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Workshop on "The Himalayan Glaciers and the Community Responsibility"

Glacier is a mass of ice, fed by snow on a mountain, slowly creeping downhill to where it melts or breaks up into icebergs. Approximately, 10 percent of the Earth's land-surface is presently covered by glacier ice. Most of it occurs in the Antarctic Ice Sheet, about 5,000,000 square miles or 85 percent of the total area, and in the Greenland Ice Sheet, about 670,000 square miles or 11 percent of the total area.

The workshop, held on September 26 and 27, 2011, in the auditorium of the Wadia Institute of Himalayan Geology at Dehradun, was jointly organized by the Wadia Institute of Himalayan Geology (WIHG), Uttarakhand Space Application Centre (USAC) and the Himalayan Environmental Studies and Conservation Organization (HESCO), Dehradun. The workshop focused on the Himalayan glaciers, climate change and mutual responsibilities of the local community, the scientists and the environmental activists.

Impacts of climate change, especially in the mountainous regions overlain by ice-sheets, have conspicuous socio-economic implications, which affect water resources, haydro-power generation, avalanches-related natural hazards and glacial lakes. The adverse effects due to these changes directly impact livelihood of the local people. Change in climate over mountains is related to their heights. As a result of these changes, the high altitude terrains experience biodiversity. Mountain ecosystems are often endemic because of isolation of a number of species at high altitudes from their counterparts in lowlying vegetated areas. The workshop covered burning issues of the Himalayan glaciers, climate change, global warming, and the Indian monsoon along with remote sensing techniques, which are specially applied to the study of the glaciers and natural disasters. And, the question on how local communities can be involved in the changing scenario was in sharp focus of the delegates.

The two-day event programme began with the Inauguration Function, commencing at 10.10 A.M. on the 26th September; it was presided by the Chief-Guest, Her

Chief Guest Her Excellency Smt. Margaret Alva, Hon'ble Governor of Uttarakhand, escorted to the venue by Prof. Anil K. Gupta, Director, WIHG, and Dr. V. C. Tewari, Workshop Convener (WIHG). She also inaugurated the Workshop.

Before the inaugural address sitting on the dais from L to R are: Dr. V.C. Tewari; Dr. M. M. Kimothi, Director, USAC; Smt. Margaret Alva, Chief Guest; Prof. Anil K. Gupta, Director,WIHG, and Padma Shri Dr. Anil P. Joshi.

The attentive audience of earthscience luminaries, professionals, guests & delegates at the workshop. Front row (L to R): Prof. V.K.S. Dave and Prof. O.P.Varma, Secretary & Executive President of IGC respectively and Dr. R.B.S. Rawat, Chief Conservator of Forest, Uttarakhand.

Excellency Smt. Margaret Alva, the Governer of Uttarakhand. Following the recital of the National Anthem, lighting of the auspicious lamp and the prayer to goddess Saraswati, Prof. Anil K. Gupta, Director, WIHG, recognized the gracious presence of the Governor and felicitated her by offering bouquet. Likewise, others sitting on the dais were also welcomed with bouquets, warmth and respect.

The Director, WIHG, then presented a warm welcome to the Chief-Guest, scientists, other guests and delegates to the workshop; he also emphasized the importance to preserve the Himalayan glaciers, which among other life-supports, contribute water for the survival of 30-40% population of our country, besides being prime attraction to the tourists. Prof. Gupta said that deliberations of the two-day workshop would be of some consequence to the Government of the State to plan programmes and policies for the welfare of the local people and at the same time help promotion of scientific studies, related to the glaciers.

Dr. V. C. Tewari, thereafter, gave introduction of the workshop and hoped that the interaction of the people with the experts will generate a new turnabout in the understanding of the glaciers and the climate change for deriving socio-economic benefits and learn to face the calamitous effects of natural hazards that normally emanate from them – the landslides, the earthquakes, the flash floods, etc. Dr. Tewari made a special mention of the fact that Uttarakhand is the abode of major Himalayan glaciers and they exert a dominant control on agricultural and hydroelectric power generation, apart from providing potable water to millions of the country's population. Vulnerability of the local people to the consequences of climate change would be a major focus of this workshop on creating awareness among the people.

Speaking on the occasion, Padma Shri Dr. Anil P. Joshi, Founder, Himalayan Environmental Studies and Conservation Organization (HESCO), Dehra Dun, said that it's a historical workshop, and paradoxically, it appears strange that there are fears about glaciers in the minds of the people and such fears seem primarily due to lack of awareness about the God-given endowment to the people. He was glad that a workshop on such a theme is being organized. The efforts, he visualized, may not be productive in the right sense unless people, who are in the midst of the glaciers, are properly educated. Whatever we do, we must do with the knowledge of the people, for the people and scientific growth related to God-blessed gifts. For any concern on glaciers, local people must be tied up with the problems. The two parties – the scientists and the villagers – who live around the glaciers, can tell us from their experience about the safeguards, which are necessary for them. The measures, then, can be thought of for implementation, visualizing that glaciers, hills, forest, resources and the people are closely linked. Workshop should discuss the problems in totality, concerning these physical endowments, he desired.

Addressing the assembly, Her Excellency the Governor of Uttarakhand, gave a wide coverage of the various problems, her expectations from the workshop for the good of the people, and well-thought of recommendations for consideration of the Government for framing worthwhile policy and programmes for the protection of glaciers and their utilization for the economic development of the people of the region. She expressed her happiness that she was present on this occasion. She also appreciated the efforts of the organizers to provide the platform to bring various organizations interface with the scientists and the people to discuss the issues related to the glaciers and the climate change.

Elaborating her address, she said that glaciers form a large water reservoir; they melt and yield important rivers and diverse ecosystems. *"GSI inventory records the presence of 9000 glaciers in the Himalaya" she observed. "Glaciers are good indicators of climate and many glaciers are said to be receding, nearly by 21% degradation (741m) in 2000. Higher magnitudes of recession may be harmful to people, forest, and animals.*

The workshop inaugurated by Her Excellency Smt. Margaret Alva. Supported by copious data, she dealt with elaborately various problems being faced by the community and other emergent issues due to climate change, which should be discussed by the workshop for possible solutions, she suggested.

The piedmont glaciers in valleys may be dangerous to cause flash floods" she remarked.

"Satellite remote sensing techniques are useful to examine and evaluate the landscapes and recession and melting rates". These techniques be used effectively to study the Hmalayan glaciers systematically, especially the Gangotri and Yamunotri, and global warming impact on melting of glaciers, apart from their adverse impact, if any, on livelihood and hydropower generation sites, danger to survival of plants and people – biodiversity damage, in particular. The WIHG, which is dedicated to the study of the Himalaya, may augment its studies to bring out the results on glacier melting, a factor likely to disturb the Himalayan ecosystems, she desired.

Strategies to protect the resources and the people from dangers be worked out. A core group be formed for creating awareness to people to face challenges. *"Can we reverse the damage to ecology by the receding glaciers?"* she asked. Concluding, the Governor wished success to the deliberations and expressed, once again, her happiness that she was there to inaugurate such an important event, and so relevant to the State of Uttarakhand.

On behalf of the team, the Governor was presented a *shawl* and a *memento* by Prof. A. K. Gupta, Director, WIHG.. Presenting a vote of thanks to the Chief-Guest, Dr. M. M. Kimothi, Director, USAC, made a special mention of the encouraging guidance and inspiration given by the Chief-Guest to Padma Shri Joshi and the Director, WIHG, for the support and initiation of the workshop.

The ***Technical Sessions*** of the workshop were subdivided into six sessions. ***First Session*** was on *"Indian Climate and Ecosystem Responses"*. There were two key-note addresses - one by G. B. Joshi of Doon University on *"Climate Change"* and the other by Anil K. Gupta on *"Indian Monsoon* and *Onset of the Monsoon in the Himalaya : An Overview"*. This session was devoted to the current issues of global climate change and its impact on the society, including melting of the glaciers.

The ***Second Session*** was exclusively on *"The Impact of Climate Change and Glaciers"*. M. M. Kimothi of USAC presented the state-of-the-art on the Himalayan glaciers, studied by remote sensing, especially in the Uttarakhand region by USAC. G. Philip (WIHG) highlighted the inventory of the glaciers and glacial lakes of the Uttarakhand State, using remote sensing technique and ground check. D. P. Dobhal (WIHG) discussed about the melting of the glaciers in the Himalaya and its consequences and adaptations, while Dhruv Sen Singh (CAS in Geology, Lucknow University) presented a paper on the *"Impact of Climate Change on Himalayan Glaciers and Society"*. Citing examples from the Gangotri and other glaciers, he emphasized that the Himalayan glaciers are shrinking at an average of 10 to 60 m annually with some retreating by 74 m a year - the Gangotri glacier located in Uttarakhand attracting international attention due to its rapid rate of retreat.

The ***Third Session*** was exclusively focused on *"Community Representation and Responses"*. Anil P. Joshi (HESCO Founder) gave an overview of *"The Himalayan Glaciers and the Community Responsibility"*. The other scientists, who actively participated in the discussion, initiated by Anil Joshi, were Meenakshi Khajuria from Jammu University; J. P. Maithani, Pipalkoti, Chamoli; P. C. Joshi (HOPE in Ranikhet), Almora; V. K. Bhatt, (Nandanya), Aditya Kumar Saini, representing *Mountain Foram Himalayas,* Shimla, Lal Singh, Himalayan Research Group, Shimla, Manikant Shah, Govt. P. G. College, New Tehri; and Harshvanti Bisht, Uttarakashi; Malvika (*Himmothan*) and others.

Fourth Session deliberated on *"The Himalayan Ecosystem and Climate Change Aspects"*. Lal Singh, Himalayan Research Group, Shimla, delivered the key-note address on *"The innovative approaches for the mitigation of rural household carbon emission in the Indian Himalayas"*. Jayendra Singh (WIHG) presented his paper on *"Temperature variations over the Western Himalayas of India, using Tree Rings"*. Trees older than 500 years were used for temperature reconstruction. He interpreted that premonsoon temperature covering the little ice-age and part of medieval warm period matches with the available climate reconstruction from the Garhwal region. P. S. Negi (WIHG) and Asha Thaplial (USAC) presented *"Important aspects of the Alpine tree line dynamics and climate change response to the Garhwal Himalaya in particular and the Central Himalaya in general"*. There was an ensuing debate on *"The demarcation of the tree-line – snow-line boundaries in the field"*. V. C. Tewari (WIHG) talked about *"the cave deposits (Speleothems) from the Himalaya and its implications on the climate change and paleomonsoon interpretations based on stable isotopic studies";* he brought forward a correlation between the decrease in oxygen isotope values and the intensification of the monsoon.

In ***Fifth Session*** emphasis was on *"Water Resources, Community Responses and adaptations"*. Harshvanti Bist from Uttarakashi gave a glimpse of the glaciers

photographed in the past and in a recent expedition by a team and compared the changes due to global warming. Swapnamita Vaideshwaran (WIHG) discussed about *"Implications of reservoir- loading and water-level fluctuations on seismicity around Tehri Dam"*. Her observations have shown that there is no correlation of focal depth of earthquakes with the oscillation cycle of the reservoir. Neelam (USAC) read her paper on *"The Impact of climate change on the Himalayan ecosystem and livelihood sustainability"*. There was also a presentation on *"The Traditional Water Management Practices in Uttarakhand"* by Manikant Shah (P. G. College, New Tehri). Navdanya, a NGO presented paper on *"Participating research on adaptation to climate change in the Himalayan ecosystems"*.

The ***Concluding Session*** was chaired by Anil Joshi (HESCO as Panel Moderator).Panel discussion was initiated by him to get the response of the panelists - M. M. Kimothi, V. C. Tewari, G. Philip, P. Srivastava and Malvika. Each panelist gave his suggestion to the Chair for the future line of action. The session was then opened for general discussion and views from the participants represented by various organizations. There was a general recommendation that scientific research being done by the scientists in different organizations of the State and Central Government should be made available to the public living near the glaciers for educating them to know the ongoing impact of the climate change on glaciers. Local communities should be involved in the studies by the glaciologists and environmentalists and NGOs. M.M. Kimothi (USAC) informed that they have chalked out one such project in which the work will be started soon in Garhwal near the glacier, involving the *Gram Panchyat*. V. C. Tewari (WIHG) suggested that all Indian organizations working on different aspects of the glaciers, environmentalists (NGOs) and the local community should work together on some well-known glaciers and come out with data on various aspects of the glaciers to prepare a model for the Himalayan glaciers which could be used for further information from unexplored glaciers of the NW and NE Indian Himalaya.

A Core Group was finally constituted to translate all these recommendations into the reality. The Core Group Members include Her Excellency Smt. Margaret Alva (Chairperson), Prof. A. K. Gupta (Director, WIHG, Co-Chairman) M. M. Kimothi (USAC, Co-Chairman), Anil Joshi (HESCO, Member), V. C. Tewari (WIHG, Member), Lal Singh (HRG, Shimla, Member), P. S. Roy (IIRS, Member), Malvika (Himmothan, Member), and S. K. Singh (NIH, Member).

"Deliberations, the outcome and the follow-up action should raise hopes for conditions of greater prosperity of the region, better understanding of snow glaciers and technical ability to face the challenges of climate change, apart from improving food scarcity, agriculture and horticulture products and soil fertility of the State, adding greater strength to the growth and utilization of medicinal plants, sericulture, horticulture and agriculture. Tourism to geo-sites and Chardham pilgrimage could be made more scientific and systematic to yield better results for protecting environment and ecology of the region", the writers of this report would wish.

Dr. Anil P. Joshi in the discussion session with Prof. Anil K. Gupta interacting with the luminaries of the section of the audience. HESCO had been the active partner in the organization of the workshop.

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