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Ladakh Lectures-1st

IMPACT OF CLIMATE CHANGE ON INDIA'S TRANS-HIMALAYAN REGION

By
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Shri Phunsong, an engineering graduate, academician, and administrator, is founder Vice-Chancellor of Ladakh University. He retired from Indian Administrative Services, and before he qualified the Indian Administrative Service (IAS) in 1972, he served as a Lecturer in Mechanical Engineering in NIT, Srinagar. Born in Nemo village of Ladakh (October 15, 1947), is the first person from Ladakh to qualify IAS and Allied Services in open competition in the general category. As a member of the J&K cadre of IAS, he held many positions in Government of J&K and Government of India, including a diplomatic assignment in London, before attaining superannuation.

After retirement from the Public Enterprises Selection Board of Government of India, on

attaining the age ceiling of 65 years for jobs under the Government, he was living a retired life when the Government of Jammu & Kashmir appointed him as the first Vice Chancellor of the University of Ladakh. In August 1979, while in service, he was selected through an international competition to be an Albert Parvin Fellow at the Woodrow Wilson School of Princeton University (USA) where he had the privilege of pursuing studies in Development Economics under Nobel Laureate, Professor (Sir) Arthur Lewis.

Achievements

- 1983 - J&K Government Gold Medal and merit certificate for exemplary devotion to duties.
- 1989 - Conferred Padma Shree for distinguished service.
- 2007 - Chief Minister's Gold Medal and Certificate of Merit for Integrity and Meritorious Service.

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Frontline thinkers have found planet earth to be a living entity with all the attributes of an organism. James Lovelock, the English environmentalist and futurist, in his hypothesis relating to planet earth, has named it 'Gaia' after the Greek mythological Goddess personifying mother earth. Climate change is essentially a part of the life-cycle exigencies of this living entity. There are both positive as well as negative impacts of climate change on planet earth – long-term as well as short-term. These can be viewed in terms of two broad time scales, again long-term and short-term. The two long-term ones are cosmic (billion year) and geophysical (million year) scales. The living earth and life forms on it are having to adjust to the

exigencies of long-term changes through the process of 'natural selection' after the fashion of the evolution of living species. However, the short-term adverse effects – of historical (thousand year) and human-life-time (hundred year) scales - are required to be managed through policy interventions of states and societies so as to see that either these are prevented altogether or, if not possible to do so, to minimise their adverse consequences.

Where does Trans-Himalayan India Stand in this Respect?

The trans-Himalayan region of India - Ladakh and parts of Himachal Pradesh – is subject to all the consequences of climate change, particularly global warming, except that it has managed to remain in the past in a complete monsoon shadow (the Himalayas acting as the orographic barrier). The result is that this region has had a microclimate of its own characterised by low

annual precipitation (about 6”), mostly in the form of snow in winter, and annual temperature variation of the order of 70 degree Celsius. This situation is believed to be the cause of desertification of this high-altitude region as a result of which the region has come to acquire the sobriquet of ‘Cold Desert or Arctic Desert’. The source of water for habitation in the region has all along been cryospheric (permafrost, glacier and snow). The arable/cultivable land is, almost without exception, glacio-fluvial, alluvial deposits and moraines.

Specific Impact of Climate change on Trans-Himalayan India

Just as the trans-Himalayan region of India has emerged over the years out of the socio-cultural shadow of the Indian sub-continent and the world, so also it is gradually emerging out of the climatic shadow of the Indian sub-continent and the world - the main reason for the latter being

global warming. Over the last few decades, the region has no longer been in the total monsoon shadow as in the past; monsoon has been crossing the Himalayan barrier now and then creating havoc in the region through flash floods and mud-flows.

Specific impacts of climate change, consequent to global warming, have manifested in the trans-Himalayan region into the following:

1) Abnormal depletion of cryospheric sources of water due to melting of permafrost and recession/melting of glaciers;
2) Glacial Lake Outburst Flood (GLOF) due to sudden sliding of the glaciers into the lakes created by them; and
3) Widespread cloudburst-like rains, during the monsoon season, resulting in flash floods, topsoil washing, erosion of

cultivable land and inundation of cultivated lands.

While all three of these are consequence of global warming, the third is due to monsoon winds managing to cross the Himalayan orographic barrier now and then, which also a consequence of global warming. All these are resulting in gradual change in livelihood pattern of the people living in the region.

Many adverse consequences of depletion in cryospheric sources of water and GLOFs in the region have been unleashed on the Indian trans-Himalayan region since the early 20th century. For example, in Ladakh, the Shyok River (a tributary of the Indus) catchment has been the scene of 13 GLOFs between 1926 and 1933 causing huge devastations in the Shyok basin in Nubra valley in Ladakh and areas downstream of it like Skardo in Pak-occupied Baltistan. These glacial lake outburst floods were caused by the

North, Central and South Chong Khumdan Glaciers sliding into the lakes fed by them. Since 1933, mercifully, the Shyok system has gone and remained quiet. In the late 20th century, a GLOF caused by the Nemo Tso in 1972 had created havoc in the village of Nemo in Ladakh involving heavy loss of property and life. Then, in the recent past (on May 7, 2015), a GLOF-like incident caused by a massive dam created by a landslide on the Phuktal River (a tributary of the Zanskar River) led to massive damage to bridges and culverts, as well as some buildings and land, both in Zanskar River and Indus River basins. The forecast is that all the Himalayan Rivers will gradually cease to be perennial or altogether dry up due to the drying of cryospheric sources of water consequent upon global warming. Under these circumstances, advance policy initiatives become imperative not only in the Himalayan and Trans-Himalayan regions but also in all the North Indian States fed by rivers originating in the Himalayas.

Advent of monsoon winds, laden with heavy moisture, in this trans-Himalayan trigon has, however, been a late 20th century phenomenon. In the geophysical environment of the region, monsoon rains take the form of cloudbursts (100 mm of rains per hour) creating unprecedented flash floods and mudflows. In recent memory, monsoon rains were in evidence in Ladakh first time in the early 1980s. A heavy monsoon-related flood was witnessed in the Indus River basin in Leh (Ladakh) in 1982. Since then, many parts of Ladakh have seen flash floods during the monsoon season in 2007, 2010, 2015, 2018 and 2019 causing heavy damage to crops, built-up areas and human lives. Scientific evidence suggests that Ladakh will experience further floods with the same or increasing frequency during the monsoon season in the coming years. Thus, with crossing of the Himalayan orographic barrier by monsoon winds now and then, Ladakh has become a theatre of alternating floods and draughts forcing many inhabitants to switch

their livelihood pattern to newer ones. This calls for policy plans to reduce vulnerability to occasional devastating floods and draughts and gradual drying of cryospheric sources of water. In the obtaining scenario, the local people are required to be motivated to take initiatives both for risk-reduction and emergency response to manage after-effects of adverse consequences of global warming and occasional monsoon rains.

Policy Interventions Required to Minimise Adverse Effects

As mentioned earlier, the long-term cosmic and geophysical adverse consequences of climate change are taken care of by the self-healing capability of planet earth as a living entity. Scientifically, climate and weather phenomena are essentially 'chaotic systems' defying accurate predictions. Besides, as per Kurt Godel's Hypothesis, it is impossible to have a

complete understanding of a system of which the observer is himself a constituent part. In view of this, we are left with the option of forecasting and managing the short-time adverse impacts of climate change as best as we can.

Adverse consequences of climate change of the human-life-time scale, as mentioned earlier, are to a great extent amenable to policy interventions and human adaptive strategies, both in respect of prevention and management and mitigation of the adverse implications of the aftermath. Such policy interventions and strategies could include the following:

Disaster Risk Reduction (DRR) Measures:

1) Mapping of geographically hazardous areas and human vulnerability to common hazards and then integrating disaster risk reduction (DRD) strategies

with policy plans of concerned government agencies;

2) Regular scientific monitoring and data-recording of environmental temperatures, rainfall patterns, river water levels and seasonal behaviours, glacier recession rates, glacial lake behaviours, permafrost behaviours etc. with a view to monitoring trends in various effects of climate change; and
3) Keeping alive the memory of past disasters through institutional mechanisms, such as, museums of recorded oral history, photographs and videos of floods, draughts etc. and performing art initiatives like street skits of flood management techniques in areas having history of repeated visitations by natural disasters like floods and draughts in the past.

Management of adverse Consequences of Global Warming:

1) Rainwater and groundwater harvesting on scientific bases;
2) Nucleating new artificial glaciers in high altitude catchments of perennial streams;
3) Banning of plantation on banks and close proximity of glacial-melt water channels to prevent ponding effect in the path in the event of flash floods in the stream;
4) Banning of new settlements or reconstruction of buildings in dry channel beds with history or evidence of repeated visitations by floods in the past;
5) Understanding the social and economic factors driving the ongoing rural-urban population migration in the region;

6) Conscious change in land-use patterns from traditional crops to crops which are more lucrative in the rapidly integrating national and regional markets; and
7) Development of attractive alternate livelihood avenues for the region's rural population aimed at preventing rural-urban migration to restrict urban population density optimum levels.

Need for Academic Study and Research for Informed Policy Interventions

In the context of what has been said in the foregoing paragraph, it would pay heavy dividend if the G.B. Pant National Institute of Himalayan Environment and the University of Ladakh were to pursue some joint research projects on subjects mentioned in para 8 (a and b), within ambit of the Memorandum of Understanding between the two institutions that is on the anvil.

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The Trans-Himalayan landscape is characterized by extreme cold climate, minimal rain and with very sparse vegetation. The region is endowed with rich socio-cultural heritage, unique biodiversity, and wetlands. Communities have adapted for extremely harsh climate and face numerous challenges. Impact of climate change is expected to be more intense in higher altitudes. Ladakh Regional Centre has been established to ensure NIHE's outreach in Trans-Himalayan region of India.

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Objectives

- ❖ To promote alternative livelihoods for climate change vulnerable cold-desert communities.
- ❖ To facilitate conservation of critical/important cold desert habitats and biodiversity.
- ❖ To strengthen and establish approaches for addressing issues of water scarcity.
- ❖ To foster climate smart communities in the trans-Himalayan landscape.

Our Mission

- Science for society,
- Networks and collaborations,
- Promotion of successful models,
- Private sector engagement,
- Harness energies of local young
- Promoting use of sustainable technology.

Wildlife Warden Building, Near Council Secretariat, Leh