

Eastern Himalayas

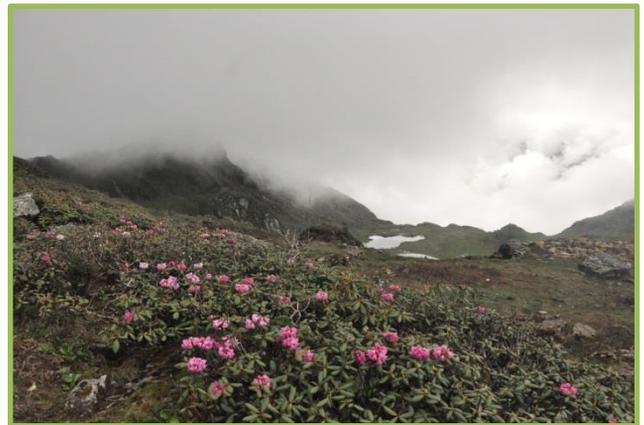
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Flowering, pollinators and climate change

In montane habitats, pollinators are known to track the flowering phenology of plants in sequential fashion from lower to higher elevations. Changes in phenology in any one of the habitats along the elevational range can therefore disrupt the equilibrium of the system. In the Sikkim Himalaya, which is a part of the Eastern Himalaya ‘biodiversity hotspot’, Rhododendrons play a significant role as keystone species in these ecosystems.

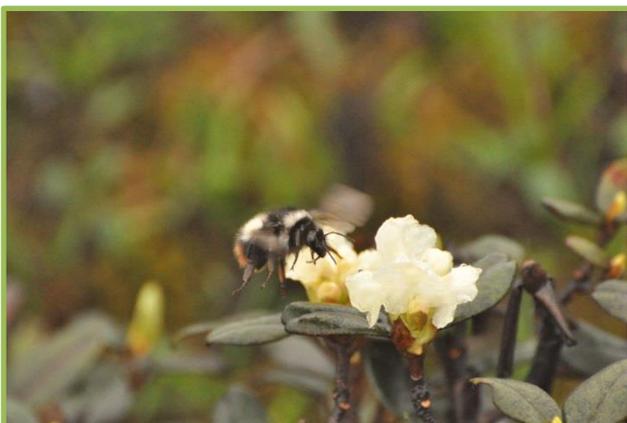
The timing of flowering can have a strong influence on the reproductive success of plants. Flowering phenology is therefore considered an important plant trait that determines the ecology and evolution of species and contributes to their persistence. Flowering patterns are influenced by seasonal variations in abiotic factors and biotic interactions with pollinators. Therefore studying the relationship between flowering patterns and the spatial and temporal variability in abiotic and biotic factors can provide valuable insights into the selective forces that affect flowering phenology.



Rhododendron flowering at high altitudes.

My study site is the Kyongnosla Alpine Sanctuary in East Sikkim. It is spread over 31 km² and covers an elevation range from 3200 to 4200m, with mixed stands of conifers and Rhododendron trees and shrubs in the subalpine zone and dwarf tussocks of Rhododendron in the alpine zone. In the subalpine areas, Rhododendron begin to flower in May and end by early June. Birds like warblers, sunbirds and thrushes serve as active pollinators here. In the alpine zone, flowering begins in early June and ends by the last week of July. Here, insects such as bumblebees, flies and moths are major pollinators.

Over the last few months, I have been monitoring the flowering phenology of eight Rhododendron species, measuring climatic variables, pollinator visitation and carrying out breeding experiments and nectar and floral trait measurements across this elevation range. The broad goal of my study is to evaluate the role of abiotic factors, biotic interactions and phylogeny in determining flowering phenological patterns, and to build a future scenario of the potential effect of climate change on these species and interactions.



A bumblebee visits Rhododendron flowers in the alpine zone.

- Shweta Basnett, PhD Scholar
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Homestay tourism in Rampuria



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Recent years have witnessed a steady increase in village home stay tourism in the region, and residents of Rampuria Forest village in Senchel Wildlife Sanctuary are keen to build on this opportunity to start a sustainable tourism enterprise that is community based and conservation oriented.

The Rampuria Village Home Stay Tourism Committee together with ATREE, after several consultative meetings with the community, has developed a Village Home Stay Tourism Management Plan that includes guidelines for institutional and environmental management and marketing along with periodic monitoring and evaluation based on widely accepted principles of low impact, sustainable, equitable and community managed tourism.

Residents of the village have been hosting guests in their homes since a few years. However, this has largely been unregulated and has not contributed significantly to the community as a whole. While the community is aware of the income and employment generating potential of such an enterprise, they are also aware of the negative environmental and socio-cultural impacts of unregulated and uncontrolled tourism. The Plan seeks to identify and develop strategies for mitigating such undesired outcomes.

The Plan was shared with representatives of the Forest Department, Tour and Travel Operators, Gorkha Territorial Administration (GTA), Eco-Development Committees from other Forest Villages and residents of Rampuria at an all- stakeholders meeting on 16 June 2013

Issues like control by single tour operator, safety and security of visitors, new marketing strategies and waste management were the other issues that came up for discussion.

While there are risks and opportunities, the Rampuria Tourism Committee will need to tread carefully, keeping in mind the feedback and suggestions offered by the stakeholders towards its goal of establishing a 'small but sustainable' community enterprise.

- Michelle Gurung
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Heron guardians in Manas



Bijoy Choudhury, a "heron guardian", speaks at a meeting to discuss the way forward.

Six "heron guardians" have been selected to mobilize communities and raise awareness as a part of an initiative to conserve the critically endangered white-bellied heron *Ardea insignis* in key sites of the Manas Tiger Reserve in Assam. This species-focused intervention, supported by IUCN-SOS, builds on the larger biodiversity conservation project that ATREE has been undertaking in Manas National Park. The heron guardians will also be responsible for implementing a community-based monitoring programme to record sightings, and to identify foraging, nesting and roosting sites, so that these areas may be prioritized for local conservation planning and action.

- Arunava Gupta
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Ecosystem services and adaptive management - a conceptual framework

As a follow-up to the stakeholder consultation workshops held in Sikkim and Darjeeling for the Tata Social Welfare Trust (TSWT) supported project, 'Integrated approaches to adaptive resilience based management of forests for supporting agro-systems in the Sikkim-Darjeeling Himalayas' extensive preliminary field surveys were conducted in all the potential study sites. A conceptual framework for assessing the status, drivers of change and their indicators and trends of priority ecosystem services has also been designed. This was adapted from the TEEB (The Economics of Ecosystems and Biodiversity) and the MEA (Millennium Ecosystem Assessment, 2005) framework.

The conceptual framework was devised to reflect various forest governance regimes, for example forest department managed forests, traditionally managed forests and privately managed forests and the level of community access of ecosystem services within these governance regimes. This was further combined with drivers of change, for instance ecosystem services and the relationship between the governance regime and stakeholders based on their ethnicity and the influence of markets.

Future activities will include a participatory mapping of resource rich and resource poor areas in all study sites based on community valuation of ecosystem services. Standard ecological methods will be employed to study species diversity, impact of NTFP extraction on regeneration, population structure and species composition for vegetation. For fauna (birds, butterflies and wildlife) a rapid assessment indicating biodiversity richness across the gradient will be conducted.

Lastly, an attempt is being made to understand ecosystem disservices and its impacts using a participatory approach. This component will assess the community's tolerance towards various wildlife responsible for crop and livestock depredation. It will then be combined with social and archival data to develop a community-based monitoring protocol for the study sites.

- Annesha Chowdhury
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Water quality of springs in Sikkim

While water scarcity is a dominant theme in the common narrative surrounding issues of groundwater in the Sikkim Himalayas, water quality, especially in its relation to groundwater transport, has been little studied or documented. ATREE has initiated a study to document and map several springs which exhibit characteristics of vulnerability to contamination.

Study areas are to be determined this monsoon season, and community health and spring water quality and discharge data will be collected for the remainder of 2013. Part of the study will involve monitoring springs serving communities that have experienced expansive and continuous adverse health related to the occurrences of waterborne diseases. It will be carried out in collaboration with various departments of the Government of Sikkim and civil society group.

- Samantha Ryder
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Yak grazing pastures at Chopta valley, Lachen, North Sikkim.

Workshops organized/ attended

ATREE organized a meeting of civil society representatives from the Darjeeling Hills to discuss issues related to participation, chapter formation and papers to be presented at the Indian Mountain Initiative (IMI) – Sustainable Mountain Development Summit III, to be held in Kohima 25-27 Sept 2013.

Samantha Ryder. ACWADAM Training in Hydrogeology to Enhance Civil Society Capabilities in Watershed and Groundwater Management. 17 June - 2 July 2013. Pune, Maharashtra.

Papers

Mohrmen, H.H. and Goswami, R. 2013. Gibbons as anti-mining conservation mascots, in *The Shillong Times*, April 1, 2013.

Goswami, R. 2013. "Hills of despair and hope." Review of *Unruly hills - nature and nation in India's Northeast* by Bengt G Karlsson. *Down To Earth*, Apr 30, 2013.

Other

Dr. Sarala Khaling has been appointed to the Core Group of the IUCN Commission on Ecosystem Management (CEM) for South Asia. CEM is one of IUCN's six scientific Commissions and is a global network of volunteer experts working on ecosystem management related issues.

Samuel Thomas has been elected Secretary of the Darjeeling NGO Network (Darjeeling Association of Social Organisations) for a two year period. The Network is a coalition of 14 NGOs working on various social and environmental issues in the Darjeeling Hills.

Interns

Alexa R. Wilson has joined the Eastern Himalayas Programme as an intern. She is a PhD scholar studying Environmental Biology at the University of Massachusetts, Boston and is being supported through the Indo-US Science and Technology Forum - Research Internship in Science and Engineering (RISE) programme. She is working on a project monitoring forest biodiversity in fuelwood extraction sites in the Darjeeling hills.

Samantha Ryder has joined ATREE as an intern on the DBT project in research related to water resources in Sikkim. She received her Bachelor's degree from University of Washington, Seattle in Geography and Geographic Information Systems (GIS). She has three years of work experience in GIS, water utilities, and environmental health through internships with the City of Seattle, Environmental Protection Agency (EPA), Seattle, and with organizations in Guatemala.

Grants received

Donor: National Geographic Society

Project Title: Gibbons under fire: Engaging Indigenous Communities and Agencies to Conserve Hoolock Gibbons in the Threatened Community Forests of Meghalaya, India

Period: July 2013 to Dec 2014

Amount: \$20,000

Principal Investigator: Rajkamal Goswami

Donor: Fondation Ensemble

Project Title: Monitoring the population, habitats and ecological requirements of the Critically Endangered White-bellied Heron, *Ardea insignis* in key sites of Manas Tiger Reserve in Assam, India

Period: July 2013 to February 2014

Amount: €10,000

Principal Investigator: Sarala Khaling

ATREE's mission is to promote socially just environmental conservation and sustainable development by generating rigorous interdisciplinary knowledge that engages actively with academia, policy makers, practitioners, activists, students and wider public audiences. ATREE's Northeast/Eastern Himalayas Programme has a direct presence in the Darjeeling and Sikkim Himalayas and Assam, and works with a range of local partners in the other states of north east India.

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