

## **China-India Joint Workshop on Mountain Ecosystem and Climate Change – A Technical Report**

**Under the aegis of China-India agreement** for cooperation in Climate Change, a China-India workshop was held in Beijing on September 29, 2010. The **theme chosen** for the workshop was on Mountain Ecosystem and Climate Change.

**The workshop was** aimed at exchange of information on the implications of Climate Change on Mountain Ecosystems. The programme consisted of the presentations by experts/ scientists from India and China. In all **16** presentations were made, 8 each from China and India.

The presentations were organized into following four themes –

- 1. Climate Change in Mountains**
- 2. Interaction between Climate, Cryosphere and Water cycle.**
- 3. Impacts of Climate Change on Mountain Ecosystem**
- 4. Effects of human disturbance on Mountain ecosystem response and Adaptation to Climate Change**

**The focus of the Chinese presentations** across the aforesaid four sub-themes was on the studies undertaken in the Tibet Plateau region. The studies presented various aspects of Climate Change over the Tibetan plateau. The region represents a large part of land mass, with complex terrain. The plateau due to its physical setting serves as a large heating source to the atmosphere at high altitudes and not only affects Asian, but also global climate, in the context of Global Atmospheric Circulation.

**The studies presented** on the Tibetan plateau included trends of 20 year warming, glacier changes during last 40 years, changes in precipitation and atmospheric water vapour, responses of Tibetan Plateau ecosystem, responses and adaptation of alpine meadow-animal production system.

**The Indian experts,** consistent with the theme of the workshop presented Climate Change scenario over India with specific reference to the Mountain Ecosystems (Western Himalayan region) observed changes in the climate in the region, impacts on glaciers and higher mountain, water availability, impacts of Climate Change on tourism and livelihood and an insight into the approaches to adaptation and mitigation in the mountain ecosystems.

**A comprehensive presentation** on the programmes, activities and institutional framework of the Chinese Academy of Meteorological Sciences (CAMS) was made. The CAMS is the largest research institution in the field of

atmospheric sciences in China and serves as a high level education base for graduate students and research facilities.

**The research base and institutional network** in China have been designed to address the themes such as – disastrous weather; thunder and lightning protection; atmospheric sounding; weather modification; climate and climate system; ecological environment and agro-meteorology and atmospheric composition. There is a strong institutional base to support the activities in the aforesaid themes.

**The emerging messages** from the studies presented reveal the following –

**The Chinese studies** revealed that –

- There are discernible signals of change in the climate parameters in the mountain ecosystems.
- There is an evidence of change observed in the average surface-air temperature by 0.32°C per decade (1961-2006) in the Tibetan Plateau region. The highest increase is in the Western plateau and the lowest in the North-East.
- An increase in the soil temperature of the order of 0.19°C per decade (1970-2005) has been observed.
- An increase in the annual precipitation of the order of 10.9 mm per decade (1961-2008) has been observed.
- The future Climate Change projections reveal increase in the precipitation in most parts of Tibet.
- The Climate Change all over the Tibet Plateau varies considerably. The change observed at the eastern edge of the plateau is different from that over the main plateau. These observed changes at the eastern edge show a decreasing trend of precipitation and water vapour under global warming condition as compared to the main plateau.
- In a global warming scenario, modification of natural vegetation is projected e.g. alpine meadows and alpine steppe might be replaced by forests, thereby accelerating the speed of desertification.
- Studies on recession of glaciers reveal rapid retreat of Greater Himalayan glaciers in comparison to the global average since 1960 (based on cumulative mass balance).

**While the Indian presentations highlighted –**

- The Indian presentations highlighted the observed changes in the rainfall patterns, inter-annual variability, observed change in the average

maximum temperature, spatial variations with all-India rainfall depicting no significant trend, however registering an increase in extreme rainfall events.

- Details of the studies on the Himalayan glaciers were presented by the expert present from Wadia Institute of Himalayan Geology. The presentation highlighted the need for in depth and long term studies of glacier losses in the Asian high mountains as they are the source of a number of major rivers. Besides, need for studies on assessment and monitoring of sustainability of mountain ecosystems and agriculture is felt.

### **On the basis of the results presented by the Chinese side**

#### **It is concluded that –**

There is a need for intensifying studies in the region through augmenting operational observational network to collect fresh data and undertake reanalysis, enhanced performance of numerical models. The areas identified for future studies include Mass, Water and Energy exchanges between Troposphere and Stratosphere over the plateau and their influence on global climate; large-scale studies on plateau influence and its application to the short term climate predictions. One of the areas identified for future studies is the impact of South-Asian Summer Monsoon (SASM) on the Himalayan atmospheric system.

#### **To sum up –**

Scientific cooperation in the area of Climate Change with China can be beneficial for reasons of common concerns. Good scientific data can enhance our understanding in sectors such as glaciology, water and South-Asian monsoon in the context of Climate Change.