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Adapting to climate change impacts in South Asia

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The South Asian region which includes Bhutan, Nepal, India, Pakistan, Afghanistan, Bangladesh, Sri-Lanka and Maldives is home to over one and one-half billion human population, one fifth of the global population. With a high annual population growth rate of about 1.8%, human population in this region is expected to reach over 2 billion in next 30-40 years. While there is a massive pressure on natural resources due to this increase in human population and related landuse changes, widespread climate change impacts, where poverty and malnutrition is widespread, is of major concern.

Highly diverse eco-regions, for example, the coral reef islands of Maldives to the alpine region of the Himalaya that hosts the highest peak in the world, Mount Everest in Nepal, and the Thar Desert in the western India and Pakistan, present countless ecological niches and species richness in this region. This region also hosts one of the most fertile lands in the world, the Indo-Gangetic Plains, and the well-known scenic Himalayan landscapes. Similarly, over 12,000 km of coastline covering five coastal countries in South Asian region: Bangladesh, India, Pakistan, Sri-Lanka and Maldives, present incredibly rich biodiversity.

The South Asia Environment Outlook 2009 published by UNEP, SAARC and DA reports nearly 15,000 glaciers will likely retreat from their present total area of 500,000 sq. km. to the total area of 100,000 sq. km. by 2035 in the South Asian region. This shrinkage of the glaciers will severely impact water supply, agricultural production, wildlife habitat, and will affect socio-economic conditions of millions of people. Quite pronounced climate change impacts in this region have already been observed and documented. For example, droughts, flash floods, and torrential rains in Afghanistan; outburst of glacial lakes in Nepal; glacier melts in Bhutan; rise in the sea level in Maldives; increased saline areas, flooding, and cyclones in Bangladesh; temperature rise and declining ground water table in India; and

flooding in Pakistan are some of the major climate change impacts recently observed in this region. Extreme rain events, landslides, increase in mosquito-transmitted diseases, diarrhea and lack of clean water supply are additional climate change impacts observed. In addition, desertification and land degradation, increased on the frequency of intense heat-waves, river cuttings, shifting of habitats and cropping zones, coastal erosion, changes on hydrology, and decline on water availability are other sets of climate change impacts in this region.

Several regional initiatives in relation to climate change impacts and adaptation measures in the South Asian Region have been undertaken. Some of these initiatives include the integrated research and development in Hindu-Kush Himalayan Region by ICIMOD, the Rice-Wheat Consortium (RWC) for Indo-Gangetic Plains (an alliance of the national agricultural research system of Bangladesh, Nepal, India, and Pakistan); the South Asian Association for Regional Cooperation's (SAARC) Regional Cooperation on Coastal and Marine Risk Mitigation Plan for South Asia; and the Dhaka Declaration of August 2008 on creating South Asian Network on Climate Change and Food Security and establishing South Asia Climate Outlook Forum.

Following the United Nations Framework Convention on Climate Change (UNFCCC) and the Seventh Session of Conference of the Partners (COP7), the National Adaptation Programs of Action (NAPA) for the climate change Work Program, especially for the least developed countries, have been launched. The NAPA program requires these countries to identify their immediate and urgent needs for adaptation to climate change. In the South Asian region, Afghanistan, Nepal, Bhutan, Bangladesh, and Maldives have already developed their National Adaptation Plan of Action for climate change. In addition, Local Adaptation Plan of Actions is also being developed across the region.

Since the South Asian Region has intricately linked hydrology, landscapes, and eco-regions across the nations, it is important to have a sound regional, in addition to national and local focuses, on climate change adaptation research and development. The regional climate change adaptation research results will allow planners and governmental agencies to share information, coordinate activities, avoid duplication of resources, develop regional capacity for addressing climate change impacts, and expedite the implementation of climate change adaptation measures across the region. A sound regional climate change adaptation research and development requires an identification of clear sub-regions for detailed and focused studies. We can identify at least eight physiographic regions for climate change adaptation studies in South Asia. These regions are: 1) The Himalayan Mountains, 2) Indo-Gangetic Plains, 3) The Deccan Plateau and the Ancient Mountain Ranges, 4) Coastal Region

and Islands, 5) The Thar Desert, 6) Baluchistan 7) Afghanistan's Southwestern Plateau, and 8) Afghanistan's Northern Plains.

The Himalayan Mountains

The Himalayan Mountain region extends from Bhutan to Afghanistan, which is part of the Hindu-Kush Himalayan region. This region has high mountains, permanent snow, glaciers, glacial lakes, and many fertile valleys and mountain agricultural lands. Food deficit, lack of necessary infrastructures, seasonal employment, and dwindling natural resources characterize this region. Climate change impacts especially on water resource availability, glacial outbursts, river cutting, and the incidence of new diseases and parasites are of major concerns in this region. This region covers about 1,476,354 sq. km. and supports more than 170 million human populations.

The Indo-Gangetic Plains

The Indo-Gangetic Plain includes flat alluvial lands from the Indus Basin in Pakistan to Ganges and the Brahmaputra in northern India, Nepal and Bangladesh. This region covers about 700,000 sq. km. area. This region is home to nearly one billion people, and is one of the most densely populated regions in the world. This region hosts major cities in South Asia such as Karachi, Faisalabad, Islamabad, and Lahore in Pakistan; Amritsar, Delhi, Lucknow, Gorakhpur, Patna, Varanasi, and Kolkata in India; Nepalgunj, Bhairahawa, and Biratnagar in Nepal; and Dhaka in Bangladesh. Three rivers the Indus, the Ganges, and the Brahmaputra, originating from the Himalayas, are the sources of water in this region. Agricultural production including livestock is the major activities in this region. Flooding, drought, temperature rise, and shift in habitat are some of the major climate change impacts in this region. These impacts are affecting the socio-economic conditions and the livelihood of the people.

The Deccan Plateau and the Ancient Mountain Ranges

The Deccan Plateau and the Ancient Mountain Ranges in India cover areas of Malwa Plateu in the west, Deccan Plateu in the south, and Chota Nagpur plateau in the east. This region is characterized by a number of mountain ranges such as Harischandra Range, Satpura Range, Ajanta Range, and Vindhyan Range. This region has a number of rivers including the Narmada River, Godavari River, Krishna River, and Tungbhadra River, and it includes the peninsular India in the south. Temperature rise, groundwater depletion, irregular rainfalls, higher precipitation intensity, and more frequent droughts are some of the major climate change impacts experienced in this region.

Coastal Region and Islands

The South Asian coastal and island regions extend from Bangladesh to India and Pakistan, and include the two island nations of Sri-Lanka and Maldives. This region hosts many big cities such as Dhaka, Kolkata, Bombay, Colombo, and Karachi. There are many climate change related issues and concerns including flooding, cyclones, sea-level rise, salinity ingress in aquifers, salt water intrusion overland, and coastal erosion in this region. Maldives has been facing serious climate change impacts resulting in sea-level rise, destruction of coral reefs, and land submergence. This region covers more than 160,000 sq. km. area and supports over 135 million human populations.

The Thar Desert

This region is also known as the Western Indian Desert or the Rajasthan Desert. This is one of the major deserts in the world, and it covers part of India and part of Pakistan. In India, it covers Rajasthan, part of Haryana and Punjab provinces, while in Pakistan it covers part of Sindh and part of Punjab provinces. The climatic condition in this region include semi-arid to arid types. Animal husbandry is the major activities in this region. Problems related to overgrazing and drought conditions due to climate change are of major environmental concerns. The Thar Desert covers about 200,000 sq. km. area.

Baluchistan

Baluchistan lies west of the Indus basin in Pakistan and boarders Iran. Baluchistan is located in the south-eastern edge of the Iranian Plateau, and covers about 44% of the total land area of Pakistan. It has an area of 347,190 sq. km., and is home to more than 7.8 million people. Baluchistan is characterized by rugged terrain, low rainfall, cold winters, hot summers, and scarcity of water. Increased frequency of floods, reduction in snow fall duration and amount, rangeland degradation, and shortage of water resources are some of the major climate change impacts in this region.

Afghanistan's Southwestern Plateau

This region lies in the southwest of Afghanistan and is the part of Eurasian Plateau. This region is characterized by sandy deserts with an arid and semi-arid climate. This region is sparsely populated and has limited agricultural lands. This region hosts part of Seistan basin that includes three large deltas: the Lash-Juwain on the Farah River, Chakhansur on the Khash River, and Seistan proper on the Helmand River. Desert climate with highly irregular rainfall, wind storms, prolonged drought, floods, hot summers, and cold winters characterize this region. The southwestern plateau region has 130,000 sq. km. area.

Afghanistan's Northern Plains

This region serves as the major food producing area for Afghanistan. Intensive cultivation is practiced in this region, and it is densely populated. Dwindling water resources, droughts, flash floods, and disease epidemics are some of the major concerns related to climate change impacts in this region. Water irrigation in this region is supplied from the Hindu-Kush Himalayan region. This region has about 103,599 sq. km area.

The regional climate change adaptation research and program implementation requires strong collaborative partnerships among various governmental agencies, international research centers, non-governmental agencies, international non-governmental agencies, universities and other stakeholders focusing on specific physiographic regions. The eight physiographic units discussed above may serve effectively in the design and implementation of regional climate change adaptation research in South Asia.