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International Decade of Soils 2015-2024

FROM THE PRESIDENT'S DESK

Mountains are an important source of water, energy and biological diversity. As a major ecosystem representing the complex and interrelated ecology of our planet, mountain environments are essential to the survival of the global ecosystem. Mountain ecosystems are, however, rapidly changing. They are susceptible to accelerated soil erosion, landslides and rapid loss of habitat and genetic diversity. On the human side, there is widespread poverty among mountain inhabitants and loss of indigenous knowledge. As a result, most global mountain areas are experiencing environmental degradation. Hence, the proper management of mountain resources and socio-economic development of the people deserves immediate action.

Mountains are home to one tenth of the world's population, and cover one fifth of the world's land mass. To most of us, mountain regions offer landscapes of spectacular scenic beauty – but what we don't see are the lives and struggles of the people who live in the mountains, many of whom are poor and marginalized. Going by the global average, one in eight persons is food insecure, but in rural hill and mountain areas this ratio is one out in two. This means that around 300 million mountain people are food insecure, with half of them suffering from chronic hunger.

The principal mountain farming systems of Asia are Himalayan Farming Systems that includes a mixed crop livestock farming system, a livestock-pasture farming system and shifting cultivation; Upland Intensive Mixed Farming Systems; Highland Extensive Mixed Farming System; and a Pastoral Farming System. The mountain regions of Asia therefore provide some of the best examples of integrated mountain farming systems. However, over recent years, the values of traditional mountain farming systems have eroded mainly due to population growth, rapid urbanization, depletion of the natural resource base, economic globalization, market influences and the effects of climate change. However, capitalizing upon both the socio-cultural and biophysical strength of the mountain landscape, integrated farming

systems have the potential to contribute significantly towards attaining food and nutrition security as well as securing improved and viable livelihood opportunities for mountain communities. The potential of agro-climatic diversity in mountain areas ranging from productive valleys to higher elevation can be optimally utilized for the diversification and integration of agronomic or field crops, livestock farming, horticulture, floriculture, dairying, fishing, bee-keeping and forestry at watershed level. The development of value-addition products would be necessary for ensuring the sustainability of the entire integrated mountain production system.

Mountain agriculture faces a number of constraints including inaccessibility, shorter and more pronounced agricultural seasons, ecological fragility, limited infrastructure, and distant markets. Yet, these contain more diversity than plain regions: their varied landscapes and the changes in altitude have created a multitude of agro-ecological zones. The genetic variety of agricultural crops and farm animals contained in these zones has the potential to provide diversified and nutritious food for all.

The challenges and problems facing sustainable mountain ecosystems and mountain agriculture are often complex, trans-boundary and difficult to be resolved by a single country, a single discipline, or single institution. All national and international partners from different backgrounds must emphasize the need to team up and continue flying the flag for supporting mountain agriculture and mountain people in the Asia region. There is a need to reach out further and communicate globally to increase multi-sectoral policy prioritization, interdisciplinary engagement, and public–private investment for the development of sustainable mountain agriculture.

Soil Carbon Credits: Opportunities and Challenges Ahead

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Soil carbon sequestration is a process by which the air's carbon dioxide is extracted and stored in a soil carbon pool. During photosynthesis, plants break down carbon dioxide and water from the atmosphere into oxygen, sugar, and carbon-rich compounds. These reach the roots and the soil underneath and nourish the organisms below the soil. The reduction of biomass below the soil, increased soil erosion, and higher tilling causes a higher percentage of carbon dioxide to be released back into the air, which leaves the soil with reduced carbon content. There are some practices that farmers can follow to restore soil health. Techniques that increase biomass and reduce the loss of carbon from soil must be adopted in order to improve soil health. These regenerative agriculture practices include cover cropping to keep the land covered at all times; residue mulching and recycling the soil's bio-waste; manure, compost, and bio-fertilizer usage; better crop rotations and intercropping; and reducing flood irrigation and chemical use.

When farmers follow these practices for a few seasons, the carbon content of soil improves. As a result, the yield also increases. However, farmers may need an incentive to adopt these practices as they can be time-consuming and expensive, and un-remunerative in the short term. The ability to trade carbon credits at voluntary carbon markets can serve as this incentive. Farmers need to be made aware of the existence and benefits of carbon credit programmes.

Carbon credit monetisation can be the nudge

Since the improvement of soil health is innately linked with the ability to increase soil carbon levels, achieving it demands the continuous monitoring of soil carbon levels and the incentivisation of its improvement. Monetising soil carbon requires a good understanding of carbon credits. Carbon credits are certificates that represent quantities of greenhouse gases that have been kept out of the air or removed from it. One carbon credit certifies that one metric tonne of carbon dioxide has been removed from the atmosphere. Advancements in remote sensing data and AI have enabled the prediction of carbon levels through satellite data, and this serves as one of the methods through which carbon credits are calculated. Companies and governments purchase carbon credits to meet the climate commitments that they make.

Farmers can benefit from participating in the carbon market

The direct benefit is that farmers receive cash-based incentives for the carbon they have helped sequester in their soils. A farmer who sequesters one carbon credit can earn approximately INR 780 at current market prices, but large corporations are likely to provide better rates as high as INR 2,000 to farmers when directly purchasing large chunks of carbon credits. In our experience, farmers who follow regenerative practices are able to sequester one to four carbon credits per acre.

The indirect benefit that farmers experience is the improvement in soil health due to the carbon captured in the soil. This improvement can be gauged by determining whether the soil displays any of the following characteristics: Increased water-holding capacity, lower soil density, increased water infiltration, increased nutrient availability, and decreased soil surface temperature.

How do carbon credit programmes for farmers work?

While it is not an easy task for individual farmers to go down this route, non-profits and farmer producer organisations (FPOs) can help them avail the benefits of the carbon credit programmes.

1. Follow regenerative agriculture practices as a group

The first step is for non-profits/FPOs to promote regenerative agriculture practices among their farmer groups, especially focusing on increasing soil organic matter and soil carbon. Since this can take time and initially lead to lower yields, it is important to handhold and supports the farmers during the initial years. Showing that these regenerative practices were adopted is a key step in the process of availing carbon credits.

2. Identify an agri-tech partner or project partner

Agri-tech companies such as Boomitra, Nurture. farm, CarbonX, and Carbon Count trade in voluntary carbon markets. Linking with these companies will enable the farmers' project to be listed and traded.

3. On boarding and third-party verification of carbon credits

Once the projects are identified and listed, third-party agencies such as Verra verify these projects. After verification and approval, these credits are sold in credit markets, and the incentives are distributed to the FPO as well as the farmers. Usually this takes around 8 to 12 months from the time the project is listed.

The challenges of farming based carbon credits

As with any emerging area, this too has its share of challenges such as the verification and accurate accounting of carbon increase in the soil is challenging when it comes to proving additionally, the company facilitating the sale of carbon credits must show that the farmer engaged in new practices over and above the routine practices to increase soil carbon levels. Once the project is listed, it takes 8 to 12 months for the cash incentives to arrive to farmers and FPOs/non-profits. Additionally, it may take about 12 to 18 months for a project to be listed. This prolonged wait can be arduous for farmers. Moreover, the average landholding size of an Indian farmer is just over one hectare. Thus, the amount of carbon credits received may not be enough for a small farmer to adopt regenerative agriculture practices. Furthermore, since carbon credit trading is in its nascent stages, there is very little awareness among farmers about this option.

What can be done to address these challenges?

Farmers need to be made aware of the existence and benefits of carbon credit programmes, so that all farmers practising regenerative agriculture can benefit from it. As per a McKinsey report, the demand for carbon credits is expected to rise by approximately 15 times by 2030. As a result, market prices of carbon credits could improve significantly. The process of measuring and verifying the carbon captured in the soil is evolving rapidly due to technological innovations. As technology continues to improve, the measurement and verification process could become far simpler. Since most carbon credit programmes onboard farmer groups rather than individual farmers, the cost and the associated risk of participation for an individual farmer are reduced. Governments at the state and central level could attempt to align existing natural farming, regenerative farming, and organic farming schemes so as to nudge farmers to participate in carbon credit programmes. For instance, scheme guidelines could mandate the regular estimation of soil carbon levels, and the data obtained could be shared with carbon credit verifiers to facilitate measurement and verification processes.

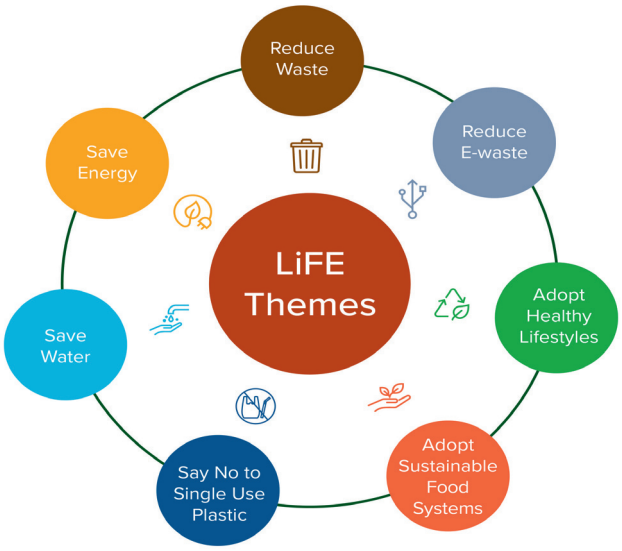
With countries across the world making climate commitments, the interplay of carbon credit markets with farmers is likely to evolve over the coming years. However, given the multifaceted benefits of an increase in soil carbon levels, it may be the nudge that leads to the proliferation of regenerative agriculture practices and helps combat climate change.

Meghalaya Chapter observed Environment Day on Mission LiFE

The Meghalaya Chapter of Soil Conservation Society of India observed 'World Environment Day' on 5th June, 2022 in befitting manner at Kendriya Vidyalaya, NEPA, Barapani by organizing series of lectures and plantation drive. At the outset, Mr. Gagdev Suthar, Principal of KV, welcomed the members of SCSI and appreciated for selecting the KV, NEPA, Barapani for celebrating this important day as it will create awareness among the students for protecting the environment. Dr. Sanjay Swami, Professor (Soils) & Chairman of the SCSI-Meghalaya Chapter, while addressing the students informed that the UN General Assembly designated 5th June as World Environment Day in 1972 to spread awareness among the people and encourage them to take some actions to protect the environment. The first celebration, under the slogan "Only One Earth" took place in 1973. Since its inception, this day is celebrated every year on 5th June. The occasion provides an opportunity to broaden the "basis for an enlightened opinion and responsible conduct by individuals, enterprises and communities in preserving and enhancing the environment." Every year, the campaign is raised around a theme in order to draw attention towards pressing environmental issues. This year marks the 50th anniversary of World Environment Day, which focus on solutions to plastic pollution, using the hashtag and slogan #BeatPlasticPollution, however, the Government of India, Ministry of Environment, Forest and Climate Change has announced that World Environment Day 2023 will be celebrated with a focus on the Mission LiFE, which stands for Lifestyle for Environment, therefore, we are focusing on the same. The aim is to encourage people to adopt sustainable lifestyle practices to protect the

environment. The concept of LiFE was introduced by the Prime Minister of India at the 2021 United Nations Climate Change Conference (COP26) in Glasgow by calling for a global effort to adopt sustainable lifestyle practices, and since then, India has been mobilizing people to embrace LiFE.

Ms. Pritisha Patgiri further elaborated that Mission Lifestyle for Environment recognizes that Indian culture and living traditions are inherently sustainable. The importance of conserving our precious natural resources and living in harmony with nature are emphasized in our ancient scriptures. The need of the hour is to tap into that ancient wisdom and spread the message to as many people as possible. Mission LiFE seeks to channel the efforts of individuals and communities into a global mass movement of positive behavioural change.



Dr. A.K. Singh, a senior member of SCSI Meghalaya Chapter highlighted about three phases of Mission LiFE. He said that first phase is change in demand for nudging individuals across the world to practice simple yet effective environment-friendly actions in their daily lives. Second phase is change in supply as the changes in large-scale individual demand are expected to gradually nudge industries and markets to respond and tailor supply and procurement as per the revised demands, and the third phase is change in policy as by influencing the demand and supply dynamics of India and the world, the long-term vision of Mission LiFE is to trigger shifts in large-scale industrial and government policies that can support both sustainable consumption and production.

Mr. Basant Tamang discussed about various issues of environment degradation and urged the student to follow simple and easy to adopt actions from their home or school to restore it. Continuing the series of lectures, other active members of the Meghalaya Chapter, Mr. Shubham Singh, Mr. Muddana Sri Sai Charan Satya and Ms. Ventina Yumnam elaborated about the issues of soil pollution, water pollution and air pollution, respectively

and appealed to scale-up and speed-up the actions to tackle these crisis with available science and solutions.

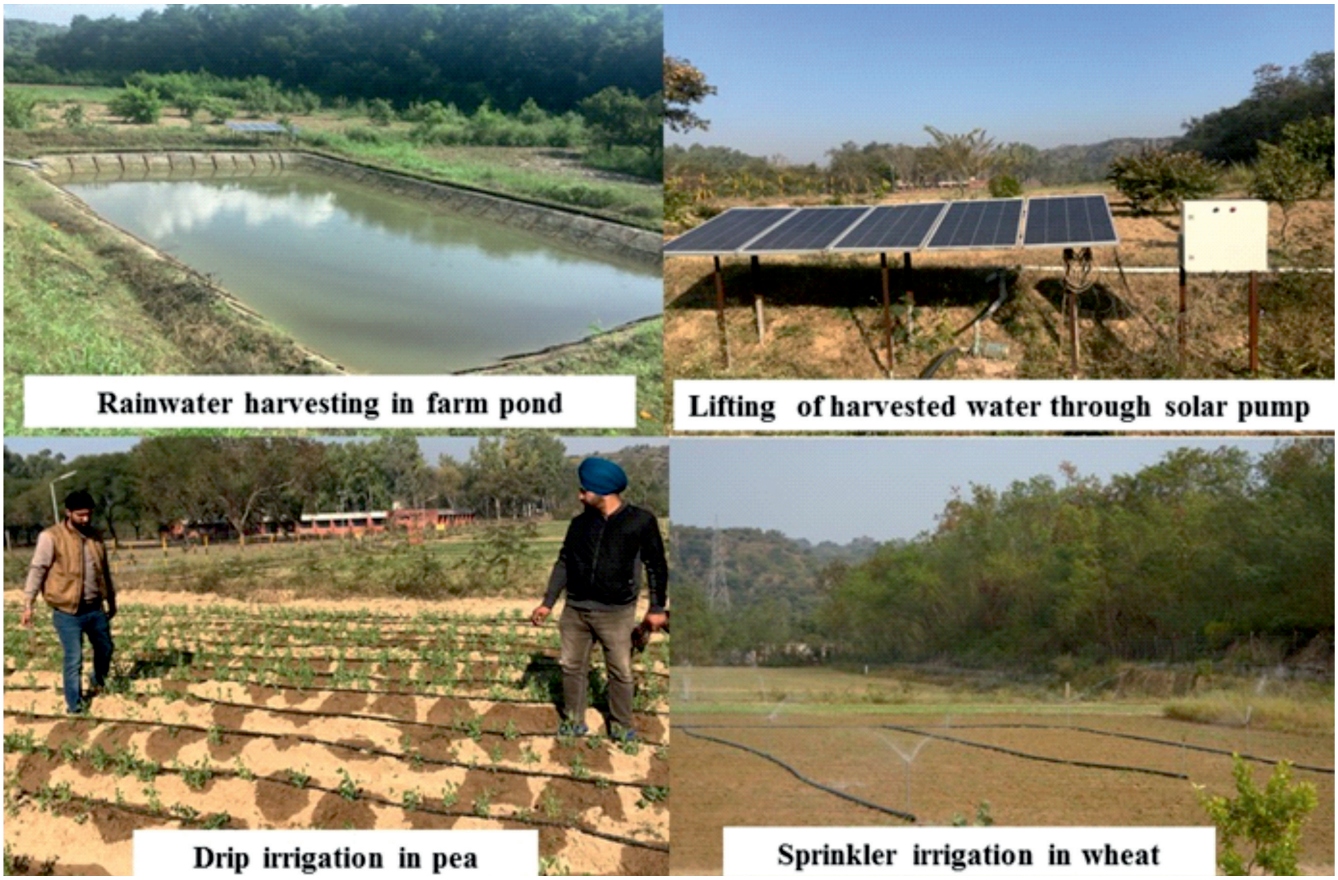
A plantation drive was also initiated by the members of SCSI-Meghalaya Chapter in the Kendriya Vidyalaya, NEPA, Barapani campus. Around 2000 fruit and ornamental plant sapling were planted in and around the campus. Member also took pledge to save the resources and reconnect with nature. The principal of Kendriya Vidyalaya, NEPA, Barapani congratulated the SCSI-Meghalaya Chapter team for organizing such a wonderful programme involving students, teachers and non-teaching staff of Kendriya Vidyalaya. A formal vote of thanks was proposed by Ms. Shilpa Mohanty, a member of SCSI, Meghalaya Chapter.

Rainwater Harvesting Through Farm Ponds: A Sustainable Source of Income for Small and Marginal Farmers

Abrar Yousuf, Manmohanjit Singh and Anil Khokhar
Punjab Agricultural University-Regional Research Station, Ballowal Saunkhri

Water is one of the essential resources required by every living organism, and for sustainability of ecosystems. The sustainable socio-economic growth of any country relies on the sustainability of the existing water resources. Nevertheless, there is severe water shortage at the global level. India is facing water crisis due to scarcity of water. Demographic expansion, global change, shrinkage of Himalayan ice and snow-caps, urbanization, poverty, industrial expansion, allocation inequalities, irrational water consumption habits, disappearance of ecosystems, delirious surface runoff and poor management of water resources have all contributed to the deterioration of resource base and put a great strain on water resources both quantitatively and qualitatively. The abstraction of subterranean water from deep aquifers exhausts resources that have taken epochs to stockpile on which the prevailing yearly rainfall has no immediate impact. In India, per capita availability of water has declined from 5180 m^3 in 1951 to 1545 m^3 in 2021. According to forecasts, it will slump to 1340 m^3 by 2025 and 1140 m^3 by 2050 approaching a level of water scarcity of less than 1000 m^3 per year. Water resource management is critical for long-term sustainability of ecosystems. Climate change results in weather anomalies like delayed and/or deficit monsoons, high intensity downpour causing greater runoff/erosion and lengthy dry spells which leads to crop failure. Even places with significant rainfall have minimal summer water footprint on account of poor water storage and infiltration capacity, besides remarkable variation in precipitation and greater evaporation demand. Due to these water resource limitations and potential expansion of the area under cultivation, it is imperative to develop an alternate supplementary water source. The management and planning of water resources is very important particularly in the regions experiencing low and erratic rainfall and having limited groundwater resources. Hence, it is essential to find sustainable solutions for the shortage of water. Rainwater harvesting (RWH) is one such promising solution to tackle the problem of water scarcity. The RWH aids in reducing soil erosion, agricultural drought and flash food hazards through rainwater storage. The Government of India is also promoting the concept of RWH under the campaign "Jal Shakti Abhiyan: Catch the Rain" with the aim to reduce the water dependency of the country on groundwater.

In the state of Punjab, an area of 5.38 lakh ha which falls in the *Shivalik* foothills and locally known as *Kandi* area, is considered to be one of the eight most degraded and fragile agro-ecosystems of the country. Erratic distribution of rainfall, small landholdings, lack of irrigation facilities, heavy biotic pressure on the natural resources, inadequate vegetative cover, heavy soil erosion, landslides, declining



Rainwater harvesting and its judicious use through micro-irrigations systems

soil fertility and frequent crop failures resulting in scarcity of food, fodder and fuel are the characteristics of this region. The groundwater in the region is very deep and irrigation facilities are very scarce. The tube wells in the region are very limited due to the small landholding of the farmers. Annual rainfall in the area varies from 800 to 1200 mm, with the normal rainfall of about 1050 mm. A large portion of monsoon rainfall (35-40%) goes as runoff in the torrents originating from the *Shivalik* foothills. Therefore, there is a good scope for rainwater harvesting in this region. The harvested rain water can have diverse uses including irrigation which will help in developing the sustainable agriculture in the region and increase the livelihood of the farmers. The rainwater harvested in various structures can be the best alternative to the groundwater and can reduce the groundwater draft in the region.

A study was conducted at the research farm of AICRPDA centre, Ballowal Saunkhri during 2019-2021. The study area lies in sub-humid subtropical climate having hot summers and cold winters. It receives an average annual rainfall of about 1050 mm, out of which 80% is received during the monsoon season. The farm pond, having a capacity of 696 m^3, was constructed to harvest the excess rainwater. The harvested rainwater was used to provide supplemental irrigation to maize and okra during *kharif* and wheat and pea during *rabi* seasons. The supplemental irrigation was applied to maize and okra through furrow irrigation. The sprinkler irrigation was used in wheat while drip irrigation was applied to pea. The experiment was laid in the random block design. During *kharif* season, supplemental irrigation in maize and okra resulted in yield of 3758 kg/ha and 126.5 q/ha which was 70.2% and 75.2 % higher over rainfed maize (2208 kg/ha) and okra (72.2 q/ha), respectively. The water use efficiency increased by about 38.7% and 46.6% in maize and wheat, respectively due to the application of supplemental irrigation. Similarly, the supplemental irrigation resulted in increased B:C ratio by 60.7% and 62.5% in maize and okra, respectively. During *rabi* season, one supplemental irrigation to wheat resulted in 65.9% higher yield over rainfed wheat. While in pea, an increase of about 76% was observed in pod yield over the rainfed pea. The water use efficiency increased from 11.25 to 19.67 in wheat, and 6.28 to 14.96 in pea due to the application of supplemental irrigation. Similarly, the supplemental irrigation resulted in increased B:C ratio by 53.5% and 41.1% in wheat and pea, respectively.

Hence it can be concluded that the farm pond technology is the best available farmer friendly technology which may be promoted for the economic benefits of small and marginal farmers.

Rainwater harvesting tanks constructed in farmers' fields

World Water Day observed by SCSI Chhattisgarh Chapter

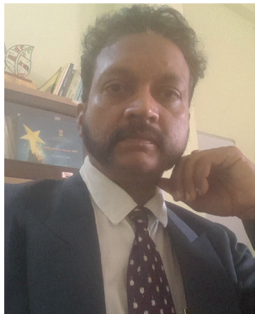
The World Water Day was observed by SCSI Chhattisgarh Chapter on 22nd March 2023 on the theme 'accelerating change to solve the water and sanitation crisis.' Er. Shailendra Shukla, Chairman, SCSI Chhattisgarh Chapter delivered the key note address and highlighted his vast experience in the field of Soil and Water Engineering. He explained the importance of natural resource management and also aptly suggested measures to overcome the field problems in watershed development works. Dr Vinay K. Pandey, Dean, College of Agricultural Engineering and Member (SCSI-CG) encouraged the students to take responsibility of water harvesting in the college premises. Dr Jitendra Sinha, Professor Soil & Water Engineering, Councillor SCSI New Delhi and Secretary SCSI CG Chapter informed the house about the PUNEET SANKALP – pledge initiative by my Gov of the Government of India and the house took pledge with zeal and enthusiasm and affirmed to save water bodies from the menace of plastics. Dr B. L. Sinha, Associate Professor, Soil and Water Engineering, the senior most member and treasurer of SCSI CG delivered vote of thanks. The day was celebrated by the members of SCSI as well as by the UG, PG and PhD students of the college. Most importantly the day was celebrated in an eco friendly manner, i.e. without the use of any 'use and throw' plastic bottles, single use plastics, disposals etc. The participants observed "How we can have the programmes without increasing our carbon, energy and water footprint".

Chhattisgarh State Chapter of SCSI elected its new Executive Body

The election of executive council/ body of Soil Conservation Society of India, Chhattisgarh State Chapter was conducted on 07.11.2022 in the conference hall of Swami Vivekanand College of Agricultural Engineering and Technology and Research Station IGKV, Raipur in the presence of members from various sectors like academic institutes, government departments, farming community, students etc.


Er. Shailendra Shukla, Chairman, CG-SCSI

Er. Shailendra Kumar Shukla, who has worked in the capacity of Director/CEO/MD/ Chairman for about 20 years out of total service of 38 years, has been selected as the new Chairman of the chapter. Er Shukla (62 years old) is an Engineering Graduate from Jawahar Lal Nehru Krishi Vishwavidyalaya (1982 batch) with MERIT; A technocrat with excellent reputation in the field of Power-Energy, Bio-fuel, Renewable Energy & Rural Development having decades of association and expertise in these fields. There are many National and International awards to his credit. He is former Chairman: Western Regional Power Committee (Consisting of Gujarat, Maharashtra, Madhya Pradesh, Goa, Chhattisgarh, Daman and Diu, Dadra and Nagar Haveli) and Chairman and Director of Chhattisgarh State Power Companies consisting of:


Dr Jitendra Sinha, Secretary, CG-SCSI

- ✓ Chhattisgarh State Power Holding Company (Also Managing Director)
- ✓ Chhattisgarh State Power Trading Company
- ✓ Chhattisgarh State Power Generation Company
- ✓ Chhattisgarh State Power Transmission Company
- ✓ Chhattisgarh State Power Distribution Company
- ✓ Uttar-Chhattisgarh Power Company ltd.

Shri Prakash Chandra Baghel, Former Additional Director (Agril) Govt. of CG has been selected as Vice-Chairman while Dr Jitendra Sinha, Professor, Soil and Water Engineering, IGKV, Raipur, Councillor SCSI New Delhi and National Water Award Winner (2018) has been selected as Secretary of the Chapter. The senior most life member of society in Chhattisgarh, Dr B. L. Sinha, has been entrusted as Treasurer of the SCSI CG Chapter and Dr Satish Verma has been selected as Joint Secretary. The members include Dr. Vinay Kumar Pandey, Mr. Bisheshar Das Sahu, Dr Shweta Ramole, Dr. S.S. Tuteja, Dr. Ajay Verma and Dr. K.K. Sahu; the Farmer Member include Mr. Sanjay Prakash Choudhary and Shri Surendra Belchandan while Shri Mukesh Kumar Ajagallay has been selected as Student Member of the SCSI CG Chapter

The new body will function for a period of three years and will be effective till 08.11.2025.

Rohit Sahu (LM-SCSI CG) honoured with Innovative Farmer Award

Rohit Sahu, a progressive farmer from Durg district of Chhattisgarh and life member of Soil Conservation Society of India has been honoured with Innovative Farmer Award by Indian Agriculture Research Institute (IARI) during Pusa Krishi Vigyan Mela 2023 organised at New Delhi.

The award was bestowed on him for his significant contribution in the field of agriculture and allied activities. Shri Sahu has developed green - coloured rice variety named 'Kamal Green Rice' which has been spread among National Innovation Foundation and farmers of ten states of India and it has been registered by plant breeding section of the Ministry of Agriculture, GoI. Shri Rohit Sahu has also been conserving 50 indigenous crop varieties and has inclination to preparation of various home-made organic pesticides. He has adopted cattle based non-toxic farming and utilizes azolla and urine of indigenous cattle in place of nitrogenous fertilizers in crop.

Principal Scientist Dr JPS Dabas, Joint Director RN Padaria and Director AK Singh felicitated Shri Rohit Sahu with a letter of appreciation.

G20 भारत 2023 INDIA

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5th International Conference on

SUSTAINABLE NATURAL RESOURCE MANAGEMENT UNDER GLOBAL CLIMATE CHANGE

November 7-10, 2023

At NASC Complex, New Delhi, India

Organized by

Soil Conservation Society of India (SCSI), New Delhi, India

Conference updates

Detailed information and updates about the Conference will be available at the society's website www.scsi.org.in

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