

National Mission on Himalayan Studies (NMHS)

HIMALAYAN RESEARCH FELLOWSHIP

(FORMAT FOR THE HALF YEARLY PROGRESS REPORT)

[Reporting Period: from January 2018 to June 2018]

Name of the Institution/ University:	Ashoka Trust for Research in Ecology and the Environment (ATREE)
No. of Himalayan JRF/SRFs/RA:	3
No. of Himalayan SPFs:	7

Himalayan Research/Associate

H-RAs Profile Description:

S. No.	Name of RA	Date of Joining	Name of the PI	Qualification
1.	Aniruddha Marathe	01/04/2016	Dr. Priyadarsanan Dharmarajan, Senior Fellow	Ph.D.
2.	Vidyadhar Atkore	01/04/2016	Dr. Jagdish Krishnaswamy, Senior Fellow	Ph.D.
3.	Rinan Shah	01/04/2016	Dr. Shrinivas Badiger, Fellow	Masters in Climate change and Sustainability studies

Progress Report: To be filled for each RA/SRF in separate row.

RA No.	Research Objectives	Achievements	Addressed Deliverables	Location of Field Site with Details, if any
1.	<ul style="list-style-type: none">Understanding drivers of species compositional change in light of morphometric traits	<ul style="list-style-type: none">Assembled data on morphometric traits and functional group compositionAnalysis suggests taxonomic diversity is driven by turnover while functional diversity through	Results on morphometric and functional diversity presented in annual report in June, 2018 did not have data from low elevation sites. These data are being assembled at present. Comparison between taxonomic and functional diversities for the entire elevational extent will be available soon.	Eaglenest Wild life Sanctuary, Arunachal Pradesh.

		nested ness.		
2	<ul style="list-style-type: none"> Quantify the relationship between biophysical factors on fish community structure (richness and relative abundance). Evaluate the impact of altered flow regime below the dams on the certain life-history and reproductive guilds of fishes. Study the impact of on dams genetic diversity of key native fish species. Examine the species recovery downstream of a dam 	<ul style="list-style-type: none"> Conducted fieldwork for two seasons (winter and summer 2018) Quantified the relationship between species richness/abundance and stream characteristics (channel morphology, water temperature, and dissolved oxygen). Reviewed literature on fish guilds and important life-history traits. Unable to carry out lab work and study genetic diversity of few native fish species. We have also ran out of contingency money to carry out this work Literature review completed. 	<ul style="list-style-type: none"> Presented and subsequently submitted paper titled "Community structure of native fishes of Ranganadi sub-basin, Arunachal Pradesh" at a conference to NMHS first consortium held at Dehradun in May 2018. Identified and catalogued more than 30 fish species from the study area. Compiled fish guilds in six fish guild categories including important life-history traits and other traits. We have preserved fish samples for selected indicator species (<i>Schizothorax</i>, <i>Garra</i> etc) at ATREE's Conservation and Genetic lab for future studies. Exploratory data analysis on field data dataset is ongoing. 	<p>Please find attachment 1 as a conference paper</p> <p>Please find attachment Appendix - 1</p>
3.	<ul style="list-style-type: none"> To understand the causes and effects of the domestic water scarcity in the eastern Himalayan towns The causes entail the biophysical and human-induced changes in and around the water sources as well as the 	<ul style="list-style-type: none"> Final phase of fieldwork has begun A paper for a special issue of the journal Water Policy is accepted for publication Second visit of supervisor to the field site in April-May 2018. Research proposal and design was accepted for carrying out the field studies 	<ul style="list-style-type: none"> A paper is under publication with Water Policy Interviews with key informants, transect walks with mapping of springs and public utilities, exploratory survey of water usage has been done A review of literature is in place. 6 months into PhD programme 	<p>The primary study site is the Darjeeling Municipal Town in West Bengal. The water sources for the town are the Municipal supply (private household connection and public standpipes), springs and private water supply (tankers or households selling/sharing their excess water). The municipal as well as the private water suppliers are also dependent on the springs which might be</p>

	<p>region to which the water is supplied and the extent of water utilization.</p> <ul style="list-style-type: none"> • The effects will be assessed in terms of the availability and accessibility of water and the definition of well-being and sufficiency for the communities. • The political and economic drivers for the manifestation of scarcity will be investigated. 	<ul style="list-style-type: none"> • Registered for PhD in February 2018 • Will be attending “Managing and Governing Resource in the ‘Anthropocene’: Political Ecological Explorations from South Asia at IIT Kharagpur, Nov-Dec 2018 • Attended “International Training and Tools and Approaches for Citywide Water and Sanitation Management” at CSE, New Delhi, it was fully-funded, Aug 2018 • Presented a photo story of my fieldwork at ATREE, Aug 2018 • 		<p>as close to the town or as far as 10-15 kilometres. The frequency of supply is very low – once a week during the lean months and twice to thrice a week during the monsoon months. The town has 32 wards which are spread across an area of 10.57 sq. km. The Municipal supply acquires its supply from the reservoirs in the Senchal Wildlife Sanctuary.</p> <p><u>Gangtok, Sikkim</u> is the capital city of Sikkim and is a glacier dependent one for its water source. The development trajectory as well as the political history is very different from that of Darjeeling. These are some of the factors that would be used to carry out a comparison.</p>
--	--	--	--	---

Note: Data, table and figures may be attached as separate source file (.docx, .xls, .jpg, .jpeg, .png, .shp, etc.).

Himalayan Junior Research/Project Fellows

H-JRFs Profile Description:

S. No.	Name of JRF	Date of Joining	Name of the PI	Qualification
1.	Barkha Subba	01/04/2016	Dr. Ravikanth G.	Masters in Biology
2	Annesha Chowdhury	01/04/2016	Dr. Soubadra Devy	Masters in Zoology
3.	Shweta Basnett	01/04/2016	Dr. Soubadra Devy	Masters in Biotechnology
4.	Manish Kumar	01/04/2016	Dr. Jagdish Krishnaswamy	Masters in Ecology & Environmental Science
5.	Urbashi Pradhan	01/04/2016	Dr. Soubadra Devy	Masters in Zoology
6.	Yangchenla Bhutia	01/04/2016	Dr. Ravikanth G.	Masters in Forestry
7.	Anirban Datta Roy	01/04/2016	Dr. Nitin Rai	Masters in Wildlife Sciences

Progress Report: To be filled for each SPF in separate row.

JRF No.	Research Objectives	Achievements	Addressed Deliverable	Location of Demonstration/ Study Site with Details
1.	<ul style="list-style-type: none"> To examine the influence of habitat variables on the stream frogs of Sikkim To investigate the influence of spatial position and environmental variables on composition of frog assemblages 	<ul style="list-style-type: none"> Out of the 54 selected sampling sites, sampling and data collection from 35 sites are completed Preliminary data analysis with the collected data has been done and the results has been submitted in a manuscript form to NMHS 	<p>The results of the present study could be used to assess the adequacy of the current system of protected areas for stream breeding frogs in Sikkim, and to identify certain classes of habitat that may be at risk from urban development and hydel power projects. If characteristics of the riparian vegetation, climate and water quality prove to be important correlates of the composition of amphibian assemblages in general, conservation of all combinations of these variables would be a simple way of ensuring suitable habitat for most amphibians in a region.</p>	<p>PDF document with study site detail attached.</p>
2.	<ul style="list-style-type: none"> Number of LTEM sites established/investigated/robust data-sets generated. Extent of scientific evidences generated across key sectors. 	<ul style="list-style-type: none"> Completed data collection Completed collection of GPS points across relevant landscape areas for future LTEM sites Conducted awareness and training workshops for relevant local institutions in Darjeeling Engaged with Darjeeling Forest Department 	<ul style="list-style-type: none"> Identification of sites for long-term environmental monitoring. Relevant institutions identified and engaged. Mainstreaming of long-term monitoring and building scientific evidence base across key sectors achieved. 	
3.	<p>We estimated</p> <ul style="list-style-type: none"> The areas of climatically suitable conditions in the present scenario and The role of global climate 	<ul style="list-style-type: none"> Jackknife tests illustrate that among the topographic 	<ul style="list-style-type: none"> Mapping the present distribution of two high altitude Rhododendron species –<i>R. setosum</i> and <i>R. lepidotum</i> 	<p>This study was carried out within the distribution range of <i>R. lepidotum</i> and <i>R. setosum</i> which covered</p>

	<p>change in determining the distribution of <i>R.lepidotum</i> and <i>R.setosum</i> in Himalayas and adjacent areas by projecting it to two scenario for the year 2050s.</p>	<p>variable altitude has a major contribution to the models of both the species (Figure 1 and 2)</p> <ul style="list-style-type: none"> • The habitat suitability is highest between elevation gradient of 2200m to 4200m for <i>R.lepidotum</i>, and we noticed a sharp increase in its habitat suitability up to almost 6600m for <i>R.setoum</i> • Under current climatic conditions, the model predicted a total suitable area of 901176 km² for wide ranging <i>R.lepidotum</i>, and we observed a decrease in its overall suitability area in both the future scenarios. Whereas in case of narrow ranging <i>R.setosum</i> the present scenario model predicted a total area of 687338 km² for <i>R.setosum</i> and we observed an increase in 	<ul style="list-style-type: none"> • Mapping the future distribution of two species by projecting it to two scenario for the year 2050s. 	<p>the Himalayan belt. <i>R.lepidotum</i> is widely distributed ranging from 72.0012°E to 103.8015°E and 25.4962°N to 34.8700°N whereas <i>R.setosum</i> is narrowly distributed and ranges from 83.9380°E to 91.9030°E and 27.3870°N to 28.3002°N. <i>R.lepidotum</i> covers an elevation gradient of 3000 to 4000m and <i>R.setosum</i> from 3500 to 4800m. These species occur as short height shrub of about 1 to 2 feet height and are highly aromatic. We compiled occurrence data from field sampling and secondary sources which includes the Global Biodiversity Information Facility. We recorded 28 presence data for <i>R.setosum</i> and 80 for <i>R.lepidotum</i>. We filtered out the initial set of occurrence points after checking for spatial autocorrelation using package spThin in R (Aiello-Lammens, 2014). Environmental layers were downloaded from global climate data (http://www.worldclim.org) which consisted of 19 bioclim variables and altitude. We used Maximum Entropy (MaxEnt) approach estimate to develop the ecological niche models. The maximum entropy (MaxEnt) approach estimates a species environmental niche by finding a probability distribution of a species occurrence that is based on a distribution of maximum entropy (Philips et al., 2006). Jackknife test was performed to evaluate the variable importance and model performances were assessed using AUC</p>
--	---	---	---	--

		the overall suitability area in both the future scenarios for the year 2050. (Figure 3)		
4.	<ul style="list-style-type: none"> Assess spatial and temporal variability in precipitation patterns across Sikkim Himalayas Predict hydrological responses of springs and streams in the context of climate variability and climate change in the Sikkim Himalayas 	<ul style="list-style-type: none"> Maintaining five long-term monitoring sites for springs and streams. Each site has one automatic discharge measuring station, automatic raingauges and soil moisture sensors. Automatic weather stations maintained at 3 sites. 	<ul style="list-style-type: none"> Five long-term monitoring sites are being continuously maintained across Sikkim for hydrological and rainfall parameters Data cleaning, processing and management tools and protocols have been developed and being carried over for the same. Secondary rainfall data from Indian Meteorological Department was used to analyse spatio-temporal patterns in rainfall across Sikkim Himalaya and a manuscript detailing the same have been submitted to NMHS-HRC. Further analysis has been focusing on adding more data from satellite-based gridded rainfall products like TRMM and GPM; and ground rainfall sources to validate the findings at much finer scales. 	<p>Details of sites are:</p> <ul style="list-style-type: none"> Kyongnosla alpine sanctuary, East Sikkim Fambongloh wildlife sanctuary, East Sikkim Kanchendzonga National Park, West Sikkim Mukter Dhara, Kamrang, South Sikkim Gaddi khola, Gaddi, South Sikkim
5.	<ul style="list-style-type: none"> to estimate major pollinator and disperser food plant in fragmented forest to understand the perception of people on the biodiversity, pollination/dispersal service and their willingness to conserve those forest patches. 	<ul style="list-style-type: none"> Important insect pollinators in the Sikkim landscape were investigated and documented. This includes rare pollinators such as Rock bees Conducted interviews and Pollinator presence was investigated through detailed 	<ul style="list-style-type: none"> Bee keepers and other villagers were interviewed to gain insights into their attitudes towards biodiversity, pollination service and their willingness to conserve neighbouring forest patches. Important pollinator food plants in the fragmented forest patches were also ascertained through interviews. 	<p>Documentation of pollinators in West Sikkim:</p> <p>Social surveys and field surveys were both used to determine the current status of insect pollinators. Through social survey, interviews of farmers helped us to understand the status of insect pollinators in the landscape which was followed by field survey and collection of insect samples visiting agricultural crops. The insect samples were collected in 70% ethanol for preservation and are presently under study for</p>

		<p>discussions with bee keepers in West district of Sikkim.</p> <ul style="list-style-type: none"> In the field, we conducted surveys to collect pollinator samples in the west district of Sikkim 		taxonomic identification.
6.	<ul style="list-style-type: none"> Test acorn viability for three different genera of Fagaceae. viz. <i>Castanopsis</i>, <i>Lithocarpus</i> and <i>Quercus</i> 	<ul style="list-style-type: none"> Acorn viability varied between species from different genera. Viability differed within and among the different genera. 	<ul style="list-style-type: none"> Oaks and its related species had different seed viability. However, within different genera, the genus <i>Castanopsis</i> species showed the highest seed viability, however the genus <i>Lithocarpus</i> reported the lowest 	<ul style="list-style-type: none"> Barsey Rhododendron Sanctuary FambongLho Wildlife Sanctuary Kachenzonga National park and Maenam Willife Sanctuary and
7.	<ul style="list-style-type: none"> What are the primary income generating eco-tourism related activities that can be implemented in these areas? Who are the primary stakeholders responsible for the implementation of such activities and what factors determine their support for the same? How do alternate livelihood options influence people's well-being in selected study sites? 	<ul style="list-style-type: none"> Continued interviews and consultations with key stakeholders in identified study village of Upper Siang district in Arunachal Pradesh to ascertain their attitudes towards alternate livelihoods in general and ecotourism in particular Discussions on the pros and cons of alternative livelihood options based on local skills and opportunities Information 	<ul style="list-style-type: none"> Literature review of ecotourism initiatives in India and lessons from them that could be applied in the study site Interviews and discussions with stakeholders in Arunachal Pradesh Documentation of alternative livelihood options (Nature based and others) An evaluation of the alternate livelihood options and the pros and cons associated with them 	

		collected from ecotourism sites in Sikkim and West Bengal was further developed through consultations and follow up interviews to understand their strategies.		
--	--	--	--	--

Note: Data, table and figures may be attached as separate source file(.docx, .xls, jpg, .jpeg, .png, .shp, etc.).

(Signature of Registrar/ Head of Department)

Report (hard copy) should be submitted to:

The Nodal Officer, NMHS-PMU
G.B. Pant National Institute of Himalayan Environment and Sustainable Development (GBPNIHESD)
Kosi-Katarmal 263 643, Almora, Uttarakhand

Report (soft copy) should be submitted to:

E-mail: nmhspmu2016@gmail.com