

Climate change education*

Climate change is recognized as one of the most serious challenges of the 21st century. It has an impact on all ecosystems and human societies, but in different ways and to different extents. Climate change issues need to be part of public awareness, learning and education for a sustainable future. Education plays a significant role in promoting knowledge, skills and values necessary for realization of noble goals of sustainability. It also helps us to learn to cope with today's challenges such as global warming and climate change. For safe and better future of the generations to come, education has a central role to play in understanding, mitigating and adapting to climate change.

A three-day national seminar was organized recently with the overall goal of reducing the impact of climate change on the environment and on the livelihood of communities by improving awareness building on climate change in the Himalayan context. The major discussions were on awareness building, information exchange and the role of higher education in addressing climate change with particular emphasis on the challenges faced by the Himalayan states and their people.

Deliberations were made on three themes. Under the theme 'Higher education institutions and climate change' participants discussed on what is climate change education and perspectives on how institutions of higher education can prepare for climate change. Researchers presented their work on their understanding of climate change and how they are developing climate science and climate science pedagogy. They shared their experiences on climate change while teaching and learning for a sustainable future, state of climate change education in India, climate science literacy, climate education with special emphasis on the Himalayan climate, education tools and materials, and practices.

In the second theme, the impacts of climate change were discussed. What is happening and where were shared by the participants. Deliberations included impacts on society, socio-economic conditions, agriculture, health, local biodiversity, quality and quantity of water resources, extinction of animal and plant species, and climate change and greenhouse effect (global warming).

The third theme dwelt on adaptation and mitigation strategies mostly through natural resource management. The managers explained how to reduce the impact of climate change, how carbon sequestration is being carried out, and how to develop field methods and technologies to assess the impact of climate change and the outcome of resource management measures.

Manju Sundriyal (USERC, Dehradun) emphasized that we should act immediately and prepare ourselves to sustain a healthy society. Climate change should become a curriculum at the school level and USERC is committed to the people of Uttarakhand for the cause. V. P. S. Arora (formerly at Kumaun University) emphasized that climate change is the foremost challenge to our socio-economic and environmental impacts. We should harness the positive impacts and mitigate the negative impacts, where education will play a key role. He emphasized that poverty in our country is a major factor that is responsible for delayed action on impacts. We need to adapt ourselves according to nature and not oppose it. Non-conventional energy has a potential in the Himalayas. Waste of food, electricity and water should be minimized, and agriculture should be nature-friendly with less application of chemical fertilizers, insecticides and pesticides. J. S. Rawat (SSJ Campus, Almora) spoke about the newly established Uttarakhand Centre on Climate Change (UCCC), and its objectives and functioning. D. N. Pant (Uttarakhand

Space Application Center) presented a talk on satellite remote sensing perspectives on climate change education. A. K. Pandey (University of Delhi) described climate change and biodiversity conservation, as well as current understanding and future challenges. He also discussed how climate change affects phenology and pollination pattern. He stressed on the need to have a strong forecasting of phenology events under global warming. He also mentioned the need to understand adaptation biodiversity to climate change using taxonomy. M. C. Porwal (IIRS, Dehradun) explained the variation in distribution of climate change impacts on the ecosystem like shrinking of ice sheets, declining arctic sea ice, flooding of lowland areas, ocean acidification and warming of oceans. Uma Melkania (GBPUAT, Pantnagar) described carbon sequestration in the forests and how conservation agriculture is beneficial in carbon storage and application of biochar. H. S. Dhama (Kumaun University, Almora) stressed on the need for green energy and a green society. He lamented how some nutrient-rich poor man's local fruits like *Hisalu* are disappearing due to lack of proper pollination and delay in fruiting timings due to changes in temperature and rainfall in the region. He proposed curriculum models, so that a diploma may be started in the UCCC soon. He also stressed on the need to motivate the youth to come forward for adaptation and mitigation measures.

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