ITS/3121/2017-18

SCIENCE & ENGINEERING RESEARCH BOARD (SERB)

(A statutory body of the Department of Science & Technology, Government of India)

5 & 5A,Lower Ground Floor,,
Vasant Square Mall, Sector B, Pocket 5
Vasant Kunj, New Delhi
Delhi - 110070

Dated : 16.05.18

ORDER

Subject: Reimbursement of travel grant to **"Dr. Nisha Singh, Assistant Professor, Department of Biochemistry, School of Life Sciences, Hemvati Nandan Bahuguna Garhwal University, Srinagar Garhwal - 246174 (Uttarakhand)"** for attending **"Workshop "Host-Directed Therapeutic Strategies For Infectious Disease""** held during **18-09-2017 to 21-09-2017 in Cape Town, South Africa**.

Sanction of the **Science & Engineering Research Board** (SERB) is here by accorded to the payment of a sum of **Rs. 74065/- (Rs. Seventy four thousand sixty five Only)** for meeting the expenses incurred towards travel expenditure & visa fees for participating in the above International event.

2. Sanction of the grant is subject to the condition as detailed in Terms & Conditions available at website **(www.serb.gov.in and http://its.serb.gov.in).**

3. The expenditure involved is debitable to **"Fund for Science & Engineering Research (FSER) "**

4. **This grant is being reimbursed** under the **ITS scheme**

5. The Sanction has been issued with the approval of the competent authority under delegated powers and vide Diary No. **SERB/F/172/2018-19 dated 07-05-2018**

6. The amount of **Rs. 74065/- (Rs. Seventy four thousand sixty five Only)** will be drawn by the Finance & Budget Officer of the SERB and will be disbursed to **Finance Officer, Hemvati Nandan Bahuguna Garhwal University, Srinagar Garhwal, Pauri District, Srinagar Garhwal - 246174** by means of RTGS/NEFT transaction as per their Bank details given below:

Account Name	**Finance Officer**
Bank Name & Branch	**Union Bank of India, Srinagar Garhwal**
Account No.	**526002010001211**
IFSC/RTGS Code	**UBIN0552607**
Applicant's E-Mail	**nishasingh0711@gmail.com**
A/c Holder's E Mail	**fo@hnbgu.ac.in**

Cont... 2/-

7. It is certified that original boarding passes have been received along with travel expenditure & visa fees documents and retained in the Board.

8. In the eventuality of any excess payment arising on account of typographical errors, etc., the excess amount should be refunded immediately to the Science and Engineering Research Board (SERB) by way of an a/c payee cheque in favour of the "Fund for Science & Engineering Research ". Non-compliance would lead to the SERB initiating recovery procedures which would also attract applicable penal interest which would be decided by the SERB.

9. In case of any discrepancy you may contact **ITS Section** at **ms.its@serb.gov.in**

(Dr. T. Thangaradjou)
Scientist-E

To,

Finance & Budget Officer
SERB, New Delhi

Copy forwarded for information and necessary action to: -

1.	The Principal Director of Audit, A.G.C.R.Building, IIIrd Floor I.P. Estate, Delhi-110002
2.	Sanction Folder, SERB, New Delhi.
3.	File Copy
4.	Dr. Nisha Singh Assistant Professor Department of Biochemistry, School of Life Sciences Hemvati Nandan Bahuguna Garhwal University Srinagar Garhwal, Uttarakhand - 246174 **Email:nishasingh0711@gmail.com**
5.	The Finance Officer Hemvati Nandan Bahuguna Garhwal University Srinagar Garhwal, Uttarakhand - 246174 **Email:fo@hnbgu.ac.in**

(Dr. T. Thangaradjou)
Scientist-E

This is to certify that

Nisha Singh

has successfully fulfilled participation in the workshop

"Host-directed therapeutic strategies for infectious diseases"

18-21 September 2017

Cape Town, South Africa

ASIA-PACIFIC NETWORK FOR GLOBAL CHANGE RESEARCH

FINAL REPORT

Development of adaptation communication framework mainstreaming indigenous and local knowledge for Hindu-Kush Himalayan region

CBA2020-02MY-Mizuno

2023

Project Reference Number:CBA2020-02MY-Mizuno

Project Duration:2 years (August 2021- August 2023)

Funding Awarded:10000 $ + 4000 $=14000$

Grant DOI:

Date of Publication:

Project Leader and Contact Details:

Collaborators and Contact Details:

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Recommended Citation:

1. Summary

Mountains encompass around 24% of the earth's area and directly sustain 12% of the world's population. Among the world's mountain's, Himalaya is the largest, highest and most populated mountain systems in Asia. Being the provider of ecological security, they are among the most sensitive ecosystems to environmental perturbations and anthropogenic changes. Studies have also reported that the entire Himalayan region is prone to ongoing climate change, which exerts a great impact on environment, biodiversity, livelihoods, water supply, health. Among the most severe impact of climate change reported in the Himalayan region is the melting of glacier, drying up of water springs, frequent forest fire, invasion of alien species, phenological changes and pest and disease outbreak. Climate change impacts are reported to influence supply of goods and ecosystem services and closely interlinked with adverse effects on different ecosystems i.e., forest ecosystem, agro-ecosystem, livestock husbandry and water resources in the region. This is due the fact that livelihood of indigenous and local communities is highly dependent on climate sensitive natural resources, and any changes in climatic conditions can affect them directly and/or indirectly. Indigenous and local communities due to their close relationship with the nature provide key information on climate change impacts and coping responses.Considering this, the present study is an attempt to examine how the local communities perceive climate change and their adaptations to climate change impacts along elevation gradient in Uttarakhand, India, which is located in the central Himalaya. The result of the study reveals substantial number of respondents (>85%) perceived that climate change manifested through increase in temperature and uneven rainfall pattern. Heavy rainfall was reported to become very common in the region often accompanied by cloudbursts that aggravate flood situation many times. Other climate change induced impacts observed by the local communities includes decreased snowfall and its pattern, changes in phenological calendar of plants, droughts and drying of water springs, invasion of alien species, shifting of species to higher altitudes, frequent forest fire, and low agriculture productivity were the most common cited examples of climate change impacts. Indigenous and local communities have devised practical adaptations to climate change by integrating traditional knowledge with modern scientific innovations. Aside from documenting ILK, capacity building/ skill development & training programme of one or two days were organised involving diverse stakeholders to raise awareness about the role & contribution of ILK and to strengthen local people ability particularly of youth & students in climate action research & validation of ILK

through on farm research and experimentation. Therefore, the observations of local communities to climate change impacts and their responses can be an important knowledge for researchers, practitioners, and policy planner for developing robust adaptation strategies and actions at the local level and regional level.

2. Objectives

The specific objectives are:

- Compiling and documenting ILKs relevant to climate change adaptation in the HKH through an open call, field assessments, and knowledge sharing workshops focusing on adaptation relevant on water resources, agriculture, ecosystem, and disaster risk reduction (DRR).
- Co-design, co-development, and testing of regional framework of adaptation communication of ILKs through regional workshops and community trials
- Engage in science-policy dialogue and outreach for advancing discussion around the framework of adaptation communication of ILK and promotion at the regional level.

The sub-objectives are:

- To understand people's perception and observations of indigenous communities on climate change along an elevational gradient.
- Documents the examples of local adaptations to climate change impacts in rural landscape
- To organize capacity building and knowledge sharing workshops focusing on climate change adaptation and coping strategies.

3. Outputs, Outcomes and Impacts

Outputs	**Outcomes**	**Impacts**
• The perception-based studies involving local people with different socio-demographic characteristics are important to provide some evidence that how climate change is interlinked with survival of local people in a particular region. • The present study is an attempt to examine how	• Primary data collected using an indicative questionnaire comprising of four parts such as**1.)** gathered general socio-economic information about the households,**2.)** focused on the climate change impacts experienced by the households or the community,**3.)** to capture indigenous local	• Indigenous and local communities have devised practical adaptations to climate change by integrating traditional knowledge with modern scientific innovations. This study helped to document and record the observations of local communities to climate change impacts and their responses which can be an

the local communities perceive climate change andsuitable operational framework for assessing local indigenous knowledge (ILK) adaptations techniques in rural landscape along elevation gradient. • Interaction/ Interview/ group discussion/focus group discussion held with various stakeholders in the study area" (across an elevational gradients) from September 2021 to July 2023 in three village Clusters (each in Chamoli, Rudra-Prayag, Pauri Garhwal Districts) involving a total of 703 (Farmers/Villagers/ youth, and representatives of NGOs, Panchayati raj institutions and Government and line department, with respect to documentation/collection of local people perception/response towards climate change impact in rural landscape and their contribution in developing climate change adaptation measures, coping and mitigation strategies. Besides, deliberations/discussions were also held with diverse stakeholders to know details about various Government schemes/programmes executed/implemented or	knowledge (ILK) systems related to climate change adaptation, and the **4.)** explored the barriers hindering the adoption of climate change adaptation strategies involving ILK systems. • Key informants such as village leaders, household head, members of community-based organizations and traditional herbal healers were also interviewed following past studies. People's perceptions and observations were documented based on their experiences and comparison of past events with present conditions. • Organized five capacity building/skill development workshop and training programme activities (two programme, each of -2days and three program each of one day) in different locations (including study villages and academic institutions) on Impact of Climate Change in rural landscape and local indigenous knowledge and adaptation, coping and mitigation strategies. • About 386 farmers/	important knowledge base for researchers, practitioners, and policy planner for developing robust adaptation strategies and actions at the local level. • Changes observed by local and indigenous communities in the past few decades in the field of climate (temperature, precipitation) rainfall, intensity of snowfall, hailstorm, forest fires, water availability, **occurrence of natural disaster/calamities (**intensity of landslides, cloudbursts, flash floods, and glacial lake outburst floods), **impact on biodiversity and people lifestyle were documented.** • The increased temperature and changing climatic conditions at higher altitude had a severe impact on the pastoralism as reported by the local people. The pastoral communities reported the changes in pastoral activities while comparing the past conditions and resulted a decrease in transhumance activities in the area.

proposed under planned adaptation as envisaged in national action plan on climate change (NAPCC) or state action plan on climate change (SAPCC). • Focused group discussions were also organized with older and younger generations to gather insights on the climate change impact on their lifestyle and agriculture, as well as their adaptation strategies.	Village representatives, students, young researchers, climate activists, scientists, academicians, environmentalists, conservationists and people from media actively participated and deliberated on diverse topic which includes Impact of climate variability on farming systems and ILK adaptation strategies, Capacity/skilling of youth for climate Action Research, documentation-validation ITLK-CCA, prioritization of ITLK, and up-scaling of adaptation strategies, role of community radio in creating awareness among the villagers and youth about CCA & communication. Youth, students and young researchers were encouraged to join the community radio and podcasts to communicate/disseminat e climate action for rural livelihood enhancement, through on-farm action research and experimentation. • Present study clearly indicated that the impact of climate change is most	• This study clearly brought out that the local communities are developing adaptations to climate change and also trying to integrate their indigenous and traditional knowledge with the modern scientific innovations. • The results of the present study reveal that farmer perceptions were significantly influenced by a variety of factors including age, education, off-farm income, access to weather information, and access to govt. schemes. These issues must be taken into consideration when developing adaptation policies and implementing them at a grass-roots level.

	prominent among rural populations, whose livelihoods are primarily based on climate sensitive sectors i.e., agriculture, natural resources and plant biodiversity. The rise in temperature and erratic rainfall has been reported to posing serious threats to biodiversity, water resources, human health and livelihoods at all altitudes. • Annual reports/publications submitted to APN bulletin, final project report and media coverage highlighting the progress of the project and other information documented in the present study is highly useful for policy planners and decision makers for developing adaptation planning for the Uttarakhand state in particular and Indian Himalayan Region/ HKH in general.	

4. Key facts/figures

Referring to section 3, please provide notable facts and numbers (figures). Some examples are provided below.

- The perception-based studies involving local people with different socio-demographic characteristics are important to provide some evidence that how climate change is interlinked with survival of local people in a particular region
- Appropriate framework and questionnaire to assess climate change impacts and Indigenous Local knowledge to climate change adaptation has been developed.
- Organised five capacity building /skill development workshop and training programme activities in different location on climate change in rural landscape involving diverse stakeholders and deliberated onILK prioritization, validation and up-scaling of localindigenous knowledge and adaptation, coping and mitigation strategies.
- About 386 farmers/ Village representatives, students, young researchers, climate activists, scientists, academicians, environmentalists, from media actively participated and deliberated on diverse topic which includes Impact of climate variability on farming systems and ILK adaptation strategies, Capacity/skilling of youth for climate Action Research, documentation-validation ITLK-CCA, through on-farm action research and experimentation.
- The study also tried to highlight the various government schemes/ programmes executed/ implemented or proposed under planned adaptation as envisaged innational action plan on climate change(NAPCC) orstate action plan on climate change(SAPCC)and barriers in theplanned adaptation to climate change impacts in the mountain region.
- Local communities are developing adaptation to climate change integrating their indigenous and traditional knowledge with the modern scientific innovation.
- The over all findings of the study is highly useful for government institution particularly line department at local level, NGOs & policy planner and decision makers for developing adaptation planning for Uttarakhand state in particular and Indian Himalayan Region in particular.
- One article (news report) published in Current Science, a reputed journal published by Indian Institute of Sciences, Bangaloreand one paper is submitted in APN science bulletin for publication.

5. Publications

1. R. K. Maikhuri*, Vidhu Gupta, Ravindra Rawat, Chandi Prasad Semwal, Girish Chandra Bhatt and Harendra Rawat (2023). Impact of climate change in the rural landscape of Central Himalaya*, Current Science*, News, Vol. 125, no. 6, 597-598.

2. R.K. Maikhuri, Binaya Raj Shivakoti, Harendra Rawat, Ravindra Singh, C.P. Semwal, Girish Bhatt, Priyanka Badoni and Shankar Pargai(2023). Climate change perception and adaptations of indigenous communities in central Himalayan, Uttarakhand, India, APN science Bulletin **(Communicated)**.

6. Media reports, videos and other digital content

1. Featured on mukhyadhara on tittle “Impact of climate variability on farming systems and possible adaptation strategies”https://mukhyadhara.in/climate-change-uttarakhand/.
2. Featured on garhninad and sarhadkasakshi on topic “Participation and role of Indigenous people in climate change adaptation through traditional knowledge”https://www.garhninad.com/2023/08/one-day-workshop-and-tree-plantation-program-organized/
   https://sarhadkasakshi.com/क्लाइमेट-चेंज-अनुकूलन-व-स/
3. Featured on Khabar_Bharatvarsh YouTube channel on topic “Participation and role of Indigenous people in climate change adaptation through traditional knowledge” https://youtu.be/TXuVTykRFwM?si=ZGvCw5HMbOsV3-Az

7. Pull quotes

- “The perception-based studies involving local people with different socio-demographic characteristics are important to provide some evidence that how climate change is interlinked with survival of local people in a particular region”. -**Professor Annapurna Nautiyal, Vice Chancellor, Hemvati Nandan Bahuguna Garhwal University (HNBGU), Srinagar Garhwal, Uttarakhand**
- **“**The present studyhighlighted that Climate change adaptation and communication is a two-way interactive tool for sharing information among government officials, researchers and the local people and needs to be well complemented with local wisdom so as to effectively reduce the negative impact of climate change in diverse sectors in the rural landscapes”. - **Prof. D.R. Purohit, Department of folk and culture, Adjunct faculty, HNBGU**
- “The socio-ecological system approach is a very useful attempt and that helped in designing appropriate climate change coping/mitigation/resilience strategy for development planning process, however, it needs to be propagated and up-scaled”**- Village Pradhan-Suman Singh Rauthan, Dadoli village, Augustyamuni Block, District Rudraprayag, Uttarakhand.**
- “TKS and IKS play a crucial role in climate adaptation and coping strategies since they are directly linked to the local communities and emphasize that to make effective use of traditional knowledge, there is a need of blending of traditional knowledge with

modern scientific knowledge so as to strengthen the communities' capacity in climate change adaptation and resilience building". - **Prof. R.K. Maikhuri, Head, Department of Environmental Sciences, HNBGU**

- "The findings of the project are very interesting and it has opened the new arena among the academia, scientific communities and policy planners to include indigenous knowledge which has huge potential to develop coping mechanism and adaptation so as to reduce the impact of climate change. By accepting Indigenous approaches, collaborating ethically and respectfully, and when appropriate, applying the knowledges held by Indigenous communities, policy-makers can help make the future for these and other communities safer for generations to come"-**Professor Rama Maikhuri, Dean, School of Education, HNBGU.**

8. Acknowledgments

The project Investigator (PI) and his project team gratefully acknowledge Professor Annpurna Nautiyal, Hon'ble Vice Chancellor, HNB Garhwal Universityfor providing necessary facilities and encouragement to carry-out the project activities. The PI also acknowledge the heartfelt thanks to funding agency APN- IGES, Japan for sponsoring this project. PI is also thankful to the head of the village institutions (Gram Pradhans) Suman Singh Rauthan, Hemlata Devi, Raghuvir Singh of Duggada, Dadoli and Ramini village clusters, and progressive farmers Bharat Singh Rawat, Mohan Rana, Syam Singh and Manoj Negi for their valuable support during the field visit and data collection. The PI also very grateful to Dr. Binaya Raj Shivakoti, Senior Adaptation & Water specialist, IGES, Japan, Dr. R.L. Semwal, Ecologist and Dr. L.S Rawat, GBPNIHE, Garhwal Regional Centre, Srinagar, Uttarakhand for providing help and valuable inputs in various steps of execution of this project.

9. Appendices

1. Publication published in Current science news report
2. Final report of project
3. Manuscript submitted to APN
4. Media report