Climate Change and South Asia: What Makes the Region Most Vulnerable?

Islam, A.K.M. Nazrul and Sultan, Salma and Afroz

Centre for Policy Dialogue (CPD), Department of Economics, Jamia Millia Islamia (Central University), Academy of Third World Studies, Jamia Millia Islamia (Central University)

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A.K.M. Nazrul Islam[1], Salma Sultan[2] and Afroz[3]

Abstract: *Climate change is no more a distant possibility rather a reality. Due to geo-physical conditions and socio-economic-demographic backwardness South Asia is projected as one of the worst affected regions from global warming and climate change. The region is the home of about 1.5 billion of the world's population and a chunk of the global poor. Climate change will affect agriculture sector across South Asian countries very hard. The overwhelming dependence on agriculture and natural resources for living makes the people of this region very vulnerable from climate change. South Asia is under serious threat from sea-level rising and increasing incidences of extreme events such as floods, droughts, cyclones, storms and irregularity of monsoon. Rapid urbanization has only fuelled the situation which may turn pathetic due to large-scale influx of 'climate refugees' to the ill-equipped cities in near future. It is not yet too late to be pessimistic, rather quick and effective actions across areas where South Asia is vulnerable can make a significant difference. There is need for global, regional and local level mitigation and adaptive strategies to face the reality of climate change. South Asian countries 'as a block' can make a better negotiation with the international communities and designing joint coping mechanisms. For that there is need for more regional understandings, collaborations and cooperation for minimizing the negative effects of climate change on South Asian countries. The article tries to review the overall situation of climate change in South Asian context and also explains various reasons of this vulnerability from different dimensions.*

Keywords: Climate Change, South Asia, Vulnerability, Regional Cooperation

[1] Senior Research Associate, centre for Policy Dialogue, Dhaka, Bangladesh; contact address: nazrul2002@yahoo.com

[2] Guest Faculty for Environmental Economics, Department of Economics, Jamia Millia Islamia (Central University), New Delhi, India

[3] Research Scholar, Academy of Third World Studies, Jamia Millia Islamia (Central University), New Delhi, India

Climate Change and South Asia: What Makes the Region Most Vulnerable?

"The impacts of climate change in the form of higher temperatures, more variable precipitation, and more extreme weather events are already felt in South Asia. It has been projected that these will intensify"- Richard Damania, World Bank Lead Environmental Economist for the South Asia Region at the **United Nations Climate Change Conference in Poznan**, Poland on December 1-12, 2008

Introduction: South Asia is the home of about 1.5 billion people. It is also one of the poorest regions of the world. Most of South Asians are still engaged with agriculture and allied sectors. Although the waves of globalization and opening-up markets have opened many windows of opportunities for the region yet this merely benefits a smaller percentage of its huge inhabitants. Although per capita GDP across South Asia has increased substantially in the last decades yet the real poverty and marginalization have not declined much rather income inequality is increasing. The benefits of globalization have not reached up to the doors of majority of its people. Despite many policies, plans and initiatives by respective governments, NGOs and international bodies/organizations, a chunk of the world's extremely poor people are yet found in South Asia. Besides poverty, inequality of resources and income the region is also prone to disasters and calamities. Floods, cyclones, storms, earthquakes, landslides, arsenic poisoning, erosion of soil are some of the common disasters South Asia regularly faces. Global warming and climate change is another serious threat which may not only harm the interests of millions of people of the region but also put them into serious risks. As these economies rely much on agriculture, natural resources, forestry and fisheries sectors, increased risk of floods and droughts would decrease production in these sectors and exacerbate the condition of the poor (Fischer et.al.; 2005). Due to global warming and climate change the incidences of extreme events and environmental degradations will affect numerous lives and properties worth of thousands of millions dollar across South Asian region. Even in the recent years these economies have experienced some of the deadliest furies of the nature. The intensity and severity of these incidences are increasing year after year. This is not a coincidence and we cannot simply ignore whatever is already happening here. Many scientific researches and evidences have proved that these are happening

mainly due to global warming and climate change. In near future these incidences and their severity may increase many folds and will bring more misery for the people of South Asia.

Climate change has already affected South Asian countries and there is need for possible actions to minimize negative effects. According to Stern (2006), "from the Himalayas, which feed water to a billion people, to the coastal areas of Bangladesh, South Asian countries must prepare for the effects of global warming even as they work to combat the human causes of climate change". As majority of the people of South Asia still depends on agriculture and rural-based economic activities for their living any changes in the arable land, productivity and insecurity will push millions more into acute poverty. Agriculture may not contribute a larger share in South Asia's GDP growth yet it is a very significant sector which employs more than half of its vast population and their fates are closely associated with agriculture. The resource-poor people do not have much option for their livings. The skewed distribution of cultivable land and natural resources across South Asian countries has made the region more vulnerable. Heavy pressure from increasing population and decreasing resource base is another issue to be seriously thought about. The projections and realities of South Asian region from climate change are really worrisome. There is need for undertaking appropriate adaptive and mitigation strategies for vulnerable areas to tackle the effects of climate change. Due to the complexity of the problem global, regional and local level strategies and cooperation are very essential. Particularly, South Asian countries as a whole needs to come together and identify the most vulnerable areas and find out possible solutions to minimize the effects of climate change. The present article is designed to identify various reasons for which South Asian countries are more vulnerable from climate change. On that backdrop the paper has been divided into three sections. ***Section-1*** discusses and analyses various facts and projections of climate change in South Asian context. ***Section-2*** identifies the reasons for which South Asian countries are very vulnerable from climate change. Finally, ***Section-3*** ends up with possible solutions and concluding remarks keeping in mind the need for undertaking adaptive and mitigating measures to face climate change in the coming years.

Section-1

Climate Change and South Asia--Facts and Figures: Despite many international environmental conventions, treaties, agreements, protocols and legislations - like the UN Conference on Human Environment (1972), Our Common Future (1987), the Kyoto Protocol (1992), the Earth Summit (1992), Johannesburg Summit (2002), Bali Conference (2007) and Poznan Conference (December, 2008), among others, the human society is still facing severe environmental degradations. Some of these are so deadly that they can even jeopardize of our very survival. One such environmental problem the world has been facing from the last over 15 years is global warming and climate change (Sathaye; 2007). Today climate change is considered as one of the deadliest environmental challenges for it far reaching consequences. Stern (2006) in his report on economics of climate change stresses that it is not yet much late to start taking collective actions to avoid the worst impacts of climate change. Such actions will outweigh the economic costs of not acting and in near future the situation can be very alarming. The report also indicates that climate change will affect the basic elements of human lives around the world--be it water, food, healthcare facilities or environmental quality. Millions of people will suffer from hunger; shortage of potable water, shortage of water for irrigation, household and industrial purposes, etc. It will also badly affect human lives and property worth of billions from unforeseen disasters and other consequences such as heavy floods, cyclones, storms, droughts, etc. Due to changes in weather agriculture will also affect in many parts of the world. In terms of economic costs, as per the report, it will be equivalent to losing at least 5% of the global GDP each year, now and forever, if we do not take appropriate actions timely. The report also cautions that in a wider range of risks and impacts it may cost upto an overwhelming 20% of global GDP or more in future due to climate change. But the cost of action for reducing greenhouse gas emissions, the main culprit for climate change and global warming, to avoid worst impacts of climate change may reduce merely a 1% of the global GDP per year which is far lesser than the costs of not taking actions (Stern; 2006).

Looking at the statistical figures and various trends and projections on climate change and its consequences the gravity of the problem can be well-understood. As per the

predictions by experts, if we fail to take positive actions and appropriate mitigation measures from now it may be too late or even make our survival very difficult. It is estimated that the global temperature has already risen about 1.5 degree Celsius in the last two hundred years (Bhattacharya; 2001). If the trend keeps on going the concentration of the greenhouse gases at the atmosphere may reach double of its pre-industrial period as early as by 2035. In the larger term, there could be more than a 50% chance that the temperature rise would exceed 5 degree Celsius. It is believed that life is almost impossible in temperature above 55 degree Celsius. The standard norm of the greenhouse gases at the atmosphere, the main reason for rising temperature, should be between 450 to 550 ppm CO_2 e. Moreover, experts think that even if we take appropriate measures from now yet the earth's temperature will continue rising due to effect from the greenhouse gases and releases of huge stocks of trapped gases from the Arctic and Antarctica after the melting of ice-burgs. Sea-level rise will continue for many centuries because of the warming of the oceans and temperature will continue to rise until 2200 (Sathaye; 2007). There is need for more and immediate action-oriented global strategies supported by both the north and the south blocks without further delay.

South Asia is projected to experience a warming of 2-6 degree Celsius by the end of the 21st century (Ravindranath; 2007). A warming of about 0.2 degree Celsius per decade is projected for the next two decades (Sathaye; 2007). South Asia, according to experts, is already facing the heats of climate change. It has major impacts on the economic performances of the South Asian countries and has affected the lives and livelihoods of millions of people of this region and in near future the situation will be even worse. Out of many vulnerable areas of the world South Asia is projected as one of the worst affected regions due to climate change. South Asian countries are very vulnerable from climate change by various reasons: due to its geo-climatic conditions, socio-economic-demographic backgrounds, overwhelming dependence on agriculture and rural sectors for livelihoods, etc. Yohe, et.al (2008) think that food and fiber, biodiversity, water resources, coastal ecosystem, human-health and land degradation are considered as highly vulnerable for South Asia due to climate change. Cyclones, storms, floods, droughts, arsenic problems are part and parcel of millions of South Asians lives. But the

most worrisome reason is that the intensity and severity of these incidences in the recent years are increasingly getting worse. Scientists opine that due to global climate change these incidences will in fact increase in near future and bring much misery to millions of people, particularly from this part of the world. The future of many areas of South Asia, particularly Maldives, southern coastal districts of Bangladesh and islands and coastal areas of India and Sri Lanka are uncertain. Even a marginal change in the global warming may cause a destructive situation for these regions. Besides damages of lives and ecosystems it will also affect much of human economic interests, their livelihoods and livings. Evidences show that one meter sea-level rise can lead to a welfare loss of $ 1,259 million in India alone which is equal to 0.36% of its GNP (Roy; 2007). Besides damaging economic interests for millions the other worst effect will be the influx of 'climate refugees' to other over-burdened areas of South Asia which will also jeopardize the economic, cultural and ecological balance of the region.

South Asian countries are steadily experiencing various sings of climate change from the last few years- be it devastating floods, cyclones and storms, droughts, changes in the timing of monsoon season and irregularities in rainfall patterns. Many incidences in the recent years can be cited to establish why climate change is a serious issue for South Asian countries:

1.1 Incidences of Floods: Flood is nothing new for the people of South Asia yet many extreme and unexpected incidences of floods in the region in the recent years is an alarming indicator of climate change. In the recent past Bangladesh alone had experienced many devastating floods. In 1988 the country (Bangladesh) had to experience a flood which covered more than 50 districts of Bangladesh out of 64 and took a heavy toll of 2373 human lives besides billions worth of economic loss. In 1998 a devastating flood killed as many as 1050 people and even in 2004 it took a toll of 747 innocent lives (Islam; 2008)**.** In the recent flood in Bihar (in 2008) many people were killed and millions were forced to live in shelter-houses and are still suffering. Mumbai in 2005 had to face a devastating flood which made millions homeless. Part of Haryana and Delhi in 2008 faced the similar fate when the water level from Yamuna River flew above the danger level. Untimely occurrence of floods

are not only destroying millions worth of properties, crops and livestock but also taking a huge tool of human lives. Be the flood in Bihar and neighbouring areas; flood in Rajasthan, many deadliest floods in Bangladesh the intensity of these floods were severe. Also due to change in the patterns of precipitation and seasonal variations many areas of South Asia are increasingly coming under devastating floods;

1.2 Droughts: People in one part of South Asia may drown into flood water but many parts of the region regularly come under droughts and severe dryness. Leave areas like Rajasthan and dry regions of Pakistan, newer areas from South Asia are increasingly coming under arid regions. Two-third of India's cultivable areas is under rain-fed agriculture and changes in climatic condition may increase the share in near future. Many India states like (Northern) Andhra Pradesh, (Southern) Gujarat, Maharashtra, (Southern) Bihar, Uttar Pradesh, Madhya Pradesh, (Northern) Karnataka, besides (Western) Rajasthan and part of Haryana now almost regularly face droughts and dryness. They are highly vulnerable from droughts (Bhadwal, et.al. 2007). Changes in the rate of precipitations across regions and dryness the arid & semi-arid regions will face much losses of economic activities and livelihoods;

1.3 Extreme Events: Another worrisome indicator of climate change can be regular and increasing incidences of extreme events such as storms, cyclones, landslides, etc. South Asia is a favourite destination of many such extreme events but in the recent years these are getting much regular and highly intensive. Countries like Bangladesh have to face many such extreme events and much casualty in every year (see *Table-1.1*). In the recent past like in 15 November 2007, the notorious SIDR Cyclone hit more than 22 south and south-western districts of Bangladesh. It killed over three thousand innocent human-beings, beside thousands of animals, cattle, livestock and severe damages to coastal ecosystems. According to an UN estimation, nine million people got affected by this powerful cyclone. The Government of Bangladesh reported that the heavy storm of about 150 km/h with a 20 feet tidal wave affected about 6,851,147 people from 1,611,139 families in 200 upzillas /sub-districts where

3,292 people; 467,469 livestock were killed and more than 35,000 people were injured. It also fully damaged about 461,819 acres and partially damaged 1,027,399 acres of crops, 365,670 houses were fully damaged and 842,657 houses were partially damaged (Islam; 2008).

The people of Orissa can never forget the notorious super cyclone of 1999 which took a huge toll of about 10,000 human lives (Ahluwalia and Malhotra; 2006), properties and crops worth of billions and also destroyed much needed ecological balance of the coastal areas by destroying mangroves (Das; 2007). Even cyclone Nargis in 2008 also killed over 100,000 people in Myanmar, besides destroying the lives and livelihoods of millions of people;

1.4 Melting of Himalayan Glaciers and Snows: Melting of glaciers and snows from the Himalayan region will make the situation very adverse for South Asia in near future (Bajracharya, et.al. 2007). The Himalayan region has the largest concentration of glaciers outside the polar caps and supplies water for the maximum South Asian Rivers. These glaciers cover around 33,000 sq. km. areas and provide around 86,000,000 cubic meters of water annually. Seven of the largest rivers of Asia: the Ganga/ Padma, the Brahmaputra, the Indus, the Salween, the Mekong, the Yangtze and the Huang Ho are provided with billions of cubic meters of water by Himalayan glaciers. These rivers provide water supply to almost a billion of Asian people (Rao; 2007). The findings from recent scientific studies and ground reality in the Himalayan ranges indicate a very tougher time ahead for South Asia. The Himalayan glaciers are melting down rapidly and if this continues in near future the stock of fresh water supply for the region will surely be in serious threat (Bajracharya, et.al. 2007). Studies show that in the recent times the 30 km long Gongotri Glacier has shown considerable amount of recession. Satellite data has shown that the rate of retreat in the last three decades has been more than three times the rate of the earlier 200 years or so (Rao; 2007). Beside agriculture, fisheries and other means of livelihoods, many of the hydropower plants in India, Pakistan and Nepal will be under serious threat due to shortage in the flows of the river water. This will also push these countries to

depend more on the other conventional sources of electricity like using fossil fuels to make electricity and thus contribute in producing more carbon emissions;

1.5 Changes in the Pattern and Rate of Precipitation: Many parts of South Asia have already seen a slow but distinctive change in the rate of precipitation and in near future this will increase many folds. Even areas which were earlier very famous to be higher recipients of rainfall are gradually becoming very dry areas and face even shortage of normal rainfall. Be it *Cherapunji* or other North-Eastern areas, which were traditionally considered areas received maximum rainfalls in the world, are under changes due to global warming. Even there is change in the timing of rainy season in many parts of South Asia. The monsoon gets either delayed or comes earlier and affects agriculture and other means of livelihoods of millions of people. Untimely rains cause floods in many parts of South Asia. In the recent years areas which have never seen regular rainfalls in the season are getting much rainfall and other traditional areas where rainfall used to be higher are getting almost nothing. Due to changes in the rate of precipitation groundwater levels in many areas of South Asia will be depleted while other parts will be over-flooded. Agriculture in both of these areas will be affected. Lesser rainfall will push the people to pump more of groundwater for agriculture and other uses. Over-pumping and mass-use of groundwater will also make the situation adverse from other front;

1.6 Decrease in Agricultural Productivity: Nearly 70% of the South Asian people still live in rural areas and it accounts for 75% of its total poor. Agriculture sector in South Asia employs about 60% its workforce and contributes around 22% of its GDP. In the year 1999-2000 agriculture contributed about 27% of India's GDP and 13-18 percent of its exports (Ahluwalia and Malhotra; 2006) and currently Indian agriculture sector contributes 19% of the country's GDP and employs over 60% of its workforce. The rainfed agriculture in India comprises about 68% of the country's total net sown area. Any change in agriculture sector will automatically affect a large part of the inhabitants. A rise in temperature by 1.5^{0}C and 2 mm increase in precipitation may lead to a reduction of rice yield by 3-15% for India (Ahluwalia and Malhotra; 2006).

Due to climate change, changes in the flows of rivers and seasonal variations the agriculture sector in South Asia will be badly affected. Crop yields could decrease upto 30% in South Asia by the mid-21st century. Particularly, agriculture in Bangladesh and the North Indian states is very vulnerable due to unusual increase in rainfall and temperature (World bank; 2008a);

1.7 Damage to Ecosystems and Environment: Consequences of climate change will also badly affect the fragile environment of the region. Many of the ecosystems which provide with means of livelihoods to hundreds of thousands of people are already under serious threat from climate change. Be it river ecosystems, lakes or other aquatic ecosystems or forest lands, grasslands and mangroves environmental conditions in this region are already jeopardized due to demographic, economic reasons and various institutional failures. Moreover, climate change will severely affect the region's coastal and aquatic ecosystems. The Northern regions of Bangladesh are under serious threat from the change in water supply by the *Padma* River (*Ganga*) during the dry season. Due to shortage and lack of availability of water the famous Keolado National Park of Bharatpur which is a World Heritage Site, is under serious threat. Recently, the UNESCO even threatened to delist the site from its list of World Heritage Sites due to damages of its rich ecosystems. On the other hand, cyclones and storms in the recent pasts have seriously damaged many coastal ecosystems. The Orissa Super Cyclone in 1999 damaged the mangrove fencing of the state and made the people of the state more vulnerable to such extreme events. The overall losses from this cyclone was devastating (Das; 2007). The SIDR Cyclone-2007 of Bangladesh partially destroyed world's largest mangrove ecosystems of the Sundarbans. Thousands of Sundari tress were uprooted and damaged by the mighty cyclone and the natural coastal fencing for Bangladesh is now really under serious threat. Such changes in ecosystems will also affect traditional means of survival for millions of South Asians;

1.8 Shortage of Freshwater: Experts opine that in near future there would be more clashes and warfare for freshwater than fossil fuels. South Asia has already

experienced such regional clashes for water sharing of many of its international rivers. For example, the Indo-Bangla relation since decades has been in turmoil due to the *Farakka Barrage* on the River *Ganga* in West-Bengal. In both sides of the border people have seen much of politics and debates on Ganga water sharing. Much hatred political scenario has been created between these two friendly neighbours on Farakka issue. In the dry season flows of the *Ganga,* the *Brahmaputra*, the *Meghna* and other international rivers in South Asia regularly become bleak against higher water demands for agricultural, domestic and industrial uses. It is obvious that without proper water sharing agreements for all international rivers such regional clashes may increase in near future. Even in India many states are fighting for water sharing from commons waterbodies. For example, Tamil Nadu and Karnataka, Gujarat and Maharashtra, Rajasthan, Haryana and Punjab are in some kind of fighting for water sharing in the recent years. In the recent years social and political movements are getting momentum in many Indian states. The issue of Narmada River water sharing has initiated a new social movement called '*Narmada Bachao Andolon*'. Divisions, clashes, hatred and distrusts are increasing due to scarcity and increased demand for water. These many not be fully due to global warming but in future the situation can become worse due to climate change;

1.9 Incidences of Diseases: According to the World Bank, diseases like malaria, dengue, cholera, and hepatitis are some of the commonly found diseases in both urban and rural South Asia and the main reason for such diseases are floods, water poisoning, water logging, among others. Climate change may increase the possibility of epidemics like malaria by 12-27%, dengue 31-47% and schistosomiasis by 11-17% (Ahluwalia and Malhotra; 2006). The aftermath of flood increases the possibility of such diseases due to shortage of potable water, lack of required medicines and scarcity of foods. Every year these diseases take thousands of innocent lives from South Asia which may increase in future due to climate change. Almost allover Bangladesh, many Indian states like Bihar, Orissa, Assam, West Bengal, Andhra Pradesh, Tamil Nadu, and Madhya Pradesh of India and parts of Pakistan have to face similar incidences and count a heavy toll from these diseases in the coming years.

Even after storms or cyclones the casualty of the affected areas increases many folds due to waterborne diseases. Plenty of examples can be cited, particularly from Bangladesh and India, where after cyclones or floods many innocent lives were lost due to shortage of potable water and from waterborne diseases.

Section-2

Reasons for Vulnerability of South Asia from Climate Change: South Asia- geographically, economically or socio-demographically is one of the most vulnerable regions from climate change. The geographical location of South Asia may have bestowed us with many of the great rivers of the world, vast fertile plane lands, favourable monsoons, natural and ecological protections by the vast mangrove forests, yet the region is very prone to many natural disasters. The low land planes of the region, particularly Bangladesh and parts of India, regularly get affected by floods, cyclones, storms and tidal surges. A mere one meter rise in sea-level would lead to a land-loss of 30,000 square kilometer in Bangladesh and 6,000 square kilometer in India which would affect 15 million people in Bangladesh and 7 million in India (Ahluwalia and Malhotra; 2006). In terms of casualty the region would be the worst sufferer in near future. Beside human and other economic losses, extreme events are also responsible for ecological destruction of the region. The ecological systems of the Sunderbans and the Southern and South Western coastal districts of Bangladesh, West Bengal, Orissa and Andhra Pradesh of India are under serious threats from strong winds, tidal waves, surge of salt water into the cultivable lands, etc. For example, the SIRD Cyclone in Bangladesh caused a huge damage for the Sunderban's ecosystems. Similarly, the Super Cyclone of Orissa in 1999 took a huge human, livestock, economic and ecological tool.

South Asia countries are among the most underdeveloped in terms of their overall socio-economic conditions. In many ways the region is the worst, even worse than the Sub-Saharan Africa. Be it demographic characteristics, per capita GNP or the distribution of rural-urban population. These indicators simply talk about the region's comparative backwardness (see *Table-2.1*).

The region is hugely dependent on agriculture, fisheries, forestry, water and natural resources for the livelihoods of majority of its vast population. This makes the region more vulnerable to climate change as climate change and global warming will badly affect agriculture and allied sectors in South Asian countries. It will also decrease water availability and quality, increase the chances of floods and droughts, reduce biomass production in certain areas and adversely impact agricultural production, fisheries and forest sectors (World Bank; 2008a). South Asia has a poor per capita share of natural resources like forest lands, fisheries and other common property resources compare to the rest of the world. Except India and Bangladesh other South Asian countries have reasonably less percentage of arable land (for details see *Table-2.2*). The forested areas of many of its members are not satisfactory at all.

The table-2.2 shows that most of the South Asian countries have negative annual growths of forest lands, except India and Bhutan. India has shown a positive growth by the virtue of social forestry and better institutional mechanisms. On the other hand, countries like Nepal, Pakistan and even Sri Lanka have negative growths and Bangladesh and Pakistan have very little forestlands compare to standard norm. Forests also work as a natural security of alternative foods during any uncertain circumstances like floods, droughts, etc. Climate change will push millions of more people into acute poverty due to scarcity of land, decrease in agricultural productivity and non-availability of alternative livelihoods. This will surely increase food insecurity across South Asian states.

Another area where South Asian countries are vulnerable from climate change is the overwhelming dependence on agriculture for employment and share of agriculture to GDP growth. South Asia is predominantly an agriculture-based region, although service sector now plays a bigger role in GDP growth across the South Asian region. Agriculture and allied agriculture provide living to more than half of its population. Compare to other countries of the world, South Asian nations are highly dependent on agriculture. Share of agriculture in South Asia is around 25%, whereas for the developed countries it is merely around 2% and for all developing countries as whole it is only 13% of their GDP (Fischer, et.al; 2005).

The data on sectoral distribution of GDP contribution over the last three decades although shows a substantial decline of the contribution by agriculture sector, yet around 25% of its GDP comes from agriculture (for more details refer *Table-2.3*). The growth of service sector in almost all South Asian countries is one reason why this share has declined much over the last few years.

Agriculture in South Asian countries is not only important for the GDP contribution but also for providing employment opportunities for vast majority of its population (*Table-2.4*). Agriculture in Maldives and Sri Lanka may not have contributed significant amount of employment opportunities yet this sector cannot be simply ignored. In case of Nepal, India and Bangladesh agriculture is yet the main occupation for majority of their people. Same way Indian agriculture is still the backbone of its vast majority of people. Climate change and its devastating impact on South Asian agriculture by reducing availability of water sources, variability and irregularity in monsoon, occurrences of floods and droughts and extreme events will not only downplay the significant contribution by the agriculture sector but also millions of people will loss their means of livelihoods sources. This will surely create much challenging situations for the rapidly growing urban South Asian cities. This reality can be easily understood by the data released by the UNDP Human Development Report 2007/2008.

Urbanization is natural with economic development and increasing opportunities in the organized and urban sectors. But large-scale migration in the ill-endowed fast growing cities across the developing world is alarming from various reasons. Such migration can cause much urban problems due to sea-level rising and negative effects of climate change on agriculture. *Table-2.5* clearly shows that by 2015 around 30% of the population of South Asian will be urban. Maximum of the South Asian cities are already overburdened with high density of population and have access to poor basic municipal amenities. In near future climate change and current patterns of urban-centered economic growth across South Asian countries will exacerbate the over situation.

This rapid urbanization not only will create many economic challenges but also will create an unhealthy situation due to shortage of drinking water, sanitation facilities, transportation and means of communications. The targets of the Millennium Development Goals by 2015 would be only a distant hope for the South Asian countries. Another serious problem which will only accelerate the sufferings from climate change for South Asia is its widespread poverty, particularly absolute poverty. Globalization has indeed opened many newer windows of opportunities for millions in South Asia but the benefits of globalization has not been reached to the doors of millions of its vast poor who are in fact getting more marginalized across South Asian countries in the recent years. This possesses a serious challenge for the policy makers and governments to bring those groups into mainstream section in the society. Climate change will only fuel this situation and make it even worse.

The trends and data indeed speak the reality from South Asia. Most of the South Asian countries-be it Bangladesh, India, Pakistan or Nepal, have been facing severe absolute poverty and the situation in near future cannot be expected better (*Table-2.6*). A mere two dollar daily income cannot be earned by almost 80% of these over populated countries on an average (UNDP; 2008). This speaks the volume of the truth about the importance of agriculture and agriculture-based productivities in South Asian countries. Due to overdependence on agriculture, natural resources like fisheries, forestry, waterbodies, etc. the population are very vulnerable from climate change as climate change is surely going to affect these sources of livelihoods. The skewed distribution of wealth and natural resources only makes the situation worse. The rich can easily enjoy a very comfortable lifestyle whereas the poor are so poor that even very basic requirements are not regularly met in these countries. Due to global warming and climate change, depletion of natural resource-bases, sea-level rising and influx of climate refugees into other parts will the South Asian countries in near future will badly affect from various dimensions.

Section-3

Conclusion: South Asia is projected as one of the most vulnerable areas from climate change. Due to geo-physical and locational reasons the region is very prone to climate

change. Moreover, socio-economic and demographic conditions across the sates of South Asia make the things even more complicated. Although the region is not much responsible for today's global warming and climate change yet the severity from climate change is expected to be very high in South Asia. Despite many international agreements, treaties, promises nothing significant has been achieved by the South Asia to save the surge of climate change. In fact the situation is getting worse day by day. Even the recently concluded Poznan Conference has brought nothing significant for the developing world. International community who are real culprit and responsible for global warming must take courageous steps to compensate the region by undertaking projects, sanctioning development grants for making infrastructure and changes in the courses of livelihoods for the people of South Asia. There is also need for better cooperation, understanding, sharing of information and joint initiatives in adaptive and mitigation measures within the South Asian countries. The developing countries as a group and particularly South Asia can play a very critical role in forcing the developed world to cut down their carbon emissions and contribute for mitigation and adaptation strategies in affected regions. Moreover, South Asian governments along with NGOs and people's organizations should try various possible means like- spreading mass awareness about climate change and encouraging people to take up newer means of livelihoods, lifestyles, consumption patterns through education, media, propaganda, social movements and adopt various mitigation and adaptive strategies to fight against climate change. Local, national and regional level mitigation and adaptive strategies should be initiated for fighting climate change more effectively. Most vulnerable people and vulnerable economic sectors like agriculture should get attentions on priority basis. Last but not the least, it is cooperation, trust, political willingness and positive actions which can make significant change and unite the people to fight climate change more effectively.

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