution. A number of researchers have recently considered demographic factors in order to explain the sources of air pollution. The first studies were based on cross-sectional data for only one time period. In this line, [Cramer \(1998, 2002\)](#) and [Cramer and Cheney \(2000\)](#) evaluated the effects of population growth on air pollution in California and found a positive relation only for some sources of emissions but not for others. [Dietz and Rosa \(1997\)](#) and [York, Rosa, and Dietz \(2003\)](#) studied the impact of population on carbon dioxide emissions and energy use. The results from these studies indicate that the elasticity of CO<sub>2</sub> emissions and energy use with respect to population are close to unity.

In a panel data context, [Shi \(2003\)](#) found a direct relationship between population changes and carbon dioxide emissions in 93 countries over the period 1975–1996. A similar result was obtained by [Cole and Neumayer \(2004\)](#). These authors considered 86 countries during the period 1975–1998 and they found a positive link between CO<sub>2</sub> emissions and a set of explanatory variables including population, urbanization rate, energy intensity and smaller household sizes. In addition, several studies have discussed and tested the existence of an environmental Kuznets curve (EKC) where the relationship between pollution and income is considered to have an inverted U shape. These models frequently take emissions per capita for different pollutants as an endogenous variable, assuming implicitly that the elasticity emission-population is unitary. A few of them considered population density as an additional explanatory variable (e.g. [Cole, Rayner, & Bates, 1997](#); [Panayotou, 2000](#)). However, their tests are not based on an underlying theory and testing variables individually are subject to the problem of omitted variables bias. The

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