

### Historical Back Ground

The Indian Institute of Soil and Water Conservation (formerly known as Central & Soil Water Conservation Research and Training Institute) was established on 1<sup>st</sup> April, 1974 with Headquarters at DehraDun by combining Soil and Water Conservation Research, Demonstration and Training Centers established in 1950's at DehraDun, Kota, Bellary, Udhagamandalam, Vasad, Agra and Chandigarh. Research centers were initially established by the Government of India and transferred to the Indian Council of Agricultural Research (ICAR) on 1<sup>st</sup> October, 1967. Subsequently two new Research Centers were established, one at Datia in Madhya Pradesh (18<sup>th</sup> September, 1986) to tackle soil and water conservation issues of Bundelkhand region and another at Koraput in Orissa (31<sup>st</sup> January, 1992) to address the ill effects of shifting cultivation. The Institute and its Research Centers, since inception, have focused primarily on evolving strategies for controlling land degradation (by adopting watershed approach), targeting area specific problems (such as ravines, landslides, mine spoils and torrents), demonstration of technologies for popularisation and imparting training besides developing technologies for water harvesting and recycling.

In the year 1956, experimental watersheds were set-up for generating watershed-based protection and production technologies. From the year 1974 onward, the Institute pioneered in operationalising the watershed concept through four Operational Research Projects at Sukhomajri (Haryana), Nada (Chandigarh), Fakot (Tehri-Garhwal in Uttarakhand), and G.R. Halli (Chitradurga, Karnataka). On realising, tremendous tangible and intangible, benefits from these watersheds, the ICAR developed 47 model watersheds in sixteen states in collaboration with State Agricultural Universities and State Agriculture Departments. Encouraged with the success of the model watersheds, the Ministry of Agriculture conceived a mega project entitled “National Watershed Development Programme for Rainfed Areas” (NWDPA) for resource conservation and sustainable agricultural development in 29 states during 1991. Subsequently, the focus of watershed development programmes shifted towards community participation besides biophysical aspects to achieve sustainability in production systems. Success of the watershed management programmes generated a lot of interest among different stake holders and attracted many international agencies, like World Bank, ICIMOD, EEC, DANIDA, KfW Germany, SIDA and Swiss Development Corporation, for support, collaboration and funding. The research and training experience of the Institutes and its Research Centers is being put to good use by the Ministries of Agriculture, Rural Development, Environment & Forests, NRAA and various Central and State departments for capacity developmental programmes.

### Land Degradation Scenario

India is blessed with vast natural resources but increasing pressure on land is disturbing the natural balance between the soil formation and soil depleting processes resulting in serious problems of land degradation which is threatening the national food security. As per the harmonized database on land degradation, about 120.72 m ha (36.70%) is suffering from various forms of land degradation on arable (104.19 m ha) and non-arable (16.53 m ha) lands out of the total geographical area of 329 M ha. In the degraded arable land, water erosion is the chief contributor (73.27 m ha) followed by chemical degradation (17.45 m ha), wind erosion (12.40 m ha) and physical degradation (1.07 m ha). Also, water erosion (9.30 m ha) and chemical degradation (7.23 m ha) are two major factors for land degradation in open forest areas. Land degradation through specific problems affects 17.96 m ha area comprising 8.53 m ha waterlogged, 5.50 m ha saline soils including coastal sandy area, 3.97 m ha ravines and gullies, 1.73 m ha shifting cultivation and 2.73 m ha riverine areas and torrents. Denudation of forest land in various watersheds has resulted in recurring floods, *chaos* and torrents besides there are serious issues of landslides, silting of rivers and reservoirs. The annual production loss in major rain fed crops due to erosion in the country has been assessed as 15.7% of total production of cereals, oilseeds and pulses. These losses can be prevented or minimised by adopting appropriate SWC strategies on arable and non-arable lands following the concept of participatory integrated watershed management.

## Mandate

- Research for management of land degradation in a primary production systems and rehabilitation of degraded lands in different agro-ecological regions of the country.
- Co-ordinate research network for developing location-specific technologies in the area of soil and water conservation.
- Centre for training in research methodologies and updated technology in soil and water conservation and watershed management.

## Presentation of Research Progress

The research progress for the year 2018-19 is being presented in a programme mode as per the advice of Research Advisory Committee of the Institute and as recommended by ICAR committee. Accordingly, the research activities were rationally divided into six programmes and 13 sub-programmes. For meaningful and logical comparison of research findings within a research programme/project, the order of presentation is as per agro-climatic regions, viz; hill region (DehraDun, Chandigarh, Udhagamandalam Centres), ravine region (Agra, Kota, Vasad), Bundelkhand region (Datia), black soil semi-arid region (Bellary) and shifting cultivation-lateritic soil region (Koraput). The research programmes and Programme Leaders are as follows:

Research programme	Project Leaders
P-1 : Water erosion appraisal in different agro-ecological regions.	Dr. P.R. Ojasvi
P-2 : Conservation measures for sustainable production systems.	Dr. N.K. Sharma (Arable)
	Dr. Harsh Mehta (Non-arable)
P-3 : Watershed hydrology for conservation planning.	Dr. D.R. Sena
P-4 : Rehabilitation of areas affected by mass erosion.	Dr. Ambrish Kumar
P-5 : Integrated watershed management for socio-economic growth and policy advocacy.	Dr. Pradeep Dogra
P-6 : Human resource development and technology transfer.	Dr. Bankey Bihari

## Organisational Set-up

The information on organizational set-up had been presented through a chart in the beginning of the report.

## Important Events

### Union Minister of Agriculture & Farmer's Welfare Visited Research Centre Vasad

Shri Radha Mohan Singh Ji, Hon'ble Union Minister of Agriculture & Farmers' Welfare visited Research Centre, Vasad on September 10, 2018. Hon'ble Union Minister had a fruitful interaction with the staff members on various issues and enquired about center's activities and their impact. Dr. P.R. Bhatnagar, Head made a presentation about the ongoing research projects at the Research Centre. A visit to the Research Farm located on NH- 8 was also arranged.



### Institute Celebrates 45<sup>th</sup> Annual Day

The ICAR-IISWC, DehraDun celebrated its 45<sup>th</sup> Annual Day on April 7, 2018. Sh. Subodh Uniyal, Hon'ble Minister of Agriculture & Horticulture, Uttarakhand graced the occasion as Chief Guest. Dr. P.K. Mishra, Director highlighted the achievements of the Institute. The Hon'ble Chief Guest congratulated the Institute for its good work at field level and underlined importance of soil and water conservation in agriculture, the main livelihood of rural Uttarakhand. Highlighting, Uttarakhand state's present agricultural scenario



with migration as the prime problem, he emphasised on Community Farming and “*Chak Bandi*” as solution to the problem. He further stressed upon importance of organic farming and horticulture for State's farmer. Farmers of Utpalta, Hattal-Sainj, Kalsi, and Langha villages and Raipur Block collaborating with Institute in various projects were felicitated on the occasion. The farmers expressed their heartfelt gratitude for various soil and water conservation interventions and watershed development works under taken by the institute.

### ICAR Governing Body Member Visited IISWC

Shri Suresh Chandel ji, Ex-Member of Parliament and Hon'ble Member of ICAR Governing Body visited the institute during May 3-4, 2018 and took stock of the research, extension, training and administrative activities. He interacted with the Director, Chief Administrative Officer, Senior Finance & Accounts Officer and other administrative staff, wherein important issues were discussed. The Hon'ble Member also visited Research Farm and expressed his contentment about efforts, being made to address soil and water conservation problems.



### Secretary (DARE) & Director General (ICAR) Visited Research Centre Chandigarh

Dr Trilochan Mohapatra, Hon'ble Secretary (DARE) & Director General (ICAR), visited Research Centre, Chandigarh on September 9, 2018. He was accompanied by Dr K. Alagusundaram, Deputy Director General (Engg & NRM), ICAR. Dr Trilochan Mohapatra showed keen interest in Center's research activities and asked for its major achievements. He was apprised of developed technologies and success stories. Hon'ble Secretary lauded the achievements of the centre and also enquired about ongoing research projects. He also emphasised on making short technology brochures, which should be able to impress the stakeholders by brieflook.



### Annual IRC Meeting-2018 of Institute Held

The annual Institute Research Committee (IRC) Meeting was held at DehraDun during April 23-28, 2018. Dr. P.K. Mishra, in his opening address emphasised upon hard work with new ideas and technologies to focus on land degradation and its restoration. During the week long deliberations, progress of seventy seven ongoing projects, including four core projects and twelve externally funded projects, were presented and discussed. Seven new project proposals, recommended by the Research Advisory Committee (RAC) and six observational trials, were also presented. Dr. P.K. Mishra gave a presentation on “Paradigm Shift in Addressing Land Degradation and Restoration Issues in the Context of IPBES (Inter-governmental Platform on Bio-diversity and Eco-system Services) Conceptual Framework”.





### Quinquennial Review Team visited Research Centre Vasad and Datia

The Quinquennial Review Team (QRT) for ICAR-IISWC visited Research Centre Vasad and Datia to review activities in various domains. The QRT took stock of infrastructure and staff position at the Centres. The team visited the ongoing experiments at research farms and held extensive discussions on objective, methodology and findings. The Quinquennial Review Team appreciated the well maintained experiments and suggested to record all possible parameters required to support output from the treatments. Field visits were conducted to Transfer-of-Technology and externally funded project sites followed by meeting with the farmers. The team appreciated the works undertaken at farmer's fields. The QRT Chairman, Dr. Pratap Narain, ex-VC, SKRAU, Bikaner and ex-Director, CAZRI, Jodhpur in his remarks appreciated the research work being carried out at the centres, and suggested that the three ravine centres along with Datia centre may work on an interlinked frame of research programme in order to avoid duplicity.



### Plantation Drive under Mission Rispana to Rishiparna

ICAR-IISWC, DehraDun actively participated in plantation drive under Mission Rispana to Rishiparna for reviving the dying Rispana river, whose upper region continues to provide drinking water to DehraDun. In this programme, staff members including Scientists, Technical Officer, Officer Trainees (118 batch of regular training), skilled supporting staff and contractual staff actively participated. About 300 pits were dug on May 19, 2018 in the allotted block No. 37 in upper catchment of Rispana river at village Karwana in Rajpur Block.



### International Yoga Day Celebrated

Fourth International Yoga Day was celebrated at IISWC, DehraDun, and its Research Centres on June 21, 2018. Under the theme “Yoga for Harmony and Peace”, Hon'ble Prime Minister Shri Narendra Modi ji led thousands of volunteers to perform yoga asanas at a function organised at Forest Research Institute campus, DehraDun. ICAR- IISWC staff members actively participated in the programme. Addressing the gathering, the Hon'ble Prime Minister said that Uttarakhand has been a centre for yoga for several decades. Yoga has now become the biggest mass movement across the Globe in quest for good health and well-being, which is crucial for creation of a peaceful world. Hon'ble Prime Minister urged people to practice yoga to lead a healthy life. A yoga camp was organised at institute campus during June 8-12, 2018. At the Research Centres, yoga instructors sensitised participants about yoga and its various health benefits.



### Capacity building programme on Participatory Integrated Watershed Management conducted

A twelve days capacity building programme on “Participatory Integrated Watershed Management” for

Nadi Veeras of Rally for Rivers -Isha Foundation was organised during 09-20 July 2018 at IISWC Regional Centre Udhagamandalam. This programme aims at training Nadi Veeras of Rally for Rivers to improve their knowledge and skills in planning and implementing soil and water conservation activities through watershed concept.



The training module consists of lectures on site selection and design of soil conservation structures, drainage line treatments, water harvesting and recharge structures, application of GIS in watershed management and benchmark survey for watershed planning. Besides the lectures, the trainees were involved in field exercises/ hands on practice of design and cost estimation of various soil and water conservation, drainage line and water harvesting structures. The trainees also surveyed and prepared detailed project report for Kappathorai watershed.

### World Soil Day celebrated:

World Soil Day was celebrated at IISWC, Head Quarters, Dehra Dun and its research centres on fifth December 2018. Shri Subodh Uniyal, Hon, ble Minister, Government of Uttarakhand was the chief guest at the programme organised at the Institute Head Quarter Dehra Dun. Shri Harbansh Kapoor, MLA, DehraDun Cantonment., Shri. Gauri Shankar, Director Agriculture, Uttarakhand, Shri R.C.Srivastav, Director, Horticulture, Uttarakhand and Shri Vijay Devrani, Chief Agriculture Officer, Uttarakhand also graced the occasion. This year the theme for World Soil Day was “*Be the solution to soil Pollution*” and the programme began with the Oath Taking Ceremony. Dr. P.R. Ojasvi, acting Director extended warm welcome to the chief guest; dignitaries and greeted the participants on the occasion and elaborated upon various programmes being conducted by the Institute across the country. The Chief Guest in his address highlighted the importance of soil health card and encouraged the farmers to diversify and adopt integrated farming in order to double their income. Sh. Harbans Kapoor indicated the importance of utilizing proper fertilizer recommendations for increasing farmer's income and highlighted the great role which the Institute has to play in achieving it. The farmers present shared their experience with regards to application of soil health card.



### National Conference of Farmers First for Conserving Soil and Water Resources in Eastern Region (FFCSWR – 2019) organised

Indian Association of Soil and Water Conservationists, DehraDun in collaboration with ICAR –IISWC,



Research Centre, Koraput organised three days National Conference of Farmers First for Conserving Soil and Water Resources in Eastern Region (FFCSWR – 2019) from 6th -8th February, 2019 at HAL, Sunabeda. During the conference, apart from research deliberations, more than 400 leading and innovative farmers from Eastern states of Bihar, Chhattisgarh, Jharkhand, Odisha and West Bengal, practicing soil and water conservation measures, were felicitated. Along with exhibition stall display of various departments, tour of the research farm, that has different technology related to farming, was also conducted for visiting farmers.



### National Conference of SCSI on Farmers' Friendly Soil and Water Conservation Technologies for Mitigating Climate Change Impact organised

Twenty eighth National Conference of Soil Conservation Society of India on Farmers' Friendly Soil and Water Conservation Technologies for Mitigating Climate Change Impact was jointly organised by SCSI, ICAR – IISWC, Research Centre, Udhagamandalam and Tamil Nadu State Chapter of SCSI during 31<sup>st</sup> January to 02<sup>nd</sup> February 2019 at Udhagamandalam, Tamil Nadu. The conference was inaugurated by the Thiru. Banwarilal Purohit, Hon'ble Governor of Tamil Nadu. Dr. M. R. Srinivasan, Former Chairman Atomic Energy Commission was the guest of honour. Dr. R.C. Agrawal, Registrar General, Protection of Plant Varieties and Former's Rights Authority, New Delhi delivered the Key note address. Dr Suraj Bhan, President, SCSI, New Delhi welcomed the gatherings and briefed about SCSI activities. On the occasion, Hon'ble Governor felicitated twenty seven scientists, farmers and students for their outstanding contribution in the field of soil and water conservation. The three days conference had a total of ten technical sessions and from each theme, recommendations were derived for developing Farmers' Friendly Soil and Water Conservation Technologies for Mitigating Climate Change Impact in the present scenario. The valedictory function, on 02<sup>nd</sup> February 2019, was chaired by Dr. N. Kumar, Vice Chancellor, TNAU, Coimbatore. Dr. K. Alagusundaram, DDG (Agril. Eng & NRM), ICAR- New Delhi was the guest of honour. Sh. C. Paulrasu, IAS, Executive Director, Tea Board of India, Coonoor; Dr. A. Arunachalam, ADG (International Relations), ICAR, New Delhi; Dr. P.R. Ojasvi, Director, ICAR-IISWC, DehraDun and Dr. E.B. Chakurkar, Director, ICAR- CCARI, Goa also addressed the august gathering on the occasion.



### Training for Technical Officers of ICAR Institutes

Training Programme on Motivation, Positive Thinking and Communication Skills or Technical Officers (T-5 and above) was conducted during 13 -19 March 2019. The week long training was sponsored by ICAR-NAAS, Hyderabad. A total number of twenty four (24) technical officers, including five (05) women from different ICAR institutes, participated.



## Important Publication

- Annual Report 2017-18, ICAR-Indian Institute of Soil and Water Conservation, DehraDun.
- Adhikary, P.P; Hombegowda, H.C; Barman, D; and Madhu, M (2018) Soil and onsite nutrient conservation potential of aromatic grasses at field scale under a shifting cultivated degraded catchment in Eastern Ghats, India. *International Journal of Sediment Research* 33(3):340-350.
- Dash, Ch. J; Adhikary, P.P; Das, N.K; Alam, N.M; Mandal, U and Mishra, P.K (2018) Comparison of rainfall kinetic energy –intensity relationships for Eastern Ghats Highland region of India. *Natural Hazards* 93:547–558.
- Dash, Ch. J., Adhikary, P.P; Madhu, M; Mukhopadhyay, S; Singh, S.K; Mishra P.K (2018) Assessment of spatial changes in forest cover and deforestation rate in Eastern Ghats Highlands of Odisha. *Journal of Environmental Biology* 39(2):196-203.
- Jakhar, P; Rana, K.S; Dass, A; Choudhary, A.K; Choudhary, M; Adhikary, P.P and Maharana, J (2018) Resource conservation practices in maize-mustard cropping system: Impact on energy, soil carbon and nutrient dynamics. *Journal of Environmental Biology* 39(4):440-446.
- Kurothe, R.S., Singh, H.B., Tiwari, S.P., Pande, V.C., Bagdi, G.L., Sena, D.R., Vishwakarma, A.K., Kumar, G., Rao, B.K. (2018). 60 Years of Research on Soil and Water Conservation in Gujarat. ICAR-Indian Institute of Soil & Water Conservation, Research Centre, Vasad 388306. 190 p.
- Manivannan, S; Khola, O.P.S; Kannan, K; Choudhury, P.K and Thilagam, V.K (2018) Efficacy of open weave jute geo-textiles in controlling soil erosion and its impact on hill slope stabilization. *Indian Journal of Agricultural Sciences* 88(5):679–84.
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- Raja, P; Bhaskar, B.P; Surendran, U; Rajan, K; Sarkar, S.K; Malpe, D.B and Nagaraju M.S.S (2018) Pedogenesis of spatially associated red and black soils in Purna valley from semi arid region of Central India. *Chemical Geology* 483:174-190.
- Ramesha, M.N; Jhenkhar, M; Holscher, D; Patil, S.L and Hombe Gowda, H.C (2018) Essentiality of fast-growing tree species in Krushi Aranya Prothsaha Yojane. *Current Science* 114(8):1595.
- Shankar, M; Green, S.M; Mishra, P.K; Snöäl, J.T.C; Sharma, N.K; Karthikeyan, K; Somasundaram, J; Kadam, D.M; Dinesh, D; Kumar, Suresh; Kasthuri, T.V and Quine T.A (2018) Nationwide soil erosion assessment in India using radioisotope tracers <sup>137</sup>Cs and <sup>210</sup>Pb: The need for fallout mapping. *Current Science* 115(3):388–390.
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- Manivannan, S; Thilagam, V.K; Kannan, B; and Thiyagarajan, G (2018) Integrated Watershed Management (in Tamil), Thannambikai Publication, Coimbatore, ISBN 978-93-87314-60-3. 262p.
- Madhu, M; Hombegowda, H.C; Meena, M.K and Barla, G.W (2018) Shifting cultivation in Odisha state - Issues and Challenges. ICAR-IISWC Research Centre, Koraput, Odisha, India. PP-02/KR/E-2016, 33p.
- Adhikary, P.P; Hombe Gowda, H.C; and Madhu, M (2018) Alley cropping for resource conservation in degraded highlands of Eastern Ghats of India. ICAR-IISWC Research Centre, Koraput, TB-06/KR/E-2018, 8p.
- Manivannan, S., Thilagam V.K; and Khola, O.P.S (2018) Training Manual on Participatory Integrated Watershed Management. ICAR-IISWC Research Centre, Udhagamandalam, The Nilgiris, Tamil Nadu, 230 p.
- Manivannan, S; Thilagam V.K and Khola O.P.S (2018) Training Manual on Soil and Water Conservation and Watershed Management for B.Tech Students. ICAR-IISWC Research Centre, Udhagamandalam, The Nilgiris, Tamil Nadu.

- Narayan, D (2018) Bundelkhand Mein Prakirtik Sansadhan Sanrakchan Evum Tikau Utpadan Hetu Chana + Sarson ki Antaphasli Kheti (in Hindi). Technical brochure.
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- Patil, S.L; Biswas, H; Morade, A.S; Naik, B.S; Ojasvi, P.R; Dupdal, R; Kumar, S; Prabhavathi, M; Dogra, P and Shrimali S.S (2018) Land Resource Inventory (LRI) Recommendations at work: Monitoring and Evaluation Experience: Sujala III, Karnataka Watershed Development Project II.

### Important Meetings

- 50<sup>th</sup> meeting of Institute Management Committee was held on 29/01/2019 at the Institute Head Quarters, Dehra Dun.

### Training Programme

During the year 2018-19, two batches (118<sup>th</sup> & 119<sup>th</sup> Batches) of regular four months Certificate Courses on Soil and Water Conservation and Watershed Management were conducted at Institute Head Quarters, Dehra Dun. A total number of forty three (43) officers, including fourteen women, attended the training programme. Up to March 2019, 2956 officers have been trained at Head Quarters., Dehra Dun and its regional centers [Bellary, Kota and Udhagamandalam].

### Resource Generation

During 2018-19, revenue worth ₹ 235.85 lakhs was generated. Highest revenue was generated through the sale of farm produce (₹97.70 lakhs) followed by internal resource generation activities viz. training & consultancy (₹24.47 lakhs) and lab analysis (₹1.99 lakhs). It is attributed to efficient management of resources at Research Farms, organisation of short-term courses, analytical testing fee and undertaking a number of consultancy projects. The details of institute unified budget are as under.

<b>Unified Budget</b> [IISWC, DehraDun and its Eight Research Centres]	Funds	₹ 5918.00 lakhs
	Expenditure	₹ 5895.52 lakhs

### Staff Position

The strength of sanctioned staff as on 31.3.2019 including filled and vacant positions is given as follows:

Category	Sanctioned	In position				Vacant
		Total	SC	ST	OBC	
RMP	01	--	--	--	--	--
Head/ Pr. Scientist	12	04	--	--	--	08
Sr. Scientist	24	19	--	01	02	05
Scientist	90	74	10	06	17	16
Administrative	83	62	10	06	04	21
Technical	150	124	23	09	16	26
Supporting	228	136	21	06	21	92
<b>Total</b>	<b>588</b>	<b>419</b>	<b>64</b>	<b>28</b>	<b>60</b>	<b>169</b>