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The Relationship between Growth-Inequality-Poverty Triangle and Environmental Degradation: Unveiling the Reality

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ABSTRACT

It is important to recognize that increase in well-being is no longer dependent on further economic growth, but on economic and social well-being, which means that the decline in carbon dioxide emission without reducing real wellbeing and growth. The aim of this study is to investigate the main driving forces affecting short and long-run carbon emissions pattern due to changes in growth, inequality and poverty triangle in Pakistan over the period 1980 – 2011 by using multivariate cointegration approach. This study uses five different models i.e., each model have an important policy implication in the context of Pakistan. The results indicate that, on the short run, there is a significant negative relationship between economic growth & carbon emissions and economic growth & poverty while there is a positive relationship between i) economic growth & income inequality; and ii) poverty & income inequality. On the long-run, there is a significant positive relationship between GDP & income inequality, carbon dioxide emissions & income inequality, and poverty & income inequality in Pakistan. On the other side, there is a negative relationship between carbon emissions & economic growth, carbon emissions & income inequality, and economic growth & income inequality. The results of environmental Kuznets curve (EKC) hypothesis show an inverted U-shaped trajectory in relation to economic growth in Pakistan. This study contributes to the debate on the existence and policy relevance of the EKC for Pakistan. The conclusion ensures the sustainability of an urgent need to look beyond the EKC by adopting courageous policy measures of environmental preservation in Pakistan irrespective of the country's level of income. For reduction of CO2 emission, environmental progressive management policies, economic transport system regulations, and low emit fuel consumption by industries are the need of the world.

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1. Introduction

Global environmental degradation has been inspiring more and more researchers to investigate the causes of environmental degradation. There is a complex relationship between environmental changes and its driving forces including economic growth and environmental degradation (McPherson and Nieswiadomy, 2005).

Environmental degradation is a process through which the natural environment is compromised in some way, reducing biological diversity and the general health of the environment. This process can be entirely natural in origin, or it can be accelerated by human activities. Many international organizations recognize environmental degradation as one of the major threats facing the planet, since humans have only been given one Earth to work with, and if the environment becomes irreparably compromised, it could mean the end of human existence (Smith, 2013).

The natural resources are consumed and waste is produced at sustainable rates represent major pertaining challenges. Recognition of these challenges resulted in the endorsement in 2000 of environmental sustainability as one of the Millennium Development Goals (MDGs) to be achieved by 2015. However, by 2003 global rates of consumption and waste production were estimated to be at least 25% higher than the capacity of the planet to provide resources and absorb waste and this rate may have risen as high as 50% by 2007 (WWF, 2010).

On another perspective when the environment becomes polluted, it means that toxic substances have rendered it unhealthy. Pollution can come from a variety of sources, including vehicle emissions, agricultural runoff, accidental chemical release from factories, and poorly-managed harvesting of natural resources. In some cases, pollution may be reversible with costly environmental remediation measures, and in other instances, it may take decades or even centuries for the environment to cope with the pollution (Wallace, 2013).

Since the Industrial Revolution, human activities such as the burning of oil, coal and gas, as well as deforestation have greatly increased CO2 concentrations in the atmosphere. Almost all CO2 emissions (about 96.5%) come from fossil fuels use. The three types of fossil fuels that are used the most are coal, natural gas and petroleum (oil). When fossil fuels are combusted, the carbon stored in them is emitted almost entirely as CO_2 (U.S Department of Energy, 2007).

The most important source of CO_2 emissions worldwide is caused by the transportation of goods and people. The emissions caused by people traveling (by car, plane, train, etc.) are examples of direct emissions. The emissions caused by the transportation of goods are examples of indirect emissions since the consumer has no direct control of the distance between the factory and the store. Since the distance between the manufacturer and the consumer is constantly growing, more pressure is put on the transportation industry to bridge this gap and this ends up creating more indirect emissions. What's worse is that 99% of the energy used to transport people and goods all over the world comes from the combustion of fossil fuels (UDE, 2007). All industrialized nations (with the exception of Canada and France) get the majority (between 60-80%) of their electricity from the combustion of fossil fuels. Eighty percent of the world's energy comes from fossil fuels. The current burning of fossil fuels – oil/ petroleum, coal and natural gas - releases 7 billion tons of carbon per year in the form of carbon dioxide, plus lots of other greenhouse gases (EPA, 2008).

Manufacturing and industrial processes all combine to produce large amounts of each type of greenhouse gas but specifically large amounts of CO_2 because of two reasons. Firstly, many manufacturing facilities directly use fossil fuels to create heat and steam which is needed at various stages of production. Second, their energy intensive activities use more electricity than any other sector so unless they are using renewable sources the energy that they use is responsible for vast amounts of emissions. By industrial production means manufacturing, construction, mining, and agriculture. Manufacturing is the largest of the four and can be broken down into five main categories: paper, food, petroleum refineries, chemicals, and metal/mineral products. These categories account for the vast majority of the energy use and CO2 emissions by the sector (AER, 2004).

CO2 when measured in absolute term, by nation-state, then China ranks first and is outpacing the rest of the world fast, with the United States second, and then Indonesia and Brazil, with a few others coming behind. If rankings are based on per-capita emissions, then Western European stateliest and America lead the pack, and far, far, far behind them, the large developing states of the global South (Ajl, 2010).

Generally at global level, the huge power stations generating electricity to keep lights on, industry operating. They're burning coal, natural gas and oil. They account for roughly one-third of carbon dioxide production in the industrialized nations. Secondly, CO2 emissions from transport sector accounts mostly about 20 to 25 percent in most nations. It includes cars, buses, planes, trains, trucks. Behind transport and power generation the home heating, agriculture, industries like the cement industry, which is a very polluting industry because it has to heat up limestone to 1,450 degrees Celsius to turn it into cement, and the chemical process itself produces carbon dioxide. Cement is 5 to 10 percent of global CO2 emissions (Monbiot, 2008).

Carbon dioxide (CO_2) emission in the United States is increased by about 10% between 1990 and 2011. Since the combustion of fossil fuel is the largest source of greenhouse gas emissions in the United States, changes in emissions from fossil fuel combustion have historically been the dominant factor affecting total U.S. emission trends. Changes in CO2 emissions from fossil fuel combustion are influenced by many long-term and short-term factors, including population growth, economic growth, changing energy prices, new technologies, changing behaviour, and seasonal temperatures. Between 1990 and 2011, the increase in CO2 emissions corresponded with increased energy use by an expanding economy and population, and an overall growth in emissions from electricity generation. Transportation emissions also contributed to the 10% increase, largely due to an increase in miles travelled by motor vehicles (US department, 2007).

In 1987, the World Commission on Environment and Development (WCED) suggested “Poverty is a major cause and effect of global environmental problems. It is therefore futile to attempt to deal with environmental problems without a broader perspective that encompasses the factors underlying world poverty and international inequality.” To better coordinate the process of economic and social development and environmental conservation, it is vital to understand the link between the two. They can’t be viewed as two independent phenomena, as there assert a cause and effect relationship between them. Several regions and communities of the world are trapped in this vicious spiral where poverty pushes people to over exploit the environmental resources to survive each day. The impoverishment of the ecosystem further pushes them deeper into poverty making survival an even more difficult task. (Jabeen, 2012).

Environmental degradation appears to be another side effect of economic inequality and analyses show there is a negative correlation between

income inequality and environmental sustainability the higher the income inequality the worse the environmental indicators such as waste production, meat and water consumption, biodiversity loss and environmental composite indices (e.g. ecological footprint) (Andrich et al., 2010).

It is well known that higher level of pollution emission (carbon dioxide emission) might lead to the reduction of the productive capacity of a country and also to climatic change. On the other hand it is also a fact economic growth necessitate higher amount of energy consumption and thus carbon dioxide and other pollution emission. In fact it has been argued that an inverted-U-shaped relationship between economic growth and measured pollution indicators (environmental quality) exist and this known as the EKC. The Environmental degradation and Economic developmental stages are best described in relationship by an inverted U-shape curve (the Environmental Kuznets Curve (EKC)). From this perspective, as the economy expands, environmental damage increases up to a threshold, above which the society demands and can afford environmental remediation and natural resource protection. In industrial period the environmental damages are at peak and after then it declines. Therefore Environmental degradation and economic development stages follow the pattern of Inverted U shape phenomena such that increase peak and decline rate with economic growth. Finally, if the environmental Kuznets curve hypothesis is supported by evidence, development policies have the potential of being environmentally benign over the long run (at high incomes), but they are also capable of significant environmental damage (Papanyotou, 1994).

Boyce et al (2007) have proposed that the unequal distribution of wealth and power within countries leads to greater environmental damage by undermining the collective action required for environmental protection. Likewise, it has been shown that more equal societies are more socially cohesive and have higher levels of trust which foster public-spiritedness (Wilkinson & Pickett, 2010). Similar findings have been reported on the relationship between social capital and environmental outcomes (Dulal et al., 2011), presumably because lack of trust and poorer social capital erode the capacity for collaborative action.

The annual carbon emissions and per capita emissions for Pakistan are expressed in thousand metric tons of carbon. Pakistan produces more than 30 million metric tons of carbon emissions. This is about 0.4 per cent of global emissions. But, this has increased almost four-fold from nine million in 1980. A heavy emphasis on industrialization in Pakistan means that the rate of increase in emissions is going up. The energy sector contributes the most to emissions is 53 per cent. At the same time, Pakistan's decreasing forest cover is suffering from among the world's worst deforestation rates, primarily from the large logging industry. Forest cover declined to 2.5 per cent in 2005 from 3.3 per cent in the late 1990s (Sheikh, 2008).

Environmental challenges and issues of Pakistan are associated primarily with an imbalanced social and economic development from the last two to three decades. This challenge is further compounded with rapid urbanization due to a shift of population from rural to urban areas. Thus, all major cities of Pakistan face haphazard, unplanned expansion leading to increase in pollution. Main factors causing degradation to air quality are, a) rapidly growing energy demand and b) a fast growing transport sector. In the cities, widespread use of low quality fuel, combined with a dramatic expansion in the number of vehicles on roads, has led to significant air pollution problems. Air pollution levels in Pakistan's most populated cities are high and climbing causing serious health issues. Although Pakistan's energy consumption is still low by world standards, but lead and carbon emissions are major air pollutants in urban centers (GOP, 2010).

The above discussion shows the strong relationship between poverty-growth-inequality and environmental degradation. The objective of this study is:

- To observe changes in environmental degradation due to changes in poverty, growth and income inequality in Pakistan.
- To examine the short-and long-run relationship among carbon dioxide emissions; poverty, economic growth and income inequality.
- To find the Existence of environmental Kuznet Curve for the Pakistan.

This study divides in to the following sections: after introduction which is presented in Section 1 above, Section 2 presents the review of literature. Data source and methodological framework are shown in Section 3. Results are discussed in Section 4. Final section concludes the study.

2. Literature Review

The relationship between CO_2 emission and growth-inequality-poverty has been the subject of intense research. Some earlier panel studies reveal different results which depend upon the countries and the period held in the analysis. As the links between economic growth and CO_2 emissions have been primary concerns of the empirical research, particularly since the 1990s. A number of empirical studies have enumerated the possible linkages of CO2 emissions and economic growth.

Ahmed (2001) attempt to study the income inequalities between and within various occupations/professions in Pakistan utilizing Household Income and Expenditure Survey (HIES) 1992-93. The results show that within various occupations/ professions, significant and highest level of inequality among skilled workers and lowest level of inequality is found among professionals. Similarly, within various professions/occupations, highest level of inequality is observed in NWFP while lowest level of inequality is found in Baluchistan Province.

Roco and Alcantara (2001) studied the relationship between CO_2 emissions and primary energy in case of Spain in time period 1972 to 1997. The results show that there is no significant evidence supporting the Kuznets curve hypothesis. Tabassum (2004) examines the relationship between economic growth and income inequality both at aggregate and regional level using more comparable data set for 69 developing countries over the period 1965-2003. The study identifies credit market imperfection in low-income developing countries as the likely reason for a strong negative relationship between income inequality and economic growth. While in short run the relationship between growth and income inequality is positive but over time more income inequalities reduces economic growth. Moreover, this study finds evidence that more physical and human capital investment, Openness to trade and higher government spending have statistically significant impact on enhancing economic growth and reducing inequality.

Khanam (2007) studied the relationship between primary education and poverty reduction which affects the individual income by using Mincer Wage function. The experiment results show direct effects of primary education on income poverty reduction at earning member levels, at household levels and at per capita levels. The income distributions in the two years have variable effects at income ranges however income distributions at different percentiles of population are affected positively by primary education expansion. The results further show that as primary education expands, the income

levels increase within income quintiles and the income inequality reduces in 2001-2002 cases. It is also observed that higher the changes in population schooling levels, higher will be the changes in income inequalities and poverty profiles.

Acharyya (2009) examines two most important benefits and costs of foreign direct investment in the Indian context - GDP growth and the environment degradation during 1980 to 2003. The findings show there is statistically significant long run positive relation, but marginal, impact of FDI inflow on GDP growth. While the long run, growth impact of FDI inflow on CO2 emissions is quite large. The finding has some far reaching implications for the global environment as well, with India having emerged as the fourth highest in the global ranking of CO2 emissions by turn of this century. The results from cointegration analysis show that FDI inflow in India did have a positive, but marginal, long run impact on GDP growth. On the other hand, though the pollution heaven hypothesis may not be a plausible argument for the upsurge in FDI inflow in the 1990s, such inflows did have a quite large positive impact on the CO2 emissions through output growth. This, however, may be an underestimate since the effect of FDI on water pollution and on the local air pollutants are not estimated.

Burnett (2009) investigates the relationship between economic growth and environmental indications for air pollution in over 100 metropolitan statistical areas from 2001 to 2005 for the United States. The results indicate a statistically significant U-shaped relationship for some of the pollutants; however, the evidence is pretty weak with the exception of ground level ozone. This study does not find evidence to support the traditional EKC inverse U-shaped relationship. Moreover these results are compared and contrasted to previous literature by providing insight into unresolved theoretical and empirical estimation issues and future research needs.

Shahbaz et al (2009) investigate the relationship between CO2 emissions, energy consumption, economic growth and trade openness in the context of Pakistan over a period of 1971 to 2009. By using ARDL model for cointegration and Granger causality tests the result infers that there exists long run relationship among the variables. The EKC hypothesis is supported in the country. Furthermore, the consequences find one-way causal relationship in succession from income to CO2 emissions. Energy consumption increases CO2 emissions both in short and long run. Trade openness reduces CO2 emissions in long run but it is insignificant in short run.

Boopen and Vinesh (2010) analyses the relationship between GDP and carbon dioxide emissions for Mauritius for the period 1975 to 2009. By Using Solow Growth function pertaining to the economic model and rigorous econometrics analysis, results depicts that the carbon dioxide emission trajectory is closely related to the GDP time path. The estimation shows that emissions elasticity on income has been increasing over time. By estimating the EKC, finding is unable to prove the existence of a reasonable turning point and thus no EKC "U" shape is obtained. Findings imply that Mauritius could not curb its carbon dioxide emissions in the last three decades. Thus, as hypothesized, the cost of degradation associated with GDP grows over time and it advocate that the economic and human activities are having increasingly negative environmental impacts on the country as compared to their economic prosperity.

Drabo (2010) examines the link between health indicators, environmental variables and income inequalities in 90 developed and developing countries by using data covering the period from 1970 to 2000. The econometric analysis shows that income inequalities negatively affect environmental quality and environment degradation worsens population's health. This negative effect of income inequalities on environment is mitigated by good institutions. The findings also show that income inequalities negatively affect health status. This confirms that environment quality is an important channel through which income inequalities affect population health. These results hold for air pollution indicators (CO2 and SO2) and water pollution indicator (BOD). The results are also robust for rich and developing countries. Countries with high income inequalities may implement distributive policies in order to avoid its negative impact on health.

Leight (2010) investigates the relationship between economic inequality, income growth, and political control in US states for the time frame 1969 to 2005. The result shows that in the short run, inequality has a significant and robust impact on growth that is robust to a number of different control variables and estimation techniques. In addition the findings reveal that the relationship among inequality is non-linear; a quadratic function relating the Gini coefficient to growth is often significant. When other measures of inequality are used in place of the Gini coefficient, they do not exhibit the same relationship with growth. Finally, political control appears to have a significant impact on both growth and inequality. Democratic control increases growth and reduces inequality, while Republican control has the opposite effects.

Murad and Mustapha (2010) examines whether or not the waste management practices of the poor households living in squatters and low-cost flats in Kuala Lumpur are conducive to the environment. The aim of this study is to empirically assess knowledge, attitude and behaviour of the urban poor concerning their household solid waste management. With primary data collected from the level of living condition and waste management practices of the urban poor, the findings of the study provide evidence to the effect that poverty does not cause environmental degradation as the knowledge, attitude, and behaviour of the urban poor concerning solid waste management are found to have been conducive to the environment.

Attari and Attaria (2011) investigate the effect of CO2 emission on economic growth by conducting the regional analysis of PIC nations i.e. Pakistan, India and China for the time period 1971 to 2008. The results show that the change in CO2 emission from 1971 to 2008 is at the rate of 51.33% globally. But in case of Pakistan it increased with minimal low rate which is 85.87% as compared to its neighbour countries like China and India which had 87.53% and 88.18% respectively. The population contribution by Pakistan is high, 63.55%, but GDP per capita is low. But the emission of CO2 from the consumption of energy is low as compared to China and India. Furthermore, the per capita emission of CO2in case of Pakistan is low as compared to China and India.

Essien (2011) examines the relationship between economic growth and CO2 emissions in Nigerian economy over the period 1980 to 2009. The econometric result suggests that there exists a long run relationship among the variables. Moreover the results reveals that electricity and gas consumption cause economic growth both in the short and long run but only fuel woods influences it in the long run. Finally the results provide confirmation that natural gas influences carbon emissions in the long run while fuel woods influences carbon emissions in the short run. These results are anticipated to shed a light on the Nigerian policy making in coping with climate change.

Mekenbayeva and Karakuş (2011) examine the relationship between Economic inequality and growth for 136 countries over a period of 1980 to 2009. A negative relationship of two variables in developing countries can result from negative opportunity-creation effect operating through the

constraints on human capital investment that it imposes on poor individuals, imperfect capital markets, unsuitable and risky conditions for investors and unstable political environment. While the situation in develop countries is different because they have higher marginal productivity of capital, higher marginal propensity to save in general and a weaker preference for leisure. So far, Turkey is concerned the negative correlation between income growth and inequality due to development policies.

Ozturk and Acaravci, (2011) studied the CO2 emissions, energy consumption, and economic growth in Turkey for the period 1968 to 2005. The results suggest an evidence of a long-run relationship between the variables at 5% significance level in Turkey. The estimated income elasticity of carbon emissions per capita is -0.606 and the income elasticity of energy consumption per capita is 1.375. Results for the existence and direction of Granger causality show that neither carbon emissions per capita nor energy consumption per capita cause real GDP per capita, but employment ratio causes real GDP per capita in the short run. Moreover, EKC hypothesis at causal framework by using a linear logarithmic model is not valid in Turkish case. The overall results indicate that energy conservation policies, such as rationing energy consumption and controlling carbon dioxide emissions, are likely to have no adverse effect on the real output growth of Turkey.

Tiwari (2011) examined causality by considering energy consumption, C02 emissions and economic growth for India in period 1971 to 2005. The results show that CO2 Granger-causes GDP while energy consumption does not Granger- cause GDP, GDP does not Granger-cause CO2 while energy consumption Granger-causes CO2 emissions. The econometric results show that CO2 Granger-causes GDP while electricity consumption does not Granger-causes GDP in short run. In the long run, it is found that cointegrating vector of CO2 equation of VECM is significant. This implies that GDP, CO2, and electricity consumption Granger-cause CO2 emissions in the long run.

Zaman et al (2011) studied the relationship between poverty, population growth and environment. The aim of this study is to examine the impact of poverty on environment (air pollution) and population in context of Pakistan during a period of 1975 to 2009. The results show that rapid population and air pollution has a significant contributor to poverty in Pakistan. However, the results nullify the conventional view that poverty is a major cause of environmental degradation (or air pollution), while the result supports the hypothesis that population have a deleterious impact on increasing poverty. The results further conclude that there is a stable long-run relationship between population, poverty and pollution in Pakistan. The results of causality test show that there is a unidirectional causal flow from population to carbon dioxide emission.

Alkhathlan, et al (2012) examines the long run and causal relationship between economic growth, CO2 emissions and energy consumption in a multivariate framework for Saudi Arabia during the year 1980-2008. By using ARDL and VECM test the results show that there are long run and short run relationships among the variables in the model. The estimated elasticity coefficients of CO2 emissions, energy consumption, and employment ratio have positive and significant impacts on GDP in the long run. Additionally results for direction of causality indicate that neither carbon emissions per capita nor energy consumption per capita causes GDP per capita, but employment ratio causes GDP per capita in the short run. On the foundation of empirical findings, it can be accomplished that energy conservation policies and controlling carbon dioxide emissions, are likely to have no adverse effect on economic growth in the short run. Nevertheless, the long run income elasticity of carbon emissions is greater than the short run income elasticity of carbon emissions, which indicates that in the long run income leads to greater carbon dioxide emissions in the country.

Arouri et al, (2012) attempt to investigate the relationship between carbon dioxide emissions, energy consumption, and real GDP for 12 Middle East and North African Countries (MENA) over the period 1981 to 2005. The results show that in the long-run energy consumption has a positive significant impact on CO2 emissions. More interestingly, findings show that real GDP exhibits a quadratic relationship with CO2 emissions for the region as a whole. However the estimated long-run coefficients of income and its square satisfy the EKC hypothesis in most studied countries, the turning points are very low in some cases and very high in other cases, hence providing poor evidence in support of the EKC hypothesis. Thus, findings concludes that not all MENA countries need to sacrifice economic growth to decrease their emission levels as they may achieve CO2 emissions reduction via energy conservation without negative long-run effects on economic growth.

Cheema and Sial (2012) determine the long-run relationship between poverty, income inequality, and growth on pooled data from eight Household Income and Expenditure survey (HIES) datasets compiled between 1992/93 and 2007/08 for the Pakistan. The results show that growth and inequality play significant roles in affecting poverty, and that the effect of the former is substantially larger than that of the latter. Estimation shows that there is a significant positive relationship between inequality and growth in Pakistan. The results at the rural-urban level show that the growth elasticity of inequality is higher in urban areas than in rural areas. Furthermore, growth has a significant positive impact on inequality. The analysis at a regional level shows that both the gross and net growth elasticity of poverty are higher in rural areas than in urban areas, whereas the inequality elasticity of poverty is higher in urban areas than in rural areas. Moreover the results show that growth contributes far more towards reducing poverty, keeping inequality constant, than the latter does to increasing poverty, holding the former constant.

Farhani and Rejeb (2012) investigate the relationship between Energy consumption, GDP and CO2 emissions for 15 MENA countries covering the annual period 1973-2008. The finding of this study reveals that there is no causal link between GDP and EC; and between CO2 emissions and EC in the short run. However, in the long run, there is a unidirectional causality running from GDP and CO2 emissions to EC.

Gani (2012) investigate the relationship between five scope of good governance (political stability, government effectiveness, regulatory quality, rule of law, and corruption) and carbon dioxide (CO2) emissions in a cross-section of developing countries for the time frame 1996 to 2009. By using regression analysis the empirical results present evidence that political stability, the rule of law, and control of corruption are negatively and statistically significantly correlated with CO2 emissions per capita. Moreover results also provide evidence in support of the Environmental Kuznets Curve (EKC) and that trade openness and the size of industrial sector as other strong correlates of CO2 emissions.

Romuald (2012) examines the existence of convergence and the importance of education on carbon dioxide growth per capita, over the period 1970-2004 for 85 countries. By using panel data and apply GMM-System estimation , the results infer the divergence in per capita carbon dioxide emissions around the world, and that education is not a factor in carbon dioxide emissions growth. Furthermore result reveals that, in developed countries, there is convergence for per capita carbon dioxide emissions. Education is found to be a factor in pollution growth, although its effect is mitigated by the presence of political institutions.

Shahiduzzaman and Alam (2012) studied the existence of an inverted U-shape relationship between CO2 emissions per capita and per-capita GDP for the Australia using data from 1961-2009. The empirical result shows the existence of an inverted U-shape relationship between per-capita CO2 emissions and per-capita GDP in Australia.

Boutabba (2013) examines the long-run equilibrium and the direction of a causal relationship between carbon emissions, financial development, economic growth, energy consumption and trade openness for India in a multivariate framework for the time period 1970 to 2008. The empirical results show that there is strong evidence on the long run and causal relationships between per capita carbon emissions, per capita real income, the square of per capita real income, per capita energy use, financial development and trade openness. The results also confirm the existence of EKC hypothesis in the Indian economy. Further, causality tests also indicate that there was a unidirectional Granger causality running from per capita real income, per capita energy consumption, and financial development to per capita carbon emissions.

The above discussion confirms the strong correlation between growth, inequality and poverty in Pakistan. In the subsequent section, an action has been made to find the statistical relationship between growth-inequality-poverty triangle and existence of environmental Kuznet curve in the context of Pakistan.

3. Data Source and Methodological Framework

The study uses annual observations for the period of 1980 to 2011. The data is obtained from various issues of Economic Survey of Pakistan and World Development Indicators which is published by World Bank (2012). The national poverty level is estimated based on an official poverty line of 2,350 calories per adult equivalent per day. To get reliable estimates of poverty and income inequality measures, a simple interpolation technique is used to take the growth in trend between two points in time and fill the data gaps between successive observations. Meanwhile forward interpolation technique is used for the year 2006 onward.

The time series data often shows the property of non-stationarity in levels and the resulted estimates usually provide spurious results (Granger, 1981). Thus, the first step in any time series empirical analysis is to test for the presence of unit roots to remove the problem of inaccurate estimates. The other important step taken was to check the order of integration of each variable in a data series in the model to establish whether the data under hand suffer unit root and how many times it needed to be differenced to gain stationarity (Yousaf et al, 2008).

3.1. Cointegration Test

The test for co-integration consisted of two steps: first, the individual series were tested for a common order of integration. If the series are integrated and are of the same order, it implies co-integration. Dickey and Fuller (1979) devised a procedure to formally test for non-stationarity. The Augmented Dickey Fuller (ADF) test was used to test the stationarity of the series. The ADF test is a standard unit root test: it analyses the order of integration of the data series (Dickey and Fuller, 1981). These statistics are calculated with a constant, and a constant plus time trend, and these tests have a null hypothesis of non-stationarity against an alternative of stationarity.

In order to apply Co-integration, we used Johanson's Cointegration test to the series of same order to determine the long run relationship between the variables. If series are cointegrated of order 1, trace test (Johansen's Approach) indicates a unique cointegrating vector of order 1 and hence indicates the long run relationship. In the multivariate case, if the I(1) variables are linked by more than one co-integrating vector, the Engle–Granger (1987) procedure is not applicable. The test for co-integration used here is the likelihood ratio put forward by Johansen and Juselius (1990), indicating that the maximum likelihood method is more appropriate in a multivariate system. Therefore, this study has used this method to identify the number of co-integrated vectors in the model. The Johansen and Juselius method was developed in part by the literature available in the field and reduced rank regression, and the co-integrating vector 'r' is defined by Johansen as the maximum Eigen-value and trace test or static, there is 'r' or more co-integrating vectors. Johansen (1988) and Johansen and Juselius (1990) proposed that the multivariate co-integration methodology could be defined as:

Model 1: CO_2 Emission and Economic Variables

$(CO2)t = f(GDP, GINI, POVERTY)$ ……(1)

Where CO_2 represents carbon dioxide emissions in kilo ton; GDP represents economic growth in current US $ million; GINI represents income inequality which is measured in percentage; POV represents poverty which is measured by head count ratio in percentage.

Model 2: GDP and Economic Variables

$(GDP)t = f(CO_2, GINI, POVERTY)$ ……(2)

Model 3: GINI and Economic Variables

$(GINI)t = f(GDP, CO_2, POVERTY)$ ……(3)

Model 4: Poverty and Economic Variables

$(POV)t = f(GDP, GINI, CO_2)$ ……(4)

Model 5: Environmental Kuznet curve

(CO2)t = f(GDP, GDP ^{2} ,GINI,GINI ^{2} ,GDP × GINI)……...(5)

For the vector of elements representation of model consider the following autoregressive representation:

$$CO2_t = \pi_\circ + \sum_{T=1}^{K} \pi_i (CO2)_{t-1} + \mu_t$$

$$GDP_t = \pi_\circ + \sum_{T=1}^{K} \pi_i (GDP)_{t-1} + \mu$$

$$GINI_t = \pi_\circ + \sum_{T=1}^{K} \pi_i (GINI)_{t-1} + \mu$$

$$POV_t = \pi_\circ + \sum_{T=1}^{K} \pi_i (POV)_{t-1} + \mu$$

Johansen's method involves the estimation of the above equation by the maximum likelihood technique, and testing the hypothesis Ho; $(\pi = \Psi\xi)$of "r" co-integrating relationships, where r is the rank or the matrix is the matrix $\pi(0 \angle r \angle P), \Psi$ of weights with which the variable enter co-integrating relationships and ξ is the matrix of co-integrating vectors. The null hypothesis of non-cointegration among variables is rejected when the estimated likelihood test statistic

ϕ_i $\{= -n \sum_{t=r+1}^{p} \ln(1 - \hat{\lambda}$ i} exceeds its critical value. Given estimates of the Eigen-value $(\hat{\lambda}_i)$the Eigen-vector (ξi) and the weights (Ψi), we can find out whether or not the variables in the vector (CO2t) are co-integrated in one or more long-run relationships among three simultaneous equations i.e., Economic Growth (GDP), GINI (income inequality) and Poverty in context of Pakistan.

3.2. Error Correction Model (ECM)

If time series are I(1), then one could run regressions in their first differences. However, by taking first differences, we lose the long-run relationship that is stored in the data. This implies that one needs to use variables in levels as well. Advantage of the Error Correction Model (ECM) incorporates variables both in their levels and first differences. By doing this, ECM captures the short-run disequilibrium situations as well as the long-run equilibrium adjustments between variables. ECM term having negative sign and value between "0 to 1" indicates convergence of model towards long-run equilibrium and shows how much percentage adjustment takes place every year.

In the error-correction form, we can effectively determine the separate influences of the short-run and the long-run on CO2 emission. The coefficient of CO2 is expected to be positive in the relationship with GDP. The rationale behind the positive relation is generally accepted that when the GDP increases in chain of outcome the process of industrialization increases, capital investment increases, and access of more resources, high consumption, and direct use of energy. So, all these factors lead to high consumption of fuel (petroleum, Gas, oil) which as a result emits high degree of CO2 emission (Attari and Attaria, 2011).

Secondly, the Income inequality is key variable that determines the income disparity and thus have positive relation with CO2 emission. It means the high income population will directly emit CO2 because the rich people have high marginal propensity to emit CO2. And low income people directly use natural resources to deplete environment and due to less income they cannot take protective measure to save natural environment (Selden and Song, 1994). Whereas, there is another consensus about the income inequality that low income population have less access of resources and low consumption and investment power so they emit low CO2 emission. Furthermore, it is of view that in developing nation the expected sign of CO2 and income inequality is positive as developing nation has high income inequality which leads to high CO2 emission and Developed nations are with positive relation with Income inequality indicating that developed nations have low income inequalities and have low CO2 emission,. More specifically in terms of inequalities, High income inequalities lead to high CO2 emission thus positive relation and Low income inequalities have low CO2 emission therefore having positive sign (Stern et al., 1998). There is also evidence that developing nation have high income inequalities than developed nations because of many factors which contributes for income inequalities such that lack of Government unemployment funds, high pensions, sick compensations, part time job opportunities, basic primary educational target, and incremental high average wage rate etc. (Taylor, et al 2012).

The expected sign for Poverty and CO2 is also positive. The rationale behind this relation is that poor people are direct emitters of CO2 via a channel of using Direct Natural resources intensively, taking low remedial measures, and due to low education they cannot understand the importance and

efficient use of Natural , Economic as well as environmental resources. As a general consensus via a channel of GDP it is believed that the increase in GDP initially increases the income inequality due to rapid production and growth, which then high income inequality leads to poverty. Thus the main reason behind increasing factors of high CO2 emission is poverty (Heshmati, 2006).

Moving towards GINI and GDP, there is complex relation between these variables. As there can be positive, negative as well as no strong relation. The understanding behind positive relation is that with increase in GDP generally in developing nations there are high income inequalities at initial stages of Economic development of nation (Cheema and Sial, 2012). It is also analysed that although increase in GDP decreases poverty but the level of income inequality remains constant due to strong political dominance in the nation and policies which are taken and ruled for the favour of political solidarity (Borghesi, 2000). In case of negative relation between GDP and income inequality the justification reveals that when GDP increases this leads to change the income inequality level and thus lowers the poverty gap, if the Government priorities are not in favor of benefiting poor from growth then the change in poverty gap would be offset by the negative effect of income inequalities. Thus, here although magnitude of GDP reduces the poverty but could not decreases the income inequality (Gelaw, 2009). Moreover the literature also identifies credit market imperfection in low-income developing countries as the likely reason for a strong negative relationship between income inequality and economic growth. While in short run the relationship between growth and income inequality might be positive but over time more income inequalities reduces economic growth. Likewise, it is evidence that more physical and human capital investment and higher government spending have statistically significant positive impact on enhancing economic growth and reducing inequality (Tabassum, 2004).

Furthermore there is negative relationship between GDP and poverty. This means that with the increase in GDP the production increases which then leads to create job and business opportunities. Thus by employment, business trend and increase in per capita income, reduces poverty (Zaman et al, 2011). When the GDP increases the population whether they are subsistence farmers, salaried workers, or self-employed entrepreneurs, poor people derive most of their income from work. This basic fact means that the level of employment, the quality of jobs, and the access which the poor have to decent earnings opportunities will be crucial determinants of poverty reduction. The intuition that jobs matter for development has not been lost on the governments of low income countries and the vast majority of national development strategies look to employment generation as a major channel for poverty reduction (Hull, 2009).

Finally, there is positive relation between GINI and poverty as this relation depends on the conditions. The rationale behind the positive relation is justified in context of level of development and Government policies. The positive relation means with increase in GINI –income inequality the poverty increases and increases in poverty gap increases income inequality as well. It indicate for developing nations, as low GDP growth rate leads to high income inequalities and increases poverty gap so have positive relation with income inequality and poverty. For developed nations as they have high GDP rate which result in low income inequalities reduces poverty gap and boosts economic growth thus in economic chain assigns negative relation between income inequality and Poverty (Stevans and Sessions, 2008).

On the other hand in context of Government polices if targeted towards low income people, basic primary and agricultural education, this would promote the basic income level of poor people by employment and thus lowers the income inequality and poverty ascertaining positive impact and relation as well in income inequality and poverty (Taylor, et al 2012).

Globalization on another fact may also widen inequality. A first channel through which this may happen is off shoring. The tasks that are relocated from richer to poorer countries are typically not skill intensive from the perspective of the skill-rich country, but they are from the perspective of the skill-poor country. As a result, off shoring makes labor demand more skill intensive in both poorer and richer countries, thus increasing inequality in both groups of countries (Feenstra and Hanson, 1996). Second, if firms differ in their profitability and low-income workers work disproportionately in low-productivity firms that are battered by import competition, trade may increase labour income inequality by lowering employment or the relative earnings of low-income workers (e.g. Egger and Kreickemeier, 2009; Helpman et al., 2010). This implied positive link between globalization and inequality is supported by a growing body of studies of individual firms, but it is more difficult to establish a robust link at the aggregate level. Globalizations and technological change may also reinforce each other, thereby further raising inequality. On the one hand, technology may underpin globalization and on the other, the increased competition that comes with globalization may force firms to innovate. Innovation may raise labour income inequality both temporarily – since R&D is skill intensive (Dinopoulos and Segerstrom, 1999; Neary, 2003) – and permanently, provided it results in skill-biased technological change (Acemoglu, 2002).

4. Results and Discussions

Time-series data is often found to be non-stationary, containing a unit root. Ordinary Least Squares (OLS) estimates are efficient if variables, included in the model are stationary of the same order. Therefore, first it is needed to check the stationary of different variables, which are used in our study. For this purpose we applied Augmented Dickey-Fuller (ADF) test. Table 1 gives the results of ADF tests. Based on the ADF tests, all variables are non-stationary at level, but after taking first difference, it would become stationary. Thus, it was concluded that these variables are integrated of order one i.e. I (1).

Table1- Augmented Dickey-Fuller (ADF) on the levels and on the First Difference of the Variables (1980-2011).

Variables	Level			First Difference		
	Constant	Trend & Intercept	None	Constant	Trend & intercept	None
CO2	4.559	3.180	9.228	-5.824*	-6.3105*	-6.955*
GDP	-1.820	-0.895	-1.412	-5.901*	-5-009*	-5.962*
GINI	-1.788	-2.035	1.041	-2.762***	-3.351***	-2.744*
POV	-2.548	-2.539	-0.623	-3.362**	-3.302***	-3.412*

Note: *, ** and *** indicates significance at1%, 5% and 10% respectively.

The relationship between the growth-inequality-poverty and carbon emissions was examined by the Multivariate Cointegration Methodology which was proposed by Johansen & Juselius (1990). The results show that there is only one cointegration relationship between the variables GDP, GINI and POV. In another test where we used interaction term, the results indicate that there are three cointegration equations between the variables CO_2, GINI, POV, GDP, GDP square, GINI square and interactive term (GDP × GINI). The presence of cointegration vector shows that there exists a long-run relationship among the variables[*]. Table 2 shows the short-run error correction model.

Table 2 - Short-run Error Correction Model.

Dependent variables	Dlog(CO_2)	Dlog (GDP)	Dlog (GINI)	Dlog (POV)
Constant	0.058* (11. 2)	0.215* (2.899)	0.008 (1.440)	-0.018 (-0.627)
Dlog(CO2)	---------	-4.420* (-3.199)	-0.053 (-0.946)	0.070 (0.257)
Dlog(GDP)	-0.01* (-9.80)	----------	0.010** (2.296)	-0.057* (-3.000)
Dlog(GINI)	0.090 (0.294)	3.070 (1.242)	----------	1.625** (2.207)
Dlog(POV)	-0.07 (-0.95)	-2.146* (-4.003)	0.08*** (1.93)	----------
R Square	0.458	0.559	0.497	0.485
Adjusted R square	0.323	0.491	0.420	0.402
F-Statistics	5.175*	8.250*	6.441*	5.886*
D.W	1.856	2.282	1.821	1.872

Note: * and ** denotes rejection of hypothesis at 1% and 5% significance level. T- values in bracket.

[*] These results are not shown in any tabular form in this study.

The results of Table 2 show that there is a negative relationship between carbon emissions and economic growth; however, one percent increase in economic growth reduces poverty around 2.146%. The result implies that CO_2 and other dangerous gases in environment makes the productive area as a red zone where production is impossible or have no economic efficiency or even have to bear high cost to make polluted environment in productive mode. This result is consistent with the study of Burnet (2009) and Tiwari (2011). In addition, one percent increase in poverty, income inequality increases by 0.089 percent. The result is consistent with the study of Tabassum (2004) and Leight (2010). The rationale behind this relation is that economic growth boosts the process of industrialization, increases employment and business opportunities; investment leads to increases the income generation which in chain increases the human capital investment and then increases the per capita income which then ultimately decreases the poverty (Stevans and Sessions, 2008). High income inequality seizes all the benefit of high economic growth and income per capita falls behind the average income. This leads to unemployment and lack of employment, business opportunities, lack of Government funds and benefits increase the poverty. The result indicates that increase in income inequality heavily influence the poverty. The empirical results, given in Table 1, appear to be very good in terms of the usual diagnostic statistics. The value of R adjusted indicates that 32.3%-49.1% variation in dependent variable has been explained by variations in independent variables. F value is higher than its critical value suggesting a good overall significance of the estimated model. Therefore, fitness of the model is acceptable empirically. The result suggests that all variables have a correlation proving the hypothesis. Table 3 shows the long-run error correction term.

Table 3 - Long-run Error Correction Model.

Dependent variables	CO2	GDP	GINI	POV
Constant	0.0562*	0.1973*	-0.0079**	-0.004
	(11.977)	(2.779)	(-2.443)	(-0.238)
Dlog(CO2)	----------	-4.542*	0.244*	-0.183
	-	(-4.099)	(4.354)	(-0.542)
Dlog(GDP)	0.0331*	----------	-0.002	-0.087*
	(3.601)		(-0.640)	(-3.746)
Dlog(GINI)	0.2169	4.524**	----------	2.386**
	(0.711)	2.317)	-	(2.327)
Dlog(POV)	-0.151***	-1.124**	0.032	----------
	(-1.928)	(-2.437)	(1.198)	
ECM (*p*)	-1.164*	-1.069*	0.789*	-0.094
	(5.212)	(5.010)	(6.687)	(-1.245)
R Square	0.371	0.898	0.718	0.564
Adjusted R ^{2}	0.235	0.876	0.657	0.469
F-Statistics	2.724**	40.850*	11.764*	5.962*
	(2.821)	(11.852)	(7.252*	(4.898)
DW	2.058	2.166	2.011	1.982

Note: *, ** and *** denotes rejection of hypothesis at 1%, 5% and 10%significance level. T- values in bracket.

The results of long-run error correction model indicate that the adjustment parameter (*p*) shows negative value, indicating the long-run convergence. The ECM estimation reveals that in between 78.9% to 116.4% disequilibrium on dependent variable is reported with other independent variables. The large sizes of coefficient of error-correction terms indicate that speed of adjustment is too fast for equations to return to their equilibrium level, once it has been shocked. The model extends an EKC to allow for an income inequality effect. The study used interaction effect which shows the relationship between CO2 emissions per capita and income inequality to depend on the value of GDP per capita. The results reveal that the relationship between carbon dioxide emissions per capita and income inequality is U-shaped i.e., for Pakistan characterized by high income inequality, reductions in income inequality are associated with lower per capita emissions. For less unequal societies, reductions in income inequality are associated with increases in carbon emissions per capita. The inequality effects are highly significant and thus clearly provide a better fit of the data than a linear effect.

The level at which reductions in income inequality stop being beneficial would depend on the level of GDP per capita. The coefficient estimates for specification is found in Table 4. The higher the economic growth in initial stage increases the emission but with the increase in GDP gradually at certain the emission is at peak level, then again in third stage of development the CO2 emission decreases. The result shows that the relationship between income inequality and per capita carbon emissions is negative and GDP^2 is with correct sign and is significant. Moreover, the value of GINI is also significant. Similarly there is negative and significant relation between interaction term and CO_2 emission. In particular, the findings are consistent with the aggregation bias argument and a more complex relationship between income and the MPE. For example, if there is a section of low incomes where the MPE is zero, as people are outside of the carbon economy, then rises, then falls, and rises again at very high levels of incomes, this could deliver the results that found here, including the different turning-points for stage of economic development. The Suggestive descriptive evidence supports the correlation between income inequality, CO_2 emission, and GDP .Thus in poorer countries higher inequality reduces access and use of these

goods, while in richer countries it increases it, confirming the supposition that the poor in poor countries are largely outside of the carbon economy while in rich countries, higher incomes might be associated with a rising MPE. Finally the goodness of fit model shows that 90.4 percent changes in CO2 emission is due to change in explanatory variables such that GDP, GINI, GDP^2 , $GINI^2$ and interaction term (GDPXGINI).

Table 4 - Existence of Environmental Kuznet Curve.

Dependent variable : CO2	Coefficient(t-value)
Constant	986295.6*
	(3.608)
GDP	(33950.29)*
	(2.830)
GDP^2	-179.639
	(-0.017)
GINI	-58544.88*
	(-4.364)
$GINI^2$	(866.143)*
	(5.217)
GDPxGINI	-825.573*
	(-2.955)
POV	(-430.152)
	(-1.677)

Statistical Tests:

R-squared: 0.904; Adjusted R- squared: 0.881; F-statistics: 39.547*; Durbin Watson: 1.864

Note: * denotes rejection of hypothesis at 1% significance level. T- values in bracket.

5. Conclusion and Policy Recommendations

Environmental degradation is not a new thing, it has been happening all over the world for centuries. The problem is that it is now occurring at a much faster rate, therefore, not leaving enough time for the environment to recover and regenerate. The greater demands placed on the environment by an ever increasing human population is putting a great strain and drain on the earth's limited natural resources (SEEN, 2012). Environment is very indispensable in every aspect of life. All the living beings are influenced by the environment. All the components required for survival of living organisms are gained through environment containing air, water, soil, food, clean environment etc. The development of living creatures i.e., quality of human life, sector developmental activities, growth, natural resources for development of civilization of human beings, even plant and animals are also depend upon the environment. Therefore, all the process of entities is done under the environment (Pilisuk, et al 1996).

The current issues of environment are open up to many categories such that water pollution from raw sewage, industrial wastes, and agricultural runoff; limited natural freshwater resources; most of the population does not have access to potable water; deforestation; soil erosion; desertification, Green houses gases and CO2emission (CIA, 2012). Environmental pollution has been rapidly increasing day by day. The vehicles, industries, power stations produce smoke, dust and harmful effects on human beings. Pollution can cause diseases like tuberculosis, cancer, disease of lungs and skin to the people. Water is polluted by sewage, chemicals from industries and factories, garbage and other biodegradable materials that can make the water undrinkable. There are different types of water born disease like cholera, typhoid, jaundice, etc. The noise that comes from vehicles and crowed has negative effects on human health causing hypertension problems (Krieger and Higgins, 2002). The soil pollution due to the excessive use of fertilizers causes barrenness of soil which is responsible for lowering plantation- forestation and increases CO2 emission in large extent. Thus all these kinds of pollution are the factor for unhealthy environment (Dipshikha, 2010).

Carbon emissions, most notably carbon dioxide (CO2), are part of a collection of gases that negatively influence the quality of our air and increase the greenhouse effect. Greenhouse gases have a direct influence on the environment, causing extreme weather changes, a global temperature increase, the loss of ecosystems and potentially hazardous health effects for people (McMichael et al, 2003). Low Carbon Economy (LCE) is the today reality, which we can't hinder. The CO2 is adversely affecting the environment which is against the sustainable goals. Now, the relationship between the energy consumed and economic growth is mainly concerned while investing in the power generation sector. The race of being the Asian power is not out of sight in the region. Low carbon technologies are the best key for the development of the world economy. Through diversification strategy for the energy, which consist of three parts: the energy resources, energy production and end use of energy can be useful in sustaining environment (Ighodaro –

CAU, 2010). The essence of the diversification of energy resources is to reduce the coal consumption ratio in the total energy consumption; to fast develop the natural gas industry; to make full use of domestic energy, and reasonable use of international ones; and to exploit the hydroelectric, nuclear, and renewable energy, for the realization of diversified energy supply pattern (Xie,2009).

Moving towards the income inequality empirically, econometric analysis in this research shows that the income inequality affects negatively environmental quality and environment degradation worsens population's health and significantly emits high CO2 emission. So, this negative effect of income inequality on environment quality is mitigated by good institutions (Drabo, 2010). Confirming that the environment quality is an important channel through which income inequality affects population health. As policy implication, it is suggested that income inequality is bad for health and environment, and countries with high income inequality may implement distributive policy in order to avoid its negative impact on health (Hunter, and Amanda, 2004).

Last but not least the economic variable - poverty contributes large proportion of CO2 emission. It is often the people living in degraded environments are responsible for the damage that as occurred, but this is often as a result of underlying social and economic problems (SEEN, 2012). Poverty is a major contributing factor to land degradation as it forces millions of people to destroy the resources that are around them in order just to survive. Poor people often do not have access to the best land, leaving them to depend on the most fragile areas and resources. Their situation may mean that they have no other choice other than to use what resources are available to them, even if these result in the degradation of the land (Shah, 2001). Environmental Degradation can be copped by Bio-physical procedure, (Planting trees over degraded land or afforestation can help to protect the soil from strong wind and from being washed away by soil erosion), Soil salinization and waterlogging can both be avoided by using drip irrigation which delivers only as much water as is needed to a specific area as opposed to high-pressure sprinklers which cause the soil to be permanently covered with water (Verbeten, 1998). The mass effects of poverty can only be eliminated through the agreement and implementation of the World's leading politicians. Without their commitment to end debt, make trade rules fairer, and give more aid to those countries in need poverty will not be eliminated. Politicians also need to sincerely address the pressing environmental problems that face our societies today, and again commit to policies that enforce the sustainable use of our planet (Speth, 2008).

The rising inequality and poverty is significantly increasing day by day. Policy makers must therefore devote more attention to inequality. The following measures can be taken to alleviate poverty and income inequalities:

- redistributive transfers;
- investment in universal access to health and education;
- progressive taxation;
- removal of the barriers to equal rights and opportunities for women.
- reforming land ownership, ensuring the right access to land and other resources, and investing in small-scale food producers (SEEN, 2012).

Federal government mandates should take remedial measures regarding control of carbon emissions. It can be done directly by a carbon tax, which is exactly sound strategy -- taxing companies, factories, industries directly, based on the amount of carbon they put into the atmosphere, and efficient fuel consumption by transport sector. The goal of a carbon tax would be to convince businesses and other organizations to reduce their total emissions (Pelosi, 2009) Secondly, the governmental control approach that has been under study in recent years is referred to as cap-and-trade legislation. In this system, the government sets a "cap" on the maximum amount of emissions it will allow. From here, it then auctions off emissions allowances to companies until it reaches that cap. Companies that cannot cover their emissions with their allowances are forced to either reduce their totals or buy allowances from other companies. This system is designed to promote stricter emissions standards without directly taxing companies (Wall Street Journal, 2010).

Currently United Nations Development Programme (UNDP) is working towards providing support in the implementation of the national environmental agenda. The Environment and Climate Change Unit works on improving environmental management through capacity building of environmental institutions; mainstreaming environment into the development processes; implementation of innovative solutions for meeting the challenges posed by climate change and sustainable use of natural resources; and advocacy (UNDP, 2010). UNDP engages national, provincial and local partners to obtain environmental information for decision-making and enhancing global and regional environmental cooperation. This also serves to advance implementation of national and regional environmental activities and create linkages among stakeholders and government for policy and implementation. UNDP also scales up coordination efforts to anchor international assistance at the provincial level (UNDP, 2010).

Now the aim of Government of Pakistan should promote sustainable use of natural resources and helps institutions understand and effectively use environmental management strategies for ecosystems, land, water, soil and bio-diversity (FAO, 2011). The appropriate measures and adapting management systems along with the empowerment at grassroots organizations is crucial need of environmental management. To help mitigate food, water and energy insecurity, the policy maker should help to build resilience to climate change. This is done by contributing to climate change adaptation and mitigation interventions, through partnership and technology transfer with a focus on youth, women and vulnerable groups (UNDP, 2010). The Government and ruling agencies should strengthen the Initial Environmental Examination and Environmental Impact Assessment components of the crisis response programmes to undertake rapid assessments of environmental damage (Economic Survey of Pakistan, 2010).

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