

TWO DAYS NATIONAL CONFERENCE

On

Climate Change: Its Impact on Bioresources of the Himalayan

Region

(5th & 6th June 2022)

Organized by

Govt Post Graduate College Dwarahat (Almora), Uttarakhand

Sponsored by: UCOST and USERC Uttarakhand.

Organizing secretary: Dr. Darshan Singh

Conference Proceedings

Introduction

Climate change is a major challenge facing our planet today. Climate and natural ecosystems are closely related and depend on each other. Mountain ecosystems play an important role in ecological sustainability, economic development and livelihood security of people at local as well as global level. Mountains are however amongst the most fragile environments on earth. These are at the same time identified as being repositories of biodiversity and water. Mountains are providers of ecosystem goods and services on which downstream communities rely on both regional and global level.

Exponential increase in greenhouse gases (GHGs) like carbon dioxide, methane, nitrous oxide, CFCs, etc., in the atmosphere has resulted in Climate change. The concentration of CO₂, mainly responsible for global warming, has reached 379 ppm in 2005 from its pre-industrial value (i.e., 280 ppm). The increase in GHGs between 1970 and 2004 was approximately 70%. The mean temperature of the earth has increased by 0.74°C during last century. The review report projecting the scenarios of global warming indicates that the global

average surface temperature could rise by 1.4 to 5.8°C by 2100. Globally, the sea level rose at the rate of 1.8 mm per year during 1961 to 2003, and faster (i.e., at the rate of 3.1 mm per year) during 1993 to 2003 and global mean sea level is projected to rise by 0.18 to 0.59 mm by the end of the current century. Climate change has emerged as a global environmental issue that has engaged the world attention as it relates to global common atmosphere. It is scientifically least predictable, and its impacts are likely to affect adversely the vulnerable and poor people mostly, who have contributed least to the major causes of Climate Change.

The Himalayas are considered to be among the most vulnerable to climate change. The 20th century witnessed a consistent warming of the Himalayas. Studies show that the Himalayas have warmed at a faster rate than the global average. The Himalayan glaciers, as noted above, are retreating at a faster rate than the global average. Advanced blooming, migration of species, and changed timings of hibernation and breeding suggest that the climate in the Himalayan region is changing. The northward movement of species and tree line is also widely reported. An increased frequency and intensity of extreme weather events is also noted in the Himalayas. Cloud bursts, intense episodes of rainfall in Uttarakhand and Nepal in June 2013 and delayed but heavy rainfall in Jammu and Kashmir in September 2014 are some of the indicators of climate change in the Himalayas. The impacts of climate change in Himalayas have local, regional and global implications.

Very little information exists about the responses to different ecosystems to climate change in this state. However, there are clear indications that changes in temperature, rainfall and other climatic variables would have an impact on forests, water regimes, agriculture and hazards; and these would affect the general human wellbeing living in the state and also impact the people downstream.

Science and Technology has made enormous inroads in understanding climate change and its causes. It is a beginning to develop a strong understanding of current and potential impacts that will affect people today and in coming decades. This understanding is crucial because it allows decision makers to place climate change in the context of other large challenges facing the nation and the world. There are still some uncertainties in the knowledge of climate and there is a potential need of research in understanding a complex system like Earth's climate. As a result of the growing recognition that climate change is under way and poses serious risks for both human societies and natural systems, the question that decision makers are asking has expanded from "What is happening?" to "What is happening and what can we do about it?".

Mountains influence the livelihoods of nearly 40 per cent of people globally. The available data on climate change impacts in mountains is sparse, even though the mountains are among the most vulnerable regions on the planet. As mountains are important providers of ecosystem services and home to wilderness refuges for lowland species in case of climate warming, understanding the impact of climate change on these ecosystems is essential. Also, the Mountains are early indicators of climate change, so it is important to assess the current situation of climate change of Himalayan regions and prepare the plan of action to minimize its adverse impacts on bio-resources and ecosystem.

June 5th is the World Environment Day, so it will be the best day to have this meet of intellectuals to discuss the implications of climate change for the betterment of society.

Program Details

Day 1 (5 June 2022)

Inaugural Session

The session of the first day starts with breakfast-tea and registration on 5th June 2022 at morning 8:30 am. Inaugural Function was started by the Lightening of lamps, Sarswati Vandana, and welcome song and welcome of delegates by Dr. Darshan Singh Kamboj. After that, there was a welcome address by Principal Prof. A. K. Joshi. The theme of the conference was presented by Dr. Darshan Singh Kamboj. Dr. Suman Garia did welcome and Profile Description of Chief Guest Prof. C. S. Mathela. Chief Guest Address by Prof. C. S. Mathela was started with congratulation to the organizing committee and appreciation for organizing a good conference in this remote area of Uttarakhand on a serious and burning issue. After this address memento (as a token of love) was given to Chief Guest Prof. C. S. Mathela by Dr. Darshan Singh.

Hi-Tea

There was a fifteen minutes break for tea and refreshment.

First Plenary lecture

Welcome and profile description of Prof. Ajay Singh Rawat was done by Dr. Bhawna Kapkoti. In his plenary lecture by Prof. Ajay Singh Rawat discussed about the wild life and wet lands. According to him forests are very striking feature of the land surface. They vary greatly in composition and density and the scenic effect of forests changes with the seasons. The forests of a country are a natural asset of immense value, which unlike mineral sources can be kept permanently productive and useful under proper management. Forests are the abode of wild life and add to the beauty of the landscape. The

ameliorative role of well managed forests is generally taken for granted. The need for them is realized only when the destruction of forests brings about shortage of essential forest products, by causing floods and damage to the agricultural land, which adversely affects the economy of the people and the change in climate. It has a still greater importance in this country because, in addition to being a source of material progress, it has also been a source of spiritual and moral advancement. In my lecture I will focus on the history of forestry of the country and biodiversity of the Central Himalayan region (Uttarakhand) which will be followed by a visual presentation on the flora and fauna of Uttarakhand. Central Himalayan biodiversity is a subject which is receiving global attention as it is the catchment area of the Indo-Gangetic plain, one of the most fertile plains on the face of the earth where more than one third of the Indian population resides, It attracts diversity of views and these views are as important as the subject itself because here latitude, longitude and altitudinal variation have moulded the characteristics as well as multiplicity of habitats, different micro climates and varied environmental niches of plants, animals and human beings. After the lecture memento (as a token of love) was presented to Prof. Ajay Singh Rawat by Prof. A. K. Joshi.

Second Plenary Lecture

After welcome and profile description of Prof. C. S. Mathela, he started plenary lecture on topic “Himalayan Floral Resource: Exploiting Chemical Diversity as Contributor in Healthcare System in The Post-Covid-19 Era And Role in Regional Sustainable Development and Providing Solution to Migration from Hills”. After the lecture memento presentation to Prof. C.S. Mathela was done by Dr. P.C. Bhatt.

Lunch

Lunch break was of one hour.

Technical Session-I (Chairperson: *Prof. Beena Mathela & Dr. B. S. Bisht*)

It was started by the welcome and profile description of Prof. Om Prakash and inviting him for his plenary lecture.

Third Plenary Lecture

Prof. Om Prakash is Professor at Department of Chemistry, College of Basic Sciences & Humanities, G.B., Pant University and Agriculture and Technology, Pantnagr, 263 145, Us. Nagar, Uttarakhand. INDIA. He has delivered his plenary lecture on biopesticides and also discussed about the risk related to the use of chemical pesticides. Following were the main focuses of his lecture:

Uttarakhand is a godsend big repository of medicinal and aromatic plants and witnessed by its rich biodiversity. Family Lamiaceae with common examples like *Salvia*, *Mentha*, *Ajuga*, *Mosla*, *Ocimum* etc, along with other many angiosperm and gymnosperm families provide an ample opportunity to explore the flora of this region for their nutraceutical, pharmaceuticals and biopesticidal applications. Synthetic pesticides are used to combat with agricultural pests *viz*: insects, weed, nematodes, fungi etc. so that the crop yield can be increased in order to meet out the demand of society for food security. Due to the excessive use of pesticides the pests have developed resistance and at the same time the residual and environmental effects of pesticides may be toxic or detrimental. There has been a growing trend in recent decades for researchers and companies to “**go green**” or be more environmentally benign. In spite of the advent of modern techniques of drug/pesticide discovery, screening of traditional knowledge systems have given clues/lead to the discovery of valuable bioactive molecules. Traditional medicinal plants are easily available, easily consumable, low costing and environmental friendly. In present scenario, practicing traditional knowledge form an integral part of complementary or

alternative source of bioactive compounds. Developing natural product based pesticides can overcome the resistance developed against pesticides because of synergetic effects of the major, minor or even trace components in essential oils/extracts or formulations based on these. In present deliberation Phytochemical composition and biological potential of some herbaceous flora from Uttarakhand Himalaya like *Ajuga*, *Mentha*, *Plectranthus*, *Mosla*, *Ocimum*, *Skimmia* *Artemisia* etc with their biological potential studied will be presented.

After completion of this lecture memento a small token of love was presented to Prof. Om Prakash by Mr. Bipin Suyal.

Hi-Tea

There was a fifteen minutes break for tea and refreshment.

Short/Poster Presentation (Judges: Prof. C. S. Mathela and Prof. Om Prakash)

Students have presented their research work by 25 poster and 15 short presentations on first day. Poster presentations were evaluated by Prof. C. S. Mathela and short presentations were evaluated by Prof. Om Prakash. After completion of these presentations the report of day one was presented by Dr. Shailendra Kumar. The programme of day one was ended by vote of thanks given by Dr. Bharatji Upadhyay.

Day 2 (6 June 2022)

Technical Session-II (Chairperson *Prof. Madhulika Pathak*)

The second day of the conference was started with breakfast and tea. After breakfast all were gathered in the conference hall. The programme started with the welcome of delegates by Dr. Upasna Sharma. After this there was welcome and profile description of Dr. B. S. Kotliya by Mr. Bipin Suyal. Mr. Suyal have invited Dr. B. S. Kotliya to give his guest lecture.

Guest Lecture (Dr. B. S. Kotliya)

Dr. B. S. Kotliya have given his lecture on topic “Climate change in Indian Himalaya during last 5,000 years: Impact on civilization”. The main point of his talk were as follows-

For the last ca. 20,000 years, the extreme climate events are known from everywhere to occur at millennial (e.g., Last Glacial Maxima, Older Dryas, Younger Dryas,) and centennial (e.g., the 8.2 ka event, Medieval warming, 4.2 ka event, Little Ice age) by using the lakes. However, today’s demand in the climate science is to comprehend the multi-annual to decadal scale climatic changes (e.g., droughts, floods, and climatic extremes with duration of 1-5 years) in the past. Recently, this research has indeed taken a pace throughout the globe in general and Indian Himalaya in particular. The sole objective of such a high-resolution research has been to ascertain the cyclicity of extreme/abrupt events in the past and their possible recurrence in the future through climate modeling.

Of late, it is proved that the Holocene climatic changes in the Himalaya are inversely correlated with that of Peninsular India, mainly because of the two active sources of precipitation in the former compared to dominance of one monsoon in the latter. Within the Himalaya itself, there are two major precipitation regimes from western to northwestern Himalaya. Because of the contribution of both the Indian Summer Monsoon (ISM) and Indian Winter Monsoon (IWM), exceptional conclusions have been drawn by our group for the Upper Holocene of the Himalaya, e.g., a wetter/warmer Little Ice Age (LIA; 1,300-1,850 AD) with very high precipitation in the western Himalaya in contrast to otherwise in Peninsular India where ISM was declined during this time. It is established that conditions were warmer and drier during the preceding Medieval Climate Anomaly (MCA; 950-1,250 AD) and also in the post-LIA periods, as evidenced by high resolution speleothem research. During the LIA, a weaker ISM brought drought conditions to the core ISM area but

triggered more monsoon 'breaks' that brought higher precipitation to the Himalaya. This also makes us believe that the so-called global events are never synchronous and their initiation and termination must be different in the regimes of different precipitations.

Guest Lecture (Sandeep Pandey)

After this there was welcome and profile description of Dr. Sandeep Pandey by Dr. P.C. Bhatt. Dr. Bhatt have invited Dr. B. S. Kotliya to give his guest lecture. Dr. Pandey have given his lecture on topic "Plastic Waste: Its effect on the Himalayan Region, Problems and Fruitful Solutions". The main highlights of his lecture were as follows-

Today, the untouched feet of the Himalayas are continuously touched by the unwilling presence of plastic waste, which are continuously deteriorating the ecosystem of the Himalayan region. The situation has been reached to its drastic condition in recent years, which must be controlled in order to preserve the immense prestige of the Himalayas. On the one way, continuously increasing tourist activities enhancing the economical growth of the local community of the Himalayas, on the other hand, plastic waste littering caused by some of the tourist activities enhancing the plastic waste density around the Himalayan region. Hence an urgent solution is needed in order to save the ecology and economy the Himalayan region. Our group recently developed a very innovative process for the Upcycling of plastic waste and reported first time the mass scale production of the graphene nanosheets from plastic waste along with value added fuel. The technology thus developed has been commercialized and several applications of the graphene nanosheets from plastic waste have been identified such as solar cells, supercapacitors, water purification, polymer nanocomposites and in cementing applications. Not limited to plastic waste, we have also explored the Upcycling routes for the paper waste, tyre waste, cotton waste and agriculture waste. In this talk, we are targeting the problems

associated with the plastic waste and its impact on the climate change and its solution for the conservation of ecology, economy and energy.

Short Presentations (Judge: Prof. Madhulika Pathak)

Students have presented their research work 20 short presentations on second day. Short presentations were evaluated by Prof. Madhulika. After completion of these presentations the report of day one was presented by Dr. Upasna Sharma and Dr. Anjum Ali.

Valedictory Session

This Session was started by valedictory address by the Principal of our college Prof. A. K. Joshi. After the valedictory address the announcement of Young Scientist awards was done by Prof. C. S. Mathela.

- Young Scientist Award (for best short poster presentation): Dr. Rajesh Kumar
- Young Scientist Award (for best short poster presentation): Mr. Bhaskar Boura

The report of this successful programme and vote of thank was given by organizing secretary of the conference Dr. Darshan Singh. After this all gathered for lunch.

Recommendations:

- Government must motivate public awareness programmes (like seminars, conferences and other awareness programmes related to climate change) for sensitizing our society towards climate change.
- Rules/laws for pollution control should be strictly followed.
- Research related to the impact of climate change on chemical composition of bio resources must be motivated and should be treated as a pilot projects.

- The technology of upcycling is not being used by the government. This technology must be given a priority concern.
- There must be an effective policy for the conservation of wet land of the state.
- All the development programmes must be assessed by the expert committee for its impact on all the environmental issues.
- There is an immense need of the research projects for the proper scientific study of impacts of climate change and future perspectives.