Task Force on Himalayan Agriculture
National Mission for Sustaining Himalayan Ecosystem
(NMSHE-TF6)

Volume 1, Issue 1 Biannual Newsletter September, 2016

About the Task Force

Under the National Action Plan on Climate Change (NAPCC) 8 National Missions have been launched to help understand, mitigate and adapt to the climate change. The National Mission for Sustaining the Himalayan Ecosystem (NMSHE) is one such initiative to understand the Himalayan ecosystem *vis-a-vis* climatic variability to evolve strategic framework for sustaining this ecologically fragile habitat. The Mission covers all 12 Himalayan States of India in the Indian Himalayan region (IHR); 10 hills States *viz.*, Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Sikkim, Arunachal Pradesh, Nagaland, Manipur, Mizoram, Tripura, Meghalaya, and the other two are Assam and West Bengal.

Task Force on Himalayan agriculture led by the Indian Council for Agricultural Research (ICAR) is one of the six task forces under NMSHE which is working towards ameliorating climate change impacts in the Himalayan agriculture. The need to address the deteriorating agricultural status of the Indian Himalayan Region (IHR), which is diverse in terms of its topography, agro-climatic zones, and development trajectories is critical to sustain production and productivity in the region. The Task Force aims to understand the dynamics of hill farming and enhance its productivity through climate resilient technological interventions on a pilot scale to ensure food, nutrition and ecological security in the IHR.

The execution of the Task Force was initiated by the Launch Workshop on Himalayan Agriculture held on 13th May, 2015 at NASC Complex, New Delhi. 87 Scientists and 61 project staffs representing 21 ICAR Research Institutions are working for the Task Force.

Zones and Partners

Cold Arid Himalaya

- Central Arid Zone Research Institute (CAZRI), RRS , Leh (Jammu& Kashmir)
- Directorate of Coldwater Fisheries Research (DCFR), Bhimtal (Uttarakhand)
- Central Agroforestry Research Institute (CAFRI), Jhansi (Uttar Pradesh)
- ICAR-NRC On Yak, Dirang (Arunachal Pradesh)
- ICAR-NRC on Camel, Bikaner (Rajasthan)
- Central Institute of Temperate Horticulture (CITH), Srinagar (Jammu& Kashmir)

Lower Middle Himalaya

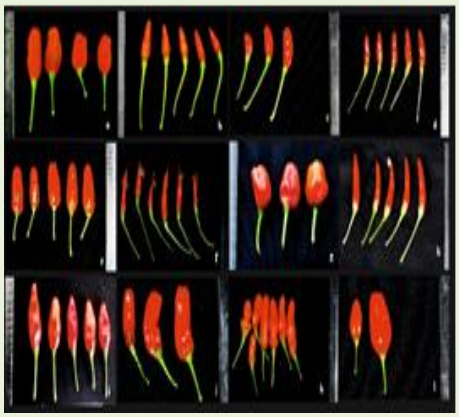
- Indian Institute of Soil and Water Conservation (IISWC), Dehradun (Uttarakhand)
- VivekanandaParvatiyaKrishiAnusandhanSansthan (VPKAS) – Almora (Uttarakhand)
- Central Agro-forestry Research Institute (CAFRI) – Jhansi (Uttar Pradesh)
- Indian Veterinary Research Institute (IVRI) Regional Station, Mukteshwar
- Indian Institute of Soil and Water Conservation (IISWC), Regional Centre – Chandigarh
- Central Institute of Temperate Horticulture (CITH), Regional Station – Mukteshwar
- Directorate of Coldwater Fisheries (DCFR), Bhimtal (Uttarakhand)

North East Himalaya

- ICAR Research Complex for NEH Region, Umiam, (Meghalaya)
- ICAR Research Complex for NEH Region, Basar (Arunachal Pradesh)
- ICAR Research Complex for NEH Region, Lamphelpat, Imphal (Manipur)
- ICAR Research Complex for NEH Region, Kolasib (Mizoram)
- National Organic Farming Research Institute (NOFRI) , TadongGangtok (Sikkim)
- ICAR Research Complex for NEH Region, Lembucherra (West Tripura)
- ICAR Research Complex for NEH Region, Jharnapani (Nagaland)
- ICAR NRC on Pig, Guwahati (Assam)
- ICAR NRC on Mithun, Medziphema (Nagaland)
- ICAR NRC on Yak, Dirang (Arunachal Pradesh)

New Varieties added to Agro-biodiversity

New endemic varieties of crops like French bean, Bird's eye chilli and maize have been identified by ICAR Research Centre at Mizoram; eight landraces of French bean were highly nutritive, two landraces of Bird's eye chilli were rich in antioxidants and three landraces of maize exhibited high drought tolerance. The study also has generated information about the nutritional importance of these landraces which can be conserved, promoted and utilized.



Highly Nutritive French bean	Antioxidant Rich Bird Eye Chilli	Drought Tolerant Maize
MZFB-47, MZFB-41, MZFB-83, MZFB-116, MZFB-52, MZFB-28, MZFB-116 , MZFB-85	MN-1, MN-2	Puakzo: MZM-3, MZM-50 Mimpui: MZM-57, MZM-22, MZM-68 Mimban: MZM-23, MZM-53

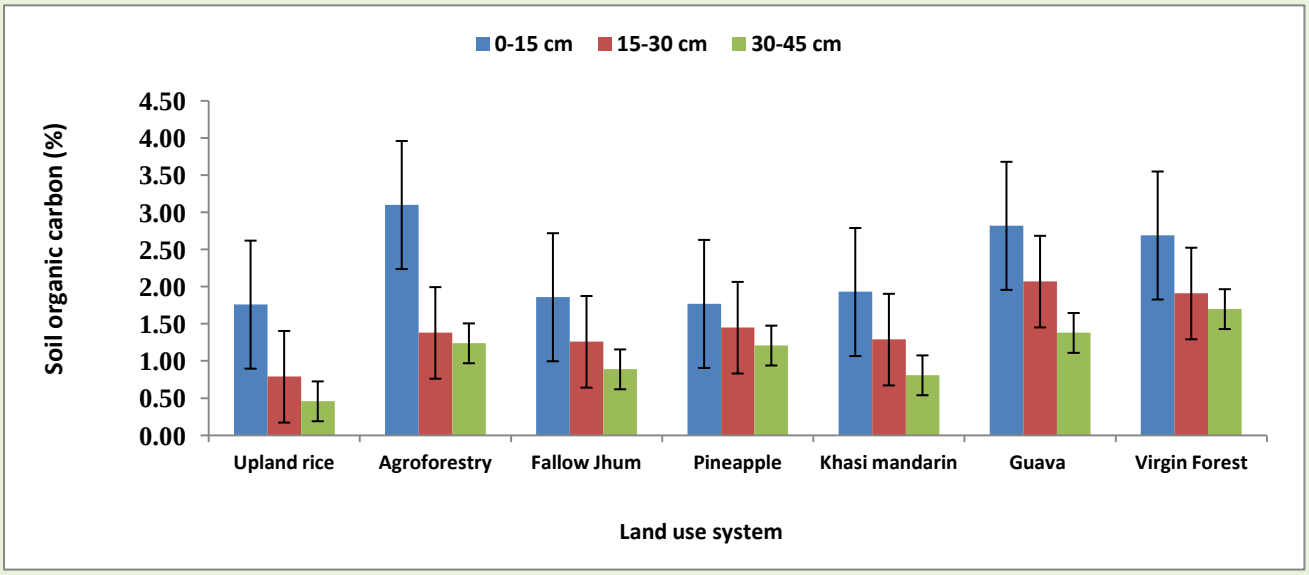
Sea Buckthorn – a Nutritional Alternative in Leh

Sea Buckthorn (SBT) is a hardy plant, drought and cold resistant, useful for land reclamation and farmstead protection through its vigorous vegetative reproduction and strong, complex root system with nitrogen-fixing nodules. It is grown in the Trans-Himalayan Region that has unique geo-climatic conditions of high altitude coupled with extreme temperature variations (–40° to 30° C), low precipitation and low oxygen in air. Being a nitrogen fixing species, it is planted in Igoo-Phey canal, as a rehabilitation measure to the prevailing soil conditions*vis-a-vis*growth and productivity of the crops. Thickets of SBT are widespread in the valley region as compared to the mountain slopes and remaining part of Ladakh region. The medicinal value of SBT is corroborated with its usage for treatment of skin diseases, jaundice, asthma, for gastro-intestinal disorder and rheumatism in India and Russia. The leaf and fruit extracts of SBT has been found to improve the anti-oxidant defence system of the cells by increasing the intracellular Glutathione Stimulating Hormones (GSH) and inhibiting Reactive Oxygen Species (ROS) production.

In view of this, an attempt was made to assess the biochemical composition of sea buckthorn growing in Leh valley at four different sites *i.e* river side, wetlands, barren and sloppy land uses by CAZRI-RC Leh. Results revealed that the mineral content in sea buckthorn was significantly higher in river side and wetland as compared to barren and sloppy land use systems. Higher vitamin A, B and C content were reported in SBT growing in the river side and wetland, followed by barren land. The study also advocated the use of sea buckthorn as nutritional supplement can help to maintain a normal balance of ions in the human body at high altitudes.

Soils in Different Land Use Systems

Agriculture in northeast Himalaya comprises of traditional crop–livestock mixed farming, which is sustained with local inputs. In such cases, the implication of different land-use system for sustainable livelihood of local communities is very vital. A study was conducted at ICAR RC for NEH Region, Arunachal Pradesh centre to assess the impact of different land use systems *i.e*. upland rice, agroforestry, fallow *Jhum*, pineapple, *Khasi* mandarin, guava and forest on soil chemical properties.



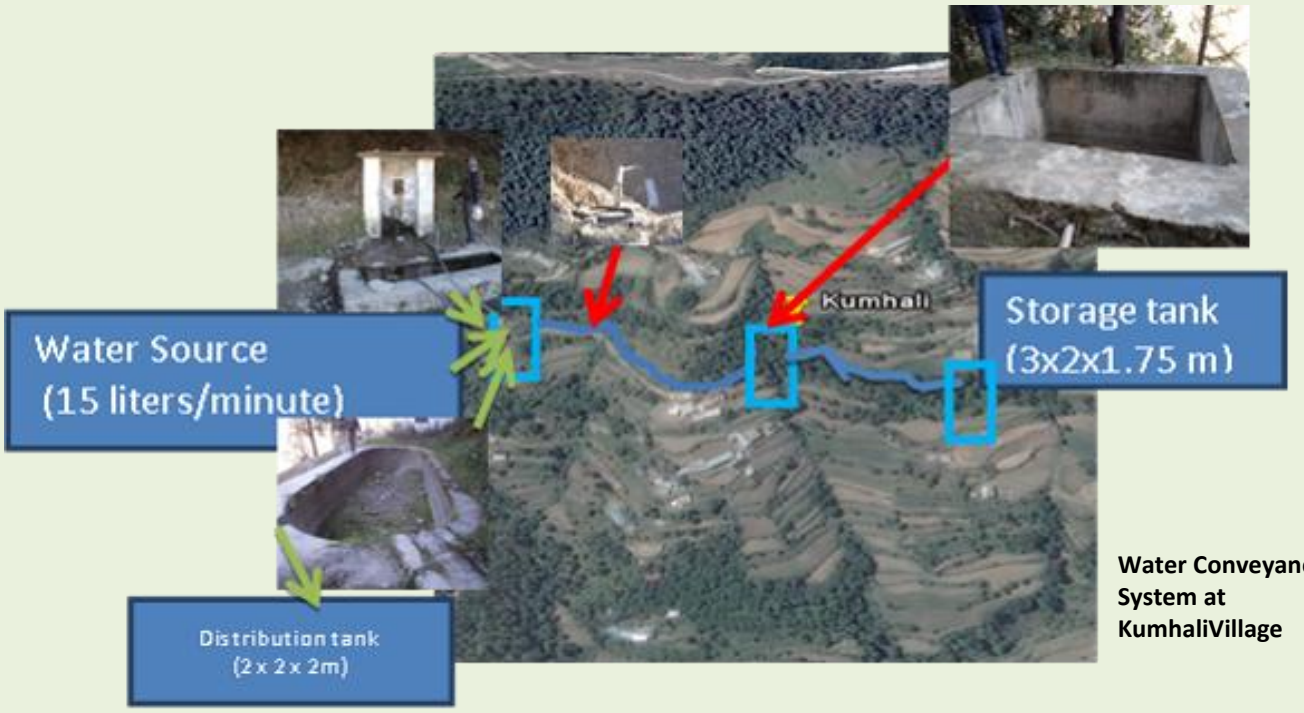
Effect of different land use systems on soil organic carbon in Arunachal Pradesh

Greater concentrations of available N, and P_2O_5 were reported for soils of agroforestry based land use system, followed by *Khasi* mandarin, guava at 0-15 cm soil depths, as compared to other land use systems. Soil organic carbon under different land-use was significantly higher in the agroforestry system as compared to other land use systems.

Our efforts to Improve Water Resources

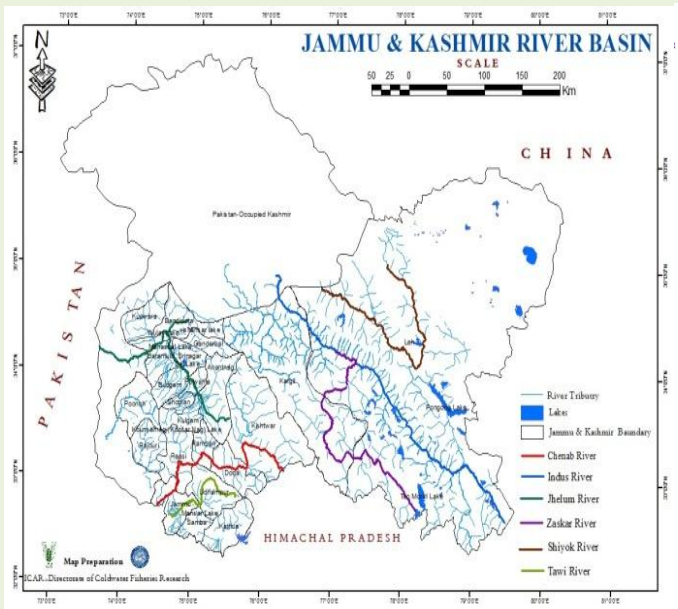
Change in rainfall pattern has adversely affected 90% of rain-fed agricultural land in the north-west Himalayan region. With the need for more irrigation facilities, the IISWC, Dehradun has built a water conveyance system comprising of 650m long pipeline, 10.5 m^3 storage and 8 m^3 distribution tanks in Kumhali village, Himachal Pradesh.

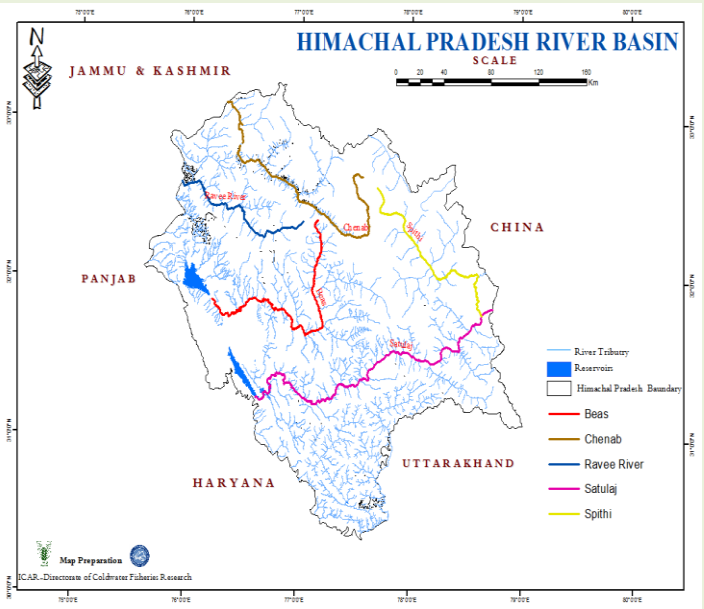
In addition two poly tanks of (33.4 m^3 and 35.3 m^3), two *Azolla* tanks (12.5 m^3), one vermicomposting tank (6 m^3) and two modified drip system covering area around 9 nalis have been constructed at JurKafun village of Uttarakhand. In another village Doonagiri, Uttarakhand with pronounced impact of climate change due to reduction in snow fall and shrinking of catchment area of Kosiriver at 5 km/yr, the Task Force has explored the possibilities of culturing Indian Major Carp. So far,20 poly tanks to stock different combination of species (exotic and indigenous carp) to evaluate growth and production have been constructed.



Water Conveyance System at KumhaliVillage

In addition to this, water resource maps of Jammu & Kashmir and Himachal Pradesh have been digitized so as to better understand the status of water availability in the states and the measures to be taken to improve the facilities for the locals.





Success Story

"Growing Garden Pea in Rice Fallows Enhanced Farmers' Income"

A successful demonstration of climate resilient farming practices was realized at Nongthymmai village in Ri-bhoi district of Meghalaya where water during the *rabi* season is acutely scarce. Majority of the farmers grow rice, maize, soybean, tomato, brinjal, ginger and turmeric *etc*. but with a low cropping intensity of about 110-120%. Generally, mono-cropping system of rice cultivation is practiced. Instead of taking up second crop after *kharif* rice, farmers leave rice field fallow during *rabi* season mainly owing to lack of irrigation facilities. Therefore, in order to enhance the cropping intensity zero tillage method of cultivating garden pea was introduced.

The technology was first adopted by the progressive farmer Mr. Stephan Shadap. Along with him four other farmers also took up the zero tillage method of cultivation on garden pea covering around 1.5 ha. ICAR provided the critical inputs like seeds, fertilizer, FYM etc. for successful demonstration on the technology. Thereafter, regular monitoring of the demonstration programme was made by scientists and project staff through frequent village visits and timely advisory services.

The technology was adopted by only 5 farmers covering 1.5 ha. The average yield of rice was enhanced from 36.85 q/ha to 64.25 q/ha with corresponding hike in net income from Rs. 17,250 toRs. 47,200.

The impressive performance of the technology awakened the farmers, farm women, rural youths of the village as well as neighbouring villages namely *Klew, Nongpyrdet, Mawnohsynrum and Mawkyrdep*to adopt this resilient technology for second crop after paddy as it helps to increase the cropping intensity and elevate net income. Moreover, this technology was also found to be a better reconciliation under the climatic stress condition.

Capacity Building

To propagate climate resilient agricultural practices through farmer's participation, so far 50 capacity building programs have been conducted under the Task Force on Himalayan Agriculture.

First Monitoring Committee Meeting held in New Delhi on 26th July, 2016

The first Monitoring Committee of the Task Force on Himalayan Agriculture (TF-6) under the National Mission on Sustaining Himalayan Ecosystems met on the 26th of July, 2016 at NASC Complex, New Delhi to review the progress of work in the TF6 as envisaged and to discuss the work plan for the year 2016-17. The meeting was chaired by Dr. K. Alagusundaram, DDG (NRM), ICAR. The members of the Monitoring Committee from ICAR-SMDs (Dr. V. Bhasin, Dr. B. K. Pandey and Dr. Yasmeen Basade), external experts Dr. J. C. Bhatt, Former Director-VPKAS, Almora and Dr. S.K Singh (Director, NBSS&LUP) as a special invitee were present in the meeting. Scientists working in different lead and partner institutes also participated in the meeting.

The following action points emerged:

- Development of a web portal and introduction of a Newsletter
- Consolidation of available information on Himalayan agriculture
- Linking interventions and technologies with the value chain to cater to the perspective of Task Force and ensure mainstreaming of the project activities in the long-run
- Defining the approach and technology intervention with a time framework
- NBSS&LUP to enable coordination with IISWC, Dehradun for datasets for modelling and simulation
- Zonal Monitoring Committeesfor respective zones
- Lead centers and partner institutes to have proper coordination with headquarters for facilitation

For Information, please contact:
Task Force Secretariat, NMSHE-TF6, ICAR HQ, NRM Division, Room 333, KrishiAnusandhanBhawan II, Pusa, New Delhi; Phone – 011-23385065; Email: icar.nmshe@gmail.com