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Causal links between renewable energy, environmental degradation and economic growth in selected SAARC countries: Progress towards green economy

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ABSTRACT

The objective of the study is to investigate the short-run and long-run causality relationship among energy (electricity production from renewable sources), carbon dioxide emissions, natural resource depletion, Gross Domestic Product (GDP) and poverty in selected SAARC countries, namely, Bangladesh, India, Nepal, Pakistan and Sri Lanka, over a period of 1975–2010. The results show that there is bidirectional Granger causality between carbon dioxide emissions & natural resource depletion in Nepal and between energy production & poverty in Pakistan. For the other three countries, the Granger causality runs from energy production to poverty in Bangladesh and India, and from poverty to energy production in Sri Lanka. The results of panel group Fully Modified OLS (FMOLS) indicates that GDP and poverty has a positive impact while carbon dioxide emission has a negative impact on energy production. Similarly, an increase in energy production leads to decrease in carbon emissions, where as, natural resource depletion increase carbon emissions in selected SAARC countries. Subsequently, an increase in energy production leads to increase in GDP which further increase carbon dioxide emission in SAARC region.

1. Introduction

> "*We all aspire to reach better living conditions. Yet, this will not be possible by following the current growth model … We need a practical twenty-first century development model that connects the dots between the key issues of our time: poverty reduction; job generation; inequality; climate change; environmental stress; water, energy and food security.*" (UN Secretary General Ban Ki-moon)

There are certain alarming factors which highlight the problem of operating in the brown economy. EDUI [1] defines Green Economy (GE) as one which "results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities". The concept marks a paradigm shift from the "brown economy" that excludes Sustainable Development (SD), which is achievable only under economic structures that ensure resource and energy efficiency along with environmental revitalization [2,3]. Fig. 1 describes the environmental benefits received from the green economy.

The concept of green economy has gained tremendous attention in the recent years because of a number of concurrent crises faced by the world recently, these include the financial and economic crises of 2008, crises in climate, biodiversity, food, fuel and water [4]. Although the causes of these crises may be diverse, the core cause is misallocation of capital where the main focus is placed on investment in non-renewable sources of energy thus encouraging "brown economy" instead of "green economy". There are three ways to bring green economy: i) investment transformation, ii) resource efficiency and iii) social and human wellbeing. By redirecting investment towards low carbon, waste minimizing, clean, resource efficient, and ecosystem augmenting activities, this would enhance resource efficiency apart from expected net increase in income and jobs at least in the medium and long term [5].

Fig. 2 illustrates the mechanism of how transition to green economy is related with economic development. Investments in key sectors of the green economy contribute to decoupling economic growth from environmental impacts and resource use.

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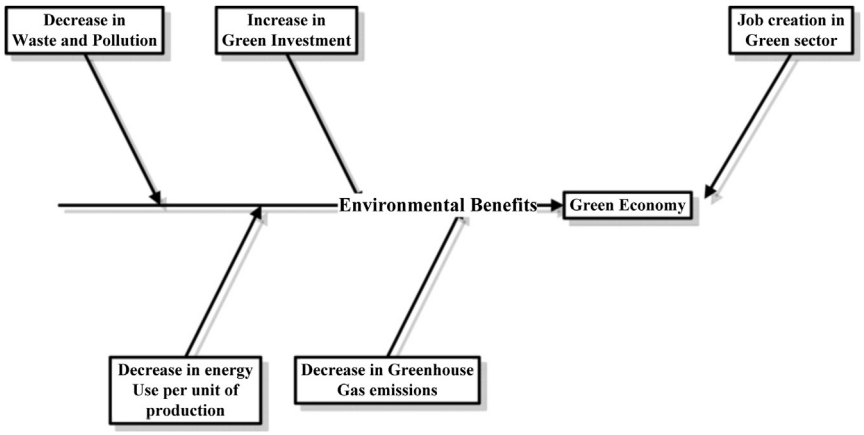

Fig. 1. Progress towards green economy.
Source: Self Extract

These improvements can be related with macroeconomic indicators, such as Human Development Index (HDI), GDP, poverty rates, and adjusted net domestic product taking into account depreciation of natural capital. Once the process of transformation into green economy is completed, it is done by shifting resources from non-renewable to renewable sources of energy. The overall procedure provides the economy by reducing CO_2 emissions, enhancing GDP, reducing poverty and controlling natural resource depletion.

The green economy reduces the poverty rate in two ways i.e., at first, by promoting the use of renewable energy, it would generates more jobs per unit of installed capacity, per dollar invested and per unit of power generated [5]. This in turn would reduce poverty, as more of the people of economy would be earning and thus would have the ability to purchase the basic necessities of life. Secondly with the degradation of natural resources, the poverty trap widens even further, as the poor segment mostly relies on natural resources such as forests, farms and coasts (fishing) for their livelihood. Coming towards the energy situation in Pakistan, it is in the state of crises for the past few years and it has impeded the social and economic development tremendously [6]. The nation is currently facing a 3 GW power supply shortage i.e., the most severe energy crises to ever hit the country [7]. While the energy shortage continues to grow, abundant indigenous sustainable energy resources such as wind, solar and biomass remain virtually untapped [8]. In the process of transition towards green economy, the Alternative Energy Development Board (AEDB) has updated its Renewable Energy (RE) policy by providing attractive incentives to local and foreign investors to invest in wind, solar, biogas, cogeneration, geothermal and waste-to-energy [9]. However, the current situation predicts a somewhat different situation, currently the energy sources used in Pakistan are mostly nonrenewable, which are a source of threat to the environment [6]. To the east of Pakistan is Afghanistan which has a similar environment/climate. Decades of instability and war have exerted a heavy tool on natural resources and environmental base of the country. Afghanistan is in its reconstruction phase and it is rich in wind, flowing water, and sunshine. Modern wind machines are the most efficient and rapidly growing electricity supply technology around the world. Despite a programme of reconstruction

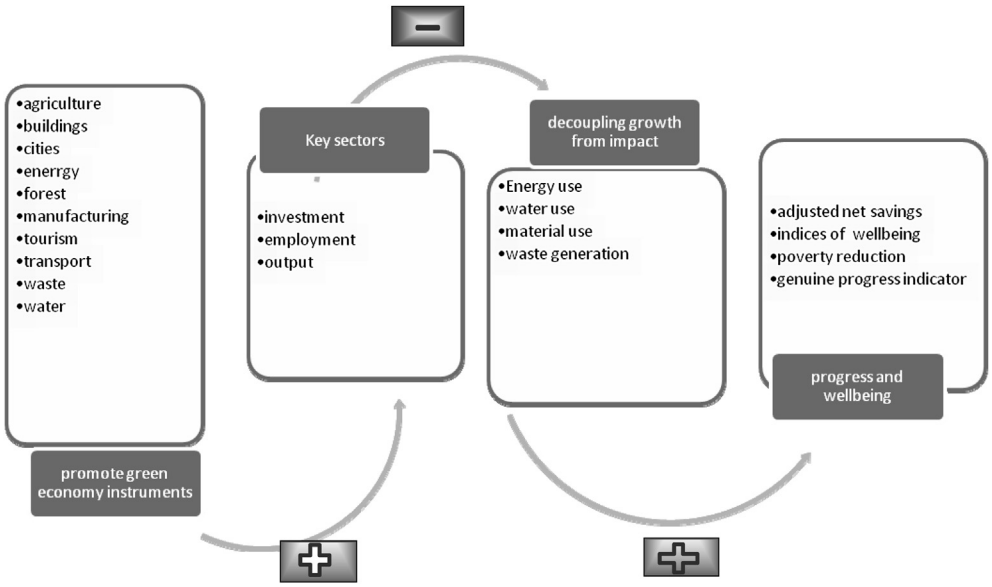

Fig. 2. Green economy on the way to economic development.
Source: Adapted from UNEP [5].