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Socio-Economic Impacts of Climate Change on South Asian Nations

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ABSTRACT

Climate change is an issue hovering as a major roadblock to global development. It is a topic that worries the developed, the developing and the underdeveloped countries equally. While it is said that climate change is the result of the development process initiated by the developed countries during the industrial revolution, its outcomes shall be faced by every part of the world. Defined as a change in the average temperature of the earth, climate change is the most discussed issue of the 21st century. Climate change is known to occur over a period of time and may range over years, decades or even centuries. It may be limited to a specific region or cover a span of region(s) and has direct potential impact on economies at the global level and civilizations. Numerous scientific and policy-focused studies were started to investigate the potential effects of climate change as well as potential human responses to it as evidence for the theory that rising greenhouse gas concentrations in the atmosphere would cause climate change accumulated over the past few years.

Indeed, in the context of South Asia, climate change is not only the biggest environmental threat faced by the region but also the likely cause of extraordinary social and economic problems in the course of this century. The paper has attempted to assess the Socio-economic impacts of climate change on South Asian nations which includes the impact on health, growth, and development. Additionally, the paper discusses the adaption and mitigation practices and strategies adopted by South Asian nations and in the end, it has put stress on following long-term efforts and policies to mitigate the adverse impact of climate change.

Keywords: Climate Change, Economic impact, Health, South Asia.

JEL Classification: O2, Q5

Introduction

Climate change has been a hot topic in recent international negotiations as well as is an important part of every country's development agenda. Erratic weather changes, changing patterns of precipitation, changing habitats, consumption patterns, adaptations, etc can be seen as direct or indirect effects of climate change. While this climate change affects directly on the climate and weather pattern of a place, its indirect effects can be seen over different sectors as spillover effects. NASA has reported that there has been a significant increase of about 0.9 degree Celsius since the second half of 19th century. Also, it notes that the major contributors to this increasing temperature are the higher concentration of greenhouse gas emissions and other anthropogenic activities.

More than 60% of the world's population lives in Asia; natural resources are already under strain, and few industries are resilient to climate change. Natural resources including water, forests, grasslands, and fisheries are crucial for the socioeconomic well-being of many nations, so any changes brought on by climate change will have a significant impact on these resources. For instance, South Asia's human settlements, food and fiber production, biodiversity, water resources, and coastal ecosystems are all regarded to be extremely vulnerable to climate change. The effects of climate change are anticipated to differ greatly across the many sub-regions and nations of Asia, and some nations will be better able to adapt than others. Because of their weak economies, inadequate institutional capacity, and greater reliance on resources that are sensitive to climate change, the Least Developed Countries (LDCs), which are already struggling to address issues of poverty, health, and education, are anticipated to be among those most vulnerable to climate change and extreme events. Realistic adaptation strategies must be created for these vulnerable nations and included into their overall development plans.

The climate of South Asia spans a wide range of altitudinal zones and microclimates. These create extremely diverse habitats that range from tropical to frigid. The region is characterized by extreme temperature ranges from extremely low to very high, significant seasonal fluctuations, and abundant rainfall.

If we ponder over the fact whether the phenomenon of climate change is natural or man-made, the answer we get is that it can be both a natural and anthropogenic phenomenon. Both the natural phenomena and their anthropogenic counterparts are explained as follows:

Natural causes

1. *Continental Drift***:** This is how continents were formed 200mn. years ago, when a part of large landmass called Pangaea started drifting away.
2. *Volcanoes***:** After few years of a major volcanic eruption, cooling takes place. When a volcano erupts, it sends SO_2, dust, water vapor and ash into the atmosphere. The SO_2 reaches Stratosphere and combines with water to form droplets of H_2SO_4. These droplets reflect sunlight and prevent it from reaching the troposphere.
3. *Earth's tilt:* The earth's axis and orbit are also responsible for bringing about natural changes in the earth's climate. Being tilted at an angle of 23.5 degrees about its axis leading to seasonal variation. The elliptical orbit of the earth keeps on varying earth's distance from the sun during the course of the year.
4. *Ocean currents:* Covering almost 71% of the earth, oceans absorb twice as much heat as the atmosphere. Heat transferred by ocean currents brings about changes in temperature and climatic changes across the planet.

Anthropogenic Causes

Anthropogenic causes start becoming a threat when human activities and consumption patterns continue to exploit beyond a point. Many countries are in the phase of rapid industrialization and urbanization which require combustion of fossil fuels and which if done beyond a point contribute to warming and climate change.

Review of Literature

The initial work on the economic impacts of climate change is attributed to Nordhaus (1991), Cline (1992), Titus (1992) and Smith (1996) which were done mainly on the United States however the credit for the first serious study of impact of climate change goes to Fankhauser (1994) as mentioned by Tol (2010) in his review paper. However, Nordhaus (1991) stands apart in all these as he generalized his US based study to the world (Tol, 2010). Various approaches were adopted by all these eminent economists to monetize or measure the impact of climate change. These comprise of the enumerative approach, statistical approach and the aggregate approach.

Nordhaus and Fankhauser are particularly known to use the enumerative approach. In the enumerative approach, evidences of impacts of climate change are gathered from natural science literature and then a price or let us say cost is imposed on such an impact. This way, the economic cost or benefit associated with the impact can be measured (Tol, 2010). Tol (2010) in his review on various approaches i.e., enumerative, statistical or aggregate comes across a common conclusion on which all these approaches agree upon. As per this agreement, the economic impacts of climate change are not extremely major but they are not negligible either. The estimates show that the loss of GDP ensuing from a climate change impact is not very large. It amounts to only a small percent of the global GDP implying that there will not be a significant loss if we observe the trends over a century or so. However, the damages are not negligible. Environmental issues such as climate change accumulate over a period of time leaving long lasting and permanent impact and therefore the call for reducing emissions is always necessary.

Another common finding in these studies, as discussed by Tol (2010) is the dual aspect i.e., positive and negative impact of climate change. This reveals that up to a certain increase in average temperature, climate change can actually be fruitful for the temperate countries. In the temperate zone, countries can actually benefit in the earlier phases of temperature increase as most of the output of the global economy is concentrated in these nations. Countries in the temperate zones can benefit as warming can reduce heating costs that they have to incur given the climatic conditions in these zones. On the contrary, most of the population of the world resides in tropical zones thus initial impacts of warming will be negative in case of these economies. However, due to smaller economies, the initial positive impact on high-income countries will outweigh the negatives on lower income countries.

However, benefits accruing to the temperate zones or high-income countries should not be viewed as an endorsement for emission subsidies. If this is done, emissions might rise in a non-proctored fashion. Evidences suggest that these benefits accrue up to a point i.e., if warming is confined to a maximum 1-2 degrees. Beyond this point, the benefits will start turning into socio-economic costs for the temperate zones as well.

Further, the reviewed studies also point towards impact on lower income countries. Despite the fact that higher income countries contribute higher amounts of emissions in the atmosphere, the impact of climate change is borne in the worst possible manner by the lower income countries. Sub-Saharan Africa reports an impact equal to one-fourth of the GDP. These countries mainly fall in the tropical zone of the globe. This implies that they are already hot or have higher temperature, with areas such as agriculture being the worst hit. Of course, the impacts are asymmetric in nature. Sectors such as agriculture, coastal regions among regions and those in the elder age-group are the worst affected ones.

Theoretical framework

The climate issue appears to be amenable to a Marxist understanding, and Max Koch appropriately understands it as a phase in the evolution of capitalism. We observe rising greenhouse gas emissions as a result of the relentless growth of wealth, a strong lobby defending its interests domestically while exporting its filthy business to underdeveloped nations, and governments prioritizing the interests of businesses above the weak and helpless. Above all, the world has always prioritized economic expansion as the necessary condition for continuing capital accumulation in response to the existential threat posed by a warming planet. However, technological industrialism, another fundamental socialist desire, rather than capitalism is to blame for the current

climatic disaster. Socialist countries have caused as much or more environmental damage than capitalist ones. Soviet industrialization was infamous for its harm to the environment. Since the Soviet Union prioritized economic growth over environmental protection, much of the Left in the West adopted this mentality. As a result, for many years, some Leftists harbored deep mistrust of the environmental movement, viewing it as a fad of middle-class activists seeking to boost their egos at the expense of workers' livelihoods. Because capitalist and Marxist ideologies share underlying assumptions, socialism has the potential to be just as environmentally damaging as capitalism. The advancement of material welfare, or wellbeing derived from nature's bounty, should be the fundamental practical goal of societal progress. Humans have the unrestricted right to take what they need, subject only to the boundaries of enlightened self-interest. Both are blatantly anthropocentric, have a totally instrumentalist perspective of the relationship between humans and nature, and believe that the ultimate goal is human emancipation, which rests primarily on freedom from material needs. In essence, both ideologies are purebred offspring of humanism during the Enlightenment.

Objectives and Methodology

The main objective of the study is to assess the impact of climate change on social and economic front of South Asian nations which includes India, Pakistan, Bangladesh, Nepal, Bhutan, Sri Lanka, Afghanistan, Myanmar and Maldives. To fulfill the objective secondary data has been used from relevant and authentic sources and database including Scopus, Jstor, Web of Science, and Google Scholar search engines. Based on the relevant resources, an exploratory and analytical approach has been used to inspect the socio-economic impact of Climate Change on South Asian nations. The major findings are discussed below in the subsections of the results.

Results and discussion

Socio-Economic impacts of Climate Change in South Asia

As discussed in the above section, even though the global north is the highest contributor to the emissions the worst impacts are borne by the lower income countries. Low ability to adapt to the changes, due to paucity of resources, worsens this scenario. Most of the third-world countries lie in the tropical regions. Since they are already characterized by hot climate, increased greenhouse emissions make sectors like agriculture even more.

Therefore, in this report we focus on a set of third-world economies in the Southern part of Asia and try to review the scenario in these countries. Attempt will be made to cover the probable socio-economic impacts that climate change can have on South Asian economies. South Asia comprises of countries with similar (not same) climate changes. The region comprises of all kinds of countries i.e., plains, hills, mountains, coastal as well as land locked. Apart from geographical, the region is home to significant communal diversity as well. This, although making research and policy formulation quite complex, creates significant scope for a relative analysis, be it inter-regional comparison or intra-regional. This will also enable us to study the impacts on a comparative basis across geographies.

Talking about the composition of South Asia, the region comprises of countries such as India, Pakistan, Bangladesh, Nepal, Bhutan, Sri Lanka, Afghanistan, Myanmar and Maldives. SAARC (South Asian Association of Regional Cooperation) is the international bloc present in the region working towards political, social, economic and trade-oriented cooperation among the South Asian countries.

Socio-economic composition of South Asia & Climate Change

Sivakumar and Stefanski (2010) have shed light on this aspect. Comprising of one-fifth of the world's population, the South Asian region is characterized as the world's most disaster-prone region. South Asia is classified as the region most prone to climate change vulnerabilities given its high rate of population, continuous natural resource degradation, being characterized by poverty, inequality, food security and similar such issues. Coming to the incidence of climate change, it is characterized by increasing air temperatures resulting in significant heating or warming of the Himalayan highlands.

The rise in temperature has a significant impact on crop yield in the tropical part of South Asia. It is one of the many vulnerable areas as crops in this region are already being produced just below the threshold temperature. Climate change further affects the moisture component of the soil and alters availability of water in the region. Small rainfed land holders face the highest risk of such changes. The capacity to cope with climate change and the ensuing changes is asymmetric throughout the region and can be found lowest among the rural poor residing in marginal areas.

Intergovernmental Panel on Climate Change (IPCC) on South Asia: IPCC Fifth Assessment Report

Intergovernmental panel on Climate Change (IPCC) was established in 1988 mainly by two organizations of the United Nations (UN) i.e., World Meteorological Organization (WMO) and United Nations Environment Programme (UNEP). The purpose of IPCC was to evaluate anthropogenic climate change or those that are human induced, study their impacts and suggest alternatives to deal with them. Since its inception, IPCC has contributed in a significant manner in this direction with its reports generating general awareness among masses about the issues of climate change and it impacts and has even forced governments across the globe to take appropriate actions. The IPCC in 2007, shared the Nobel Prize for Peace with the former US President Al Gore wo was the writer of "The Inconvenient Truth". The IPCC has published five assessment reports so far.

As per the report on Asia by the Intergovernmental Panel on Climate Change (IPCCS), the South Asian region has been witnessing unprecedented warming since the 1950s. The rise in sea levels has been highest in the region. Due to increasing warming, the region and its inhabitants have suffered from flooding of settlements and infrastructure, heat related deaths, food and water shortages etc. Coming to the changes, the report also highlights the

changes that have been observed in climatic conditions of the region. These include changes in temperature trends, altering rainfall patterns and rise in sea level.

The IPCC reports that warming has been taking place in most of South Asia, throughout the 20th century and in the 2000s. since the 1950s there has been a change in the number of warm days and nights. It has been observed that the number of warm days and nights has increased while the number of colder days and nights has decreased significantly. In addition to this, there has been an observed increase in heat wave frequency throughout the Asian continent.

As far as the rainfall trends are concerned, IPCC reports insufficient observational records in this regard. However, there exists a strong variability in changes in rainfall patterns among different regions in South Asia. If we look at Central India, a pattern is observed which is characterized by more of extreme rainfall and fewer instances of weaker rainfall. Since 1960 the seal level has shown significant rise which has proved to be instrumental in bringing about changes in the observed wind patterns. This probably explains the significant increase in warming throughout the 20th century.

Effects of Climate Change observed in IPCC report

The fifth assessment report of has reported the effects that have occurred as a result of climate change in South Asia.

- The region has witnessed the greatest number of climate-based natural disasters in the period between 2000 and 2008.
- The IPCC reports that the losses incurred during this phase amounts to around 30% of the global economic loss.
- Most of the floods that shook Mumbai in 2005 can be attributed to both climate changes and man-made causes.
- Taking another instance, an embankment of the Kosi tributary of the Ganges broke off which displaced around 60000 Nepalese people and 3.5 million Indians.

Health Impacts of Climate Change

Climate change in South Asia poses several health vulnerabilities on the inhabitants.

- Contaminated urban flood water carries toxins with itself and leaves people vulnerable to several diseases.
- High temperatures serve as breeding ground for several parasites and pathogens, ultimately leading to increasing disease incidence.
- Change in temperature and rainfall pattern have contributed to the development of diseases such as dengue and Japanese encephalitis.
- The prevalence and of Malaria in India and Nepal can be attributed to the changing rainfall patterns in the region.
- El Nino is a climate phenomenon which can be attributed to the prevalence of the cholera epidemic in Bangladesh.

Climate change and Growth and Development

South Asia is a rapidly urbanizing region with 1.4 billion people expected to be added to the urban population, thus accounting to about 50% of the global population. Parts of South Asia such as the Indian East coast are characterized by poor infrastructure and high rates of population thus making them region's most vulnerable. The region comprises of two contraries, on the one hand it is rapidly urbanizing while on the other hand it is till predominantly agrarian as a significant population is still dependent on agriculture and allied activities for livelihood and survival. Poverty rates are higher in the rural areas as compared to urban areas which makes rural poor the most vulnerable group in the region.

The natural calamities which are a resultant of climate change such as riverine, coastal and urban floods pose the greatest threat to livelihoods and settlements in the region. Population and assets located in the coastal areas are at the highest risk in the coming decades particularly in India and Bangladesh. As per the IPCC 5AR, by 2070s South Asian port cities such as Dhaka, Mumbai and Kolkata while be facing high risks in terms of population and assets exposed to coastal floods. Another key climate change factor that impacts growth and development in the region is food and water shortage. These are consequences of extreme and increasing temperatures, drying etc. Erratic rainfall in most parts of the region will be instrumental in lowering rice yield in the region. This further translates into rising food prices, malnutrition and worsening the already existing rural poverty.

On a positive note, South Asia has in fact made significant progress in tackling diseases, malnutrition, poverty and other social issues. However, the threats discussed so far pose a big hurdle in the path of all this progress. The threat that climate change poses is real and challenging particularly for a region like South Asia which is in a phase of rapid development. Given the fact that low-income countries contribute the least to global emissions, the impact faced by them is the highest. One of the most significant impacts that they face is probably the diversion of resources towards tackling climate related impacts which could have been otherwise utilized for socio-economic development such as enhancing infrastructure which can actually contribute to economic growth, adopting poverty eradication measures to achieve social progress and so on.

Mitigation and adaptation

The IPCC claims that climate change is going to continue. They have shown that even if we enter the 21st century with reduced rates of emissions, the next century is very much going to witness a surge in temperatures. Now the question is, whether mitigation is really feasible. The answer is that mitigation is of course important but not enough. Since we already know that temperatures are going to rise anyhow, just reducing emissions won't be instrumental in protecting the region from climate related vagaries. In addition to mitigation, adaptation is what is the need of the hour.

Regional Responses: Country Specific and role of the Asian Development Bank

Before moving on to the ways forward or the adaptation mechanisms that countries in the region can adopt, let us see what have been the regional responses in order to mitigate and adapt to the constant climate change. Regional responses include measures adopted by individual governments and regional blocs or organizations.

SAARC (South Asian Association of Regional Cooperation)

- In 2007, the SAARC Council of Ministers agreed on a declaration on Climate Change in order to assess and come up with appropriate response to climate change and related consequences.
- In 2008, the SAARC Environment Ministers signed the Dhaka declaration agreeing upon a 3-year action plan which called for appealing to the international community for increasing partnership and assistance to counter climate change consequences.
- In its Golden Jubilee year 2010, the Thimphu declaration was signed which set an ambitious goal for South Asia to lead the world in advancing renewable energy, mitigate poverty, reduce carbon emissions and strengthen the region's resilience capacity.

Asian Disaster Preparedness Centre (ADPC)

ADPC is a regional organization which provides assistance in skill enhancement, policy implementation, dissemination of correct information and enhancement in expertise and better awareness for disaster preparedness.

Country level responses

In addition to the regional blocs and organizations, countries in their individual capacity have adopted several measures to counter climate change and their consequent impacts.

Bangladesh developed Bangladesh Climate Change Strategy and Action Plan which works on 6 key areas which include:

- Food security, social security and health.
- Comprehensive disaster management.
- Infrastructure development.
- Research and knowledge management.
- Mitigating and lowering carbon developments.
- Capacity building and institutional structure

In addition to this, a climate change trust fund was created which allocated $100mn. towards climate change for the year 2009-10 and same amount for the year 2011-12. The Bangladesh Climate Change Resilience Fund attracted several international commitments from United Kingdom, Denmark and European Union.

India adopted the National Action Plan on Climate Change in 2008. The Asian Development Bank has been active in supporting the nation's initiatives such as National Water Mission and development of renewable energy in Gujarat and Karnataka.

Other nations in the region such as Nepal, Bhutan and Maldives also have dedicated response measures to climate change and the impacts on economy and the social well-being of the respective countries.

Conclusion and policy implications

As discussed earlier that the IPCC in its 5th assessment report had found that even if we enter the next century with reduced levels of emission in the current one, the temperatures are going to soar anyway. Therefore, in addition to mitigation measures, it is adopted that the regions resort to enhance adaptability to climate change and take appropriate measures to enhance resilience to climate change. Given its social and economic condition, the vulnerabilities it faces due to climate change and the meagre response in this direction, adaptation measures hold a particular importance in the context of South Asia.

Mishra (2016) has discussed the way forward to tackle climate change impacts in the context of Odisha state of India. However, those measures hold valid for the entire region and some of those measures are of relevance to areas facing coastal risk in South Asia. Mishra (2016) has suggested enhancement in energy consumption efficiency by making use of cleaner fuels, promoting extensive use of public transport. Water resources can be well managed by waste-water recycling, introducing technology in water conservation etc. Adaption, research and rehabilitation are viable approaches to tackle climate related impacts in the coastal areas and Odisha in particular. As per their recommendations, self-help groups, skill development and public awareness can also play a significant role in making people aware of their individual responsibilities and indebtedness towards environment.

Fiscal measures such as imposition of Carbon tax on industries emitting high amounts of carbon, a differential tax regime to tax heavily the industries manufacturing products contributing degradation of the environment while lower rates to be charged from those producing cleaner goods in order to encourage production of cleaner products. (Mishra, 2016) These measures if put in place accompanied by close scrutiny on the part of the government in order to ensure proper implementation can be instrumental in making significant strides to combat climate change and its impacts on lives in South Asia.

South Asian countries are already in a process of accumulating practices that can enable them to tackle this pressing issues quite effectively. The practices are being adopted at the local, regional and international level. One such example is the agriculture sector where South Asian nations have been adopting practices to adapt to the climatic conditions. These strategies are peculiar to specific crops and geographical location as per the region's need.

Another such adaptation example can be drawn from Ahmedabad, Gujarat in India. In 2010, when the city experienced extreme heat waves and temperature soared as high as 48 degrees causing heat related deaths and illness, the state called for a Heat Action Plan. It was a result of a coalition of academic, health and environment groups. The plan is based on robust scientific research, generation of public awareness related to heat related health problems, preparedness of medical practitioners to tackle such issues and also focuses on an international emergency response system in event of a severe heat wave (IPCC fifth assessment report, 2014).

The IPCC emphasizes that it is a good time to start now with the adaptation practices. It warns against too much focus on short-term measures or an amateur anticipation of consequences. Since climate change has its impacts which vary across sectors, communities and social groups, the development plans should be ensured that they are not poorly conceived. In addition to this, the adaptation strategies should be holistic rather than just sector specific. Otherwise, it will lower the resilience in other sectors and ecosystems.

Governments must evaluate the potential range of socio-economic impacts in their jurisdictions in order to establish their positions at the formal international negotiations on abatement and to appropriately balance these impacts. This is necessary given the current magnitude of uncertainties about future emissions and atmospheric concentrations of various greenhouse gases, about the sensitivity of the global climate to them, and, especially, about the actual patterns of local and regional climate change.

Additionally, these nations may experience other, less immediate effects of climate change. The rural population, which was driven by poverty, has migrated to metropolitan areas as a result of previous catastrophic disasters. Such extensive intercommunity movement is likely to fuel social instability and aggravate ongoing conflicts. Agencies on a national and international level are starting to acknowledge how much climate change would impact South Asia's growth. The next stage is to move from theory to practice and create workable adaptation techniques that are included into ongoing development projects. Depending on how well they take into account climatic influences, current and future development initiatives may either make communities more or less vulnerable to climate change. Adaptation strategies must be integrated into current development strategies at all levels and across all sectors if climate change and development programs are to be successful. Different stakeholders, such as government policymakers, implementing organizations, development partners, the private sector, and communities, will need to take part in this and work together.

Limitations and Future Research Directions

The research is limited to South Asian nations only which can be further directed to other nations as well to assess the socio-economic impact of climate change. Impact areas other than social and economic such as international trade, water management, forests, coastal ecology, agriculture, and food security can also be assessed to address the issue of climate change globally.

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