

The Valley of the Divine Bhagirathi - a paradise amidst changing climatic variables

By - Dr Nishikant Gupta / Dr Krishnendu Mondal

“Utilize your senses...Mother Nature will not disappoint you”. An advice I hold dear to my heart till today. A simple stop over for a cup of tea near a river can reveal what hours of scanning a mountain cliff from a vantage point cannot. Staring down the deep valley provided that perfect sight – a family of Near Threatened Himalayan gorals (*Naemorhedus goral*) heading towards the majestically flowing Nayar River. It was a treat for the eyes. The Himalayan gorals, renowned for their acrobatic skills on steep, near vertical cliffs were strolling casually on a river bed...a rare sight indeed, and the perfect start to my journey.



A family of Himalayan gorals on the Nayar River bed

“We are in heaven’s abode”; proclaimed the driver of the vehicle. The very next moment I was jolted awake by the screeching of the brakes. Hurriedly trying to get hold of my scattered senses, I looked at him ready to give him a piece of my mind; now staring and grinning at me. I looked straight at him, and then followed his waving fingers pointing beyond the wind-screen of the vehicle. The scene in the horizon was one which would put a satisfying smile on the most experienced Himalayan researchers...and I was just an amateur! The snow-clad mountains glittered in the horizon, as if mysteriously signaling to the moving clouds. The tall trees with long side branches, their dry leaves demarcating the road’s edges, the eroded side hills staring bare at you...they all welcomed you with open arms. If there was ever a paradise, this was it, and I was right in the middle of it.

I slowly got down from the vehicle, keeping an eye on the moving clouds. It was a glimpse waiting to be cherished, before the playful clouds took control of it all. “The clouds are heading our way, Sir”, announced the driver. “We must get going”, he continued. Reluctance got the better of my decisions and I decided to stay on for those extra few minutes. “We will be fine”, I said like a know-it-all.

This is where one goes wrong in the Indian Himalaya...just when you think you know what you are doing; nature plays its mischievous tricks and gets the better of you.



The Indian Himalayan landscape

We were soon engulfed by a thick fog. The next three-quarters of an hour consisted of driving in a near-zero visibility condition...windows open...the driver and I avoiding the 100 feet drop below. An experienced researcher and a good friend had once advised me, “You do not dance around with nature...and definitely not while working in the Himalaya”!



Dense fog engulfing the road ahead

My visits to the Indian Himalaya always intensify my fascination and respect for this region and its people. One is always mesmerised by a horde of extraordinary and charismatic wonders, be it the sheer beauty of its deep valleys, its majestic rivers, or the tranquillity one experiences while watching the evening *Aarti* on the banks of the Alaknanda and Bhagirathi Rivers in Deoprayag.

The Indian Himalaya is truly a paradise of sorts, both geographically and in terms of its wildlife. This region is home to the snow leopard (*Panthera uncia*), the highest predator and one of the most threatened animals in the world; the Himalayan musk deer (*Moschus leucogaster*), one of most solitary, elusive and threatened animal; the western tragopan (*Tragopan melanocephalus*), the rarest of all living pheasants with very restricted home range; the Himalayan monal (*Lophophorus impejanus*), the most beautiful bird in the Indian Himalaya; and the golden mahseer (*Tor putitora*), an endangered fish species which attracts recreational anglers from world over in its pursuit.

The Bhagirathi River is nestled in the north-western portion of the

Indian Himalayan state of Uttarakhand, originates from Gomukh (3, 900 m asl) in the Gangotri glaciers and is one of the holy shrines of the Hindus. Many devotees visit the region annually to seek blessings. The river travels for a distance of 217 km with an elevation ranging from 480 to 3,200m, forming a catchment area of just over 8,846 km².



The Indian Himalayan river

The Bhagirathi River meets the Alaknanda River at Deoprayag, a holy city for Hindus. The Bhagirathi River basin is rich in floral and faunal diversity. The basin serves as a migratory route for the endangered golden mahseer and the snow trout (*Schizothorax richardsonii*) fish species. The birds found here include numerous species from Schedule – I of the Indian Wildlife (Protection) Act, 1972. Inclusion of a species within this Schedule provides absolute legislative protection and highest penalties are levied on offenders. These species are the Indian white-backed vulture (*Gyps bengalensis*), Egyptian vulture (*Neophron percnopterus*), Cinereous vulture (*Aegypius monachus*), cheer pheasant (*Catreus wallichii*), western tragopan and the Himalayan monal. The mammalian species found here include the Schedule – I species such as the Himalayan brown bear (*Ursus arctos isabellinus*), Asiatic black bear (*Ursus thibetanus*), snow leopard, common leopard (*Panthera pardus fusca*), Himalayan musk deer, Himalayan tahr (*Hemitragus jemlahicus*), blue sheep and serow (*Capricornis thar*). The floral diversity includes that of the Indian maple (*Acer caesium*), Ativisa (*Aconitum hetrophyl- lum*), *Allium stacheyi*, *Arnebia benthami*, *Caragana sukiensis*, *Datisca cannabina*, *Epipogium aphyllum*, *Lilium poly- phyllum*, *Nardostachys jatamansi* and *Picrorhiza kurroa* (Source: Rajvanshi et al. 2012).

Nonetheless, the region is at the receiving end of multiple stressors we humans throw at it. Numerous scientists over the last few years have discussed these threats in great detail, (e.g. rapid increasing population, unplanned urbanization, numerous hydropower projects, direct and indirect sources of pollution, and land use change near critical habitats of threatened species). However, a potential threat which is fast approaching and which has ruffled sufficient feathers of policy makers, is the changing and unpredictable climatic variables. Although debatable, there is ample literature stating that India's greenhouse gas emission continues to increase despite the best conservation practices and efforts. Further, scientists have predicted a temperature rise anything between 3 to 5 °C by the year 2100. This is alarming as such a fluctuation can give rise to devastating floods supported by rapid glacial melt in the Indian Himalaya. There is also a long term possibility of decrease in water flow to the perennial rivers originating here, and which are the lifelines of millions of people not just in the region, but also in downstream reaches.

“We know so much, see so much, yet do so little, why?” asked my 16-year old cousin last summer while flicking through my field photos showing anthropogenic impacts on Himalayan rivers. “We are doing so in bits and pieces, and will continue to do so”, was my quiet reply. But a thought bounced around my head all night long, “I hope we do...and not just in bits and pieces”.

It was not until eight months later when I was given the golden opportunity by the Wildlife Institute of India (WII), Dehradun to work on one of their flagship projects, the National Mission for Sustaining the Himalayan Ecosystem, or NMSHE as we so proudly call it. The Prime Minister’s Mission on Climate Change has launched this project, and it is being implemented by the Department of Science & Technology (DST).

The project “Assessment and monitoring of climate change effects on wildlife species and ecosystems for developing adaptation and mitigation strategies in the Indian Himalayan Region” aims to understand the complex processes affecting the Himalayan ecosystem and evolve suitable management and policy measures for sustaining and safeguarding it. The main goal of the project is to develop strategies to mitigate climate change effects on wild animal and plant species and ecosystem in the Indian Himalayan Region (IHR). The broad objectives of this project are: (a) identify the drivers of landscape change (climatic and anthropogenic) in the IHR and their effects on the ecological and social systems; (b) conduct focussed research on wildlife aspects (terrestrial and aquatic fauna, micro flora and their habitats) and human dimensions in IHR for framing evidence-based policy measures; (c) develop monitoring and Decision Support Systems (DSS) for indicator species in the IHR; (d) undertake climate change scenario analyses and visualization for predicting potential effects on fauna and ecosystems as a strategy to communicate with stakeholders and to influence policy and decision making; (e) develop spatial and inter-operable database to facilitate and policy decision making; and (f) build capacities within WII and of other stakeholders for sensitization and development of action plans for climate change impact mitigation and to enhance capabilities for negotiations at the national and international forums.

A cohesive team of highly experienced and expert faculty members, participating organizations (State Forest/Wildlife Departments of J&K, HP, UK, Sikkim and Arunachal Pradesh; State Biodiversity Boards of Himalayan States; GB Pant Institute for Himalayan Environment & Development, Almora; Indian Institute of Tropical Meteorology, Pune; National Botanical Research Institute, Lucknow; Birbal Sahni Institute for Paleobotany, Lucknow; Doon University, Dehradun; Uttarakhand State Forest Department; Uttarakhand State Biodiversity Board; and University of British Columbia, Canada), project scientists, project associates, project fellows and project assistants are working tremendously hard to make this project a success story.

The programme has identified four major themes, *viz.*, terrestrial ecology, aquatic ecology, spatial ecology and human ecology. The research team includes 3 Project Scientists (spatial ecology, climate change and aquatic ecology), 4 Project Associates (Fauna, Flora, Spatial ecology and Human ecology), 8 Project Fellows and 8 Project Assistants. Some of the aspects of the project which are extremely vital for the region, and ones which are close to my heart are detecting and decoupling natural and anthropogenic induced signals of global environmental changes in the Indian Himalaya; and generating a strong data base through monitoring and analysis, to eventually create a knowledge base for policy interventions.

It has to be highlighted that various government and non-government organizations have already been fighting a challenging battle on a daily basis to protect the Indian Himalayan region. The never-give-up attitude of some of these organizations is indeed credible. The NMSHE project is going to substantially add to their efforts and will strive to achieve a protected and conserved Indian Himalayan region for generations to come.

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