Jawaharlal Nehru Krishi Vishwa Vidyalaya
College of Agricultural Engineering
Jabalpur

ICAR-National Agricultural Higher Education Project

Annual Progress Report
(April'20 to March'21)

Component1b: Centers for Advanced Agricultural Sciences and Technology

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1. Executive Summary

1.1 NAHEP Project Objective:

NAHEP is designed to strengthen the national agricultural education system in India with overall objective to provide more relevant and high-quality education to agricultural university students. This programme will promote efficiency and competiveness through changes in working mechanism of agricultural universities, raising the teaching and research standards through improved research and teaching infrastructure and enhanced faculty competency and commitments, and making agricultural education more attractive to talented students. There are four key components under NAHEP, namely; Institutional Development Plan (IDP), Centers for Advanced Agricultural Sciences and Technology (CAAST), ICAR to support excellence in agricultural universities (AUs), and ICAR Innovation Grants to AUs. It is envisaged that improved AU performance through quality enhancement, better employment and entrepreneurship opportunities created for agriculture graduates, non-accredited AUs attaining ICAR accreditation, and institutional reforms implemented in education division of ICAR and AU sunder these components together shall contribute to the achievement of the overall program objective.

Progress made during period:

The progress made across each component of NAHEP duringApril20 toMarch'21 has been captured herewith.

Component 1 b: Support to Centers for Advanced Agricultural Sciences and Technology (CAAST)

In order to improve standard and quality of agricultural higher education, the investments under CAAST component contribute towards enhancing the relevance of the teaching and research. The focus of CAAST hinges upon development of multidisciplinary faculty, innovative approaches to teaching and research, technology development and commercialization. The holistic approach to teaching and research for agriculture and rural development would be building capacities in a specialized thematic area and cutting-edge agricultural science and make AUs globally competitive and locally relevant. High emphasis on industry orientation of agricultural science and technology generation system through strengthened association and partnership will be laid under this component. It is envisaged that the support and efforts under CAAST would strengthen agricultural higher education with better employment and entrepreneurship opportunities for agriculture graduates.

1.2 Broad Activities during year 2020-21

Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur has been awarded with CAAST on Skill Development to Use Spatial Data for Natural Resources Management in Agriculture with the main objectives of:

1. To build basic capacity for using RS & GIS techniques applied for betterment of Natural Resource Management particularly in Agriculture and allied sectors.

2. To identify appropriate techniques for integration of spatial and ground data to realize problems related to land, water and vegetation.
3. To develop user friendly spatial data products using identified technologies for policy makers, researchers, field workers and farmers.

Activities

- Awareness program for Students
- Introductory program for administrators
- Educative learning for executives
- Capacity building for Scientists, Teachers, officials, students and young professionals
- National and international Training of faculty for knowledge upgradation
- Problem identification in realizing process with satellite and ground data with techniques available.
- Making the spatial data maps more precise and accurate using fine resolution data available with present satellite systems.
- Providing research fellowship to the students undergoing master and doctoral degree involved to undertake research project on related aspects.
- Preparation of Theme based maps
- Preparation of Integrated maps for decision making
- To develop user friendly spatial data products using identified technologies for policy makers, researchers, field workers and farmers.

Summary of work done

NAHEP-CAAST-CSDA identified the training requirements of university faculties and PG and Ph.D. students for enhancing their competencies in spatial data usage for natural resource management in agriculture. The identified training needs are for updating the skills of faculties, Scientists, KVK line staff and PG & Ph.D. students to make them aware about handling the spatial data and their applications especially in agriculture. Also training for higher secondary schools students have been planned in order to promote agriculture education by making them aware about the Agriculture advancements along with applications of RS & GIS in Agriculture. Also future opportunities in Agriculture higher educations also discussed among students of different schools.

The second objective of the CAAST is to start the identification of field problems like land degradation, soil pollution, water stress, crop stress, water declination, low farm income, low productivity etc. and integrate the ground data with spatial data to realize the problems. The NAHEP-CAAST-CSDA has procured the geospatial remote sensing software's and started working on developing precise and accurate spatial maps using fine resolution data e.g. Drainage map, Slope maps, LULC, Soil Maps, Crop Maps, ET maps, Soil Erosion maps etc. to identify the field problems. Also field data procurement is in process for few problem areas. Ground water data analysis and its trend analysis have been started to identify the critical areas where trends were significant on ground water declination. Also students of undergoing master and doctoral degree program have been involved to undertake research project on related aspects. Research fellowship have been provisioned for students working on relevant research problems of this

particular objective. These activities will continue in the following years, also with value addition.

The third objective of the NAHEP-CAAST-CSDA is to start working with Thematic information available on GIS platform to derive useful information e.g. for drought forecasting, disease forecasting, yield assessment, agricultural related input management for precision farming and marketing of agricultural produce within and outside the country. The primary aim of this objective is to prepare ready to use spatial maps (i.e. site suitability map for soil and water conservation, crop yield assessment map, biotic and abiotic stress assessment map, site suitability map for water harvesting structures, evaluation and monitoring impact of watershed management, agro-forestry maps, afforestation priority map, watershed prioritization map, optimized transportation and marketing map) which are user's friendly for decision making in Natural Resources Management in Agriculture. NAHEP-CAAST-CSDA started preparing the thematic maps of different problem area of agriculture and such data will be integrated with ground data to analyze the problem. Remedial measures for identified problems will be addressed by preparing spatial products for end users. These activities will be continued in the following years, also with value addition of mobile app development for farmers and other agriculture stake holders.

1.3 Major achievements

1.3.1 Capacity Building

Successfully organized8 awareness programs for students, 9 departmental, 8 skill development training programs for both students and faculty and one Educative Learning for Executives for lectures for adopting RS and GIS and cutting edge techniques in respective fields. An initiative was taken on study of river revival in scarcity area. Student's skill development and awareness programme on 13 aspects of environmental issues were organized under Environmental safeguard plan. The center has also addressed the social and equity aspects of students through 5 awareness programs on social theme/equity aspects involving all categories of students. The number of beneficiaries of the project were 6258 including faculties and students. Awareness campaign was launched for faculty members of three colleges located at Pawarkheda, Balaghat and Rewa districts of Madhya Pradesh.

1.3.2 Problem Identification through RS and GIS

Problems and techniques used to realize the problems of soil, water and plants were identified by the faculty and students together which were used to converge them into research projects for the degree programs. The particular problems includes, to plan priority of Watershed Development works, Demarcation of Ground Water potential zones, Declining Flow in Rivers, Addressing Rainfall variability, Non Availability of spatial crop area maps, Lacking of Land use planning based on Natural Resources and Inappropriate values of hydrological components.

1.3.3 Development of Application products

The project is intended to develop application for Ground water Potential Zoning to facilitate ground water exploration and Recharge, Evaluation of Watershed Activities to appreciate Watershed works and Watershed prioritization to initiate watershed development works for utilization by Field functionaries and Policy makers on Web GIS and Mobile application. Theme based maps on Land use land cover, Crop classification, Rainfall availability and Soil are being prepared for the development of integrated decision-making applications

1.3.4 Out of box research initiatives

(a) Started working on revival of rivers Ms. Ayushi Trivedi, working for her Ph.D. received Augmenting Writing Skill for Articulating Research(AWSAR) Award by Department of Science and Technology (DST) for excellent article including cash prize of 10000/- for science story entitled “Reviving Hopes: Re-Establishment of a Lost River”.

(b) Way towards entrepreneurship- CAE team achieved award low cost onion harvesting machine in technical innovation-based competition Sep 2020-March 2021(TIFAN) amongst 42 teams at national level at MPKV Rahuri organised by Society of Automotive Engineers

(c) Entrepreneurship development - Created awareness among stakeholders through webinar organized on entrepreneurship about options and opportunities to start their own venture. The resource person was Mr Prakash Rai from John Deer Tractor co. Interacted with UG and PG Students on Agricultural Engineering, Farm Mechanization and for timely need of technology and placements.

(d) Students Research aptitude - Ayushi Trivedi Ph D Student achieved Best Paper Award at National Web-Conference on Technological Approaches for Resource Conservation and Management for Environmental Sustainability organized online on August 16-17, 2020, on ‘Determination of Quantum Recharge Requirement by Utilizing Spatial Data for Revival of Kanari River’.

(e) Publication initiatives- One day webinar on H–index organized on 28 June 2020 attended by 140 PG and Ph.D. students including faculty. The webinar covered understanding the H-index, determination of H-index, creation and updating, key points for improving H-index of individual and of university, and then hands on experience

(f) Technical writing skill development: One Day Basic Awareness Program on “Thesis Writing and online Thesis Evaluation” organized on 3rd March, 2021. Renowned academicians explained the components of thesis from conceptualization of the problem, review, synopsis, methodology, analysis and interpretation as well as on line thesis evaluation.

1.3.5 Knowledge Destination

The post graduate and Doctoral students were made aware of the techniques of RS and GIS applicable for their respective fields and the same has been incorporated in the research projects planned by them on Heat stress in crop and planning solution, Contribution of orchard in Carbon sequestration, Spatial Mapping of Orchards , Insect infestation in maize crop, Revival of River, Imbalance in Ground water Utilization, Depleting Ground water availability, Fixing Priority of Watershed development Works, Monitoring Irrigated command, Spatial Monitoring of field Crops and Assessment of Carbon foot prints of various cropping Systems.

1.4 Plan Ahead

1.4.1 Capacity Building

(a) The center has planned the awareness program for students, introductory program for administrators, educative learning for executives and capacity building for scientists, teachers, officials, students and young professionals. First two weeks will be devoted for introductory remote sensing and GIS and basic software learning and third week specifically allocated like for Apps use for Executives, Research tools viz. Groundwater potential zoning, watershed prioritization, crop discrimination, crop acreage estimation etc. for scientists and teachers and Project preparation and

presentation by students.

(b) The CAAST-CSDA has started the online training programme to provide the learning opportunities to the students and faculties not only of JNKVV but of other Agricultural Universities and Organizations. This also enabled the CAAST- CSDA to take the benefits of available experts from all over India due to lock-down period, to develop the networking of CAAST-with the experts and the corresponding organizations; and to keep the staff engaged positively during lock down period and more importantly provide them the opportunities to conduct the on line programme along with the learning opportunities.

(c) The participants were subjected to quizzes and were asked to complete the on-line pre and post evaluation pro-forma. The response was tremendous and feedback was excellent. The center intended to plan more on-line training programmes and webinars in online mode in the different subjects related to application of RS &GIS in the field of agriculture and natural resources management.

(d) As on now, we don't have any plan to conduct the on-campus training program ; but depending on the relaxation of COVID-19 situation, we shall plan for the on-campus training programs on the aspects application of RS and GIS techniques in the Natural resources management and in mobile and web based applications, modelling and decision support systems including latest technology and software available (Artificial Intelligence, machine learning, Python and MATLAB software; and soft computing techniques).

1.4.2 Working on Problem Identification through RS and GIS

The research projects on planning priority of watershed development works, ground water potential zoning, river revival, rainfall variability, spatial crop area maps, land use planning based on Natural Resources management and evaluating hydrological components shall be continued. Problems and techniques used to realize the problems of soil, water and plants shall be continued to be identified by the faculty and students together and shall be used to converge them into new research projects for the degree programs.

1.4.3 User oriented Application Product

The work on development of application for utilization by Field functionaries and Policy makers on Web GIS and Mobile application shall be continued particularly on ground water Potential Zoning to facilitate ground water exploration and Recharge, Evaluation of Watershed Activities to appreciate Watershed works and Watershed prioritization to initiate watershed development works and for other areas applied to agriculture and allied sector.

2. Output-outcome monitoring

S. N.	Particulars	Apr' 20 to March' 21		Remarks (Action plan for areas where improvement is needed)
		Plan	Achievement	
1.	Number of technologies transferred to industry / private sector / national / international organizations	-	-	Action Plan: It is plan to transfer at least two number of the technologies developed under CAAST –JNKVV during the year 2021-22 (second effective year of the project). Efforts are planned to finalize them after the lock down period is over and normalized working starts in the project.
2.	Number of students selected in JRF / SRF / ARS/GATE	68	37* Data required	Action Plan: Special trainings/ workshops on competitive examinations for the PG Students will be organized by inviting subject experts; and the capability of the students to excel in theses examinations including GATE for the Agril. Engg. Students will be developed
3.	Number of students who were admitted in foreign universities	-	-	Action Plan: Collaboration with the foreign Universities through CAAST will be initiated for higher enrollment of PG students in Foreign Universities. The process of signing MoUs with the International Universities/Organizations will be speed up for this purpose.
4.	Number of students received National Young Scientist Award	-	-	Action Plan: Awareness among the students regarding National Awards and its criteria will be created through continuous interaction with students using various social media platforms
5.	Number of students received ICAR's Jawaharlal Nehru thesis Award	-	-	Action Plan: 1. Awareness about ICAR's Jawaharlal Nehru thesis Award with in-house screening before submission to ICAR

S. N.	Particulars	Apr' 20 to March' 21		Remarks (Action plan for areas where improvement is needed)
		Plan	Achievement	
				2. Organizing workshops for technical writing skills and research methodology
6.	Number of students awarded at Agri-unifest	7	NOT HELD	Identification, counseling and guidance to students by experts and professionals in different fields for better performance at Agri-University festival
7.	Number of students awarded at Agri uni sports meet	-	NOT HELD	Identification, counseling and guidance to students by experts and professionals in different fields for better performance at Agri-Sports
8.	Number of industry-sponsored projects and positions in cutting- edge areas of agri-science	-	-	Action Plan: 1. Young faculties will be exposed to new cutting-edge research areas through national and international trainings. 2. The collaboration with the industries is being developed through CAAST-CSDA for this purpose; and more number of faculties will be encouraged to earn the industry sponsored projects.
9.	Number of competitive grants from a national/international funding agency	8	3	Action Plan: Workshops and interaction with industries will be organized for preparation of project proposals for external funding
10.	Number of international trainings undertaken by faculties under CAAST	10	NIL-	The faculties are made aware of advanced trainings in RS and GIS application in respective fields and planned to finalize the same after favorable circumstance to move internationally to desired institutes in different countries. Trainings procedure could not be started

S. N.	Particulars	Apr' 20 to March' 21		Remarks (Action plan for areas where improvement is needed)
		Plan	Achievement	
				due to COVID-19 pandemic. However, this planned training will now be scheduled in consultation with required institution when situation gets normal.
11.	Number of national trainings undertaken by faculties under CAAST	11	8	Faculties attending training are counted for the number trainings completed. The Trainings conducted online were only attended by faculty. It is expected to undertake the required trainings by faculty when the situation in country becomes normal.
12.	Number of international trainings undertaken by students under CAAST	-	-	This training will be under taken upon granting the permission from desired institutes and depending on the relaxation of COVID 19 situation. Trainings procedure could not be started due to COVID-19 pandemic. However, this planned training will now be scheduled in consultation with required institution when situation gets normal.
13.	Number of national trainings undertaken by students under CAAST	8	8	Students attending training are counted for the number trainings completed. The Trainings conducted online were only attended by students. It is expected to undertake the required trainings by students when the situation in country becomes normal.
14.	Number of direct beneficiaries of the project	3000	6258	Participation was large due to online programs. The beneficiaries shall be increased by contacting more students within and outside university directly after the situation of Covid 19 improves.

S. N.	Particulars	Apr' 20 to March' 21		Remarks (Action plan for areas where improvement is needed)
		Plan	Achievement	
15.	Number of female beneficiaries out of total direct beneficiaries	1500	2743	Participation was large due to online programs. The beneficiaries shall be increased by contacting more students within and outside university directly after the situation of Covid 19 improves.

3. Input and activity monitoring

Input / Activity indicator	Sub- head / category	April'20toMarch'21 Expenditure/ input in INR lakhs		Activity elaboration
		Utilization	Planned	
Goods and equipment	Equipment, Plant & Machinery	**49.39**	**90.00**	For handling RS input data and its processing Spectro-Radiometer (350-1100 nm) (02) and Work Station (20) are procured. Other equipment's including Hyper Spectral Radiometer are under process
	Office equipment	**3.02**	**4.50**	Multi-Functional Photocopier Machine, Public Address System and Wall mounted smart LED display TV For meeting Room required for training were ordered but last one had to be cancelled due to GeM problem.
	Laboratory equipment	**62.01**	**64.00**	The equipment required for locating objects, for processing satellite imageries, for collecting ground truth observations, modeling ground water flow and big data analysis. Procurement of CCTV with 20 cameras and control unit(01), Geo Positioning Systems (15), Software ArcGIS , ERDAS, Air Conditioner (6), Canopy analyzer (1),

Input / Activity indicator	Sub- head / category	April'20toMarch'21 Expenditure/ input in INR lakhs		Activity elaboration
		Utilization	Planned	
				Line Quantum PAR sensor with logger (02), Chlorophyll SPAD meter (05), Software Visual MODFLOW (3D), MATLAB, Crop growth modelling software etc is almost over.
	Furniture & fixtures	**15.25**	**9.00**	For establishing training and capacity building facility, the required furniture namely Steel Almirah (06), Book Shelves (10), Chairs For executives (10), Table for executives, Steel Rack (06), Lab stool (10), Compactor (01), Computer tables (50), Computer Chairs (50), Side table with Drawer (05) are procured.
	Computers and Peripherals	**6.99**	**8.00**	10 Desktop computers and 4 printers were purchased for training, data analysis and completion of day to day activities of the project.
	Books and Journals	**0.00**	**4.00**	List of books from different disciplines of thematic areas of the project has been prepared and purchase process is on in STEP.
Civil works	Minor repair and renovation works	**41.64**	**40.00**	The contract has been signed for Civil works for renovation and establishment of RS and GIS lab and training facility.
Human capacity building	National level training	**-**	**5.00**	The activity is in online mode and therefore expenditure is yet to start when the situation permits.
	International level training	**-**	**-**	Venue and Institutes could not be materialized due to restrictions of COVID 19 Protocol. Therefore, expenditure is yet to start when the

Input / Activity indicator	Sub- head / category	April'20toMarch'21 Expenditure/ input in INR lakhs		Activity elaboration
		Utilization	Planned	
				situation permits The training will be completed using allocated amount once the restrictions due to COVID 19 are removed.
	Short visit/ seminars	**0.00**	**5.00**	Venue and Institutes could not be materialized due to restrictions of COVID 19 Protocol. Therefore, expenditure is yet to start when the situation permits The visits/seminar will be completed using allocated amount once the restrictions due to COVID 19 are removed.
	Meetings and workshops	**0.47**	**3.00**	Venue and Institutes could not be materialized due to restrictions of COVID 19 Protocol. Therefore, expenditure is meager, it shall be made when the situation permits. The amount was utilized to meet the expenditure during local meetings and workshops.
Consultancy	National level consultancies	**0.00**	**10.00**	Renewed attempts will be made to utilize the grants under national level consultancy.
Recurrent cost /	Travel	**0.05**	**6.00**	Very little expenditure towards local state level travels. The travelling was restricted due to COVID 19 Protocol. Therefore, expenditure is yet to start when the situation permits. The expenditure shall be incurred on field visits for students, meeting of staff for collaboration with national partners etc.

Input / Activity indicator	Sub- head / category	April'20toMarch'21 Expenditure/ input in INR lakhs		Activity elaboration
		Utilization	Planned	
Miscellaneous	Contractual services	**26.28**	**73.50**	Salary of contractual staff, skilled workers, and office and field assistants and contractual labourer wages for about 4-5 months were incurred from this head. The low expenditure is due to late appointments of contractual staff due to Covid 19 Restrictions. Now the project is working with about 90 percent staff.
	Operational costs	**13.43**	**65.00**	Expenditure on recurring contingent charges for management and operating laboratories, farm inputs, purchase of spare parts etc. was done through this head. Expenditure for contingencies required for innovative research projects was incurred. The low expenditure is due to late appointments of contractual staff due to Covid 19 Restrictions. Now the project is working with about 90 percent staff. The students are conducting their research work with certain restrictions due to limited hostel facility and their movement in field due to Covid Pandemic. The same is expected to improve in near future.
	Institutional charges	**7.93**	**20.00**	Expenditure has been incurred on the development of farm improvement activities and better facility for operation and monitoring of the Project at College and University level.
Total		**226.50**	**407.00**	

4. Case study/Success story:

<table>
<tr><th colspan="2">Major categories of success stories / case studies:</th></tr>
<tr><td>a) MoUs signed:
Signed with Jabalpur Engineering College
Signed with Jabalpur Municipal Corporation.
Signed with Govt Home Science College.
Signed with Govt College Panagar.
Signed with JNKVV-Department of Bio-technology (DBT) Govt. of India
Signed with JNKVV-Indian Meteorological Department IMD, (MoES) Pune
Signed with JNKVV- Indian Meteorological Dept. Ministry of Earth Science, New Delhi
Signed with JNKVV-ICAR, New Delhi (Umbrella MoU of AICRPS)
Signed with JNKVV, Jabalpur-Bayer Bio-Science Private Limited, Thane (MS)
Signed with IABM-JNKVV - IUM-(RDVV, Jabalpur)
With Central Citrus Research Institute in process.
With Indian Institute of Information Technology, Design and Manufacturing in process.</td><td>b) Media coverage of project activities and achievements:
Print / press release: Activities under CAAST-CSDA Published in newspapers
Social media coverage: Activities under CAAST- CSDA covered on different social media platforms like face book, twitter, Instagram, WhatsApp and Project as well as VV website.</td></tr>
<tr><td>c) Establishment of facilitative centers:
Spatial Data lab / Centre
Capacity building Centre
Upgradation of existing RS GIS lab
Online meeting platform Webex, google meet, Zoom for regular meetings and training classes</td><td>d) Digital initiatives undertaken:
Initiated development of Application (Mobile / Web based)
Design and Development of Mobile App
Development of Android Application with database
Online meeting platform Webex, google meet, Zoom for regular meetings and training classes.
Digital information to students in form of soft notes and videos during Covid pandemic.</td></tr>
<tr><td>e) Innovations and out of box initiatives undertaken:</td><td>f) Hands on Training to Students:
Supported students and allowing them</td></tr>
</table>

• Started working on revival of rivers • Entrepreneurship through Students participation in Machine Competition TIFAN • Entrepreneurship development awareness among stakeholders • Students Research aptitude • Publication initiatives • Technical writing skill development	for hands on training for research projects on planning on priority of watershed development works, ground water potential zoning. • Land use planning based on Natural Resources management by working with the faculty and students together.

4.1 MoU Signed:

- **Collaborating partners and Status of MoUs:** The status of MoU with different collaborative partners including educational institutes, research organizations and industries of CAAST-CSDA is shown in following table

4.1.1 Educational institutes

Sr. No.	Institute	Purpose	Status
National institute(s)			
1.	Indian Institute of Information Technology, Design and Manufacturing	To promote joint research/education activities with exchange of students	In Process
2.	Jabalpur Engineering College	To promote joint research/education activities with exchange of students	MOU Signed
3.	Govt Home Science College	To promote joint research/education	MOU signed
4.	Govt College Panagar	To promote joint research/education activities	MOU Signed

4.1.2 Research Organisations

Sr. No.	Organization	Purpose	Status
National Organisation(s)			
1.	Central Citrus research Institute Nagpur	To promote joint research studies with PG students	In process
2.	Department of Bio-technology (DBT) Govt. of India	To promote joint research studies with PG students	MOU Signed
3.	Indian Meteorological Department IMD, (MoES) Pune	To promote joint research studies with PG students	MOU Signed
4.	Indian Meteorological Dept. Ministry of Earth Science, New Delhi	To promote joint research studies with PG students	MOU Signed
5.	ICAR, New Delhi (Umbrella MoU of AICRPS)	To promote joint research studies with PG students	MOU Signed

4.1.3 State Organization

Sr. No.	Organization	Purpose	Status
National			
1.	Jabalpur Municipal Corporation	To promote Green tech activities in Students	MOU Signed

4.1.4 Private Organization

Sr. No.	Organization	Purpose	Status
National			
1.	Bayer Bio-Science Private Limited, Thane (MS)	To promote research collaboration	MOU Signed
2.	Institute of management, Rani Durgawati Vishwavidyalaya	To promote research collaboration	MOU Signed

4.2 Media coverage of project activities and achievements:

4.2.1 Print / press release:

Different activities were conducted by CAAST-CSDA hat attracted the attention of print media; and hence published in newspapers: Different activities performed under CAAST-CSDA Project were flashed in 15 National and Local Newspapers regularly. Following table shows the number of news flashed in corresponding newspaper.

Sr. No.	Name of Newspaper	Activities Published Under CAAST-CSDA	Sr. No.	Name of Newspaper	Activities Published Under CAAST-CSDA
1	Dainik bhaskar	5	12	Yash Bharat	1
2	Patrika	2	13	Tripuri Times	1
3	Hitvada	1	14	See Times	3
4	Nai Duniya	1	15	Swatantramat	3
5	Agniban	1			
6	Haribhumi	2			
7	Navbharat	1			
8	Raj Express	3			
9	JNKVV News	1			
10	Peoples Samachar	2			

जाना रिमोट सेंसिंग के विषय में

जबलपुर। नेशनल एग्रीकल्चर हायर एजुकेशन प्रोजेक्ट (एनएएचईपी) के द्वारा स्कूली छात्रों के लिए रिमोट सेंसिंग और जीआईएस का कृषि में अनुप्रयोग आयोजित किया गया। दो दिवसीय स्किल डेवलपमेंट प्रोग्राम का आयोजन कृषि अभियांत्रिकी संकाय के तत्वावधान में हुआ। अधिष्ठाता डॉ. आरके नेमा का नेतृत्व तथा डॉ. मनोज कुमार अवस्थी (प्रिंसिपल साइंटिस्ट) का निर्देशन रहा। जागरूकता अभियान में क्राइस्ट चर्च गर्ल्स, क्राइस्ट चर्च बॉयज, सेंट अलॉयसियस, सेंट जोसेफ कॉन्वेंट के 87 छात्र शामिल हुए। कार्यक्रम में डॉ. सौरभ नेमा, डॉ. मीनाक्षी मेश्राम ने रिमोट सेंसिंग और जीआईएस टेक्नोलॉजी के कृषि में अनुप्रयोग और कृषि शिक्षा के विभिन्न आयामों पर व्याख्यान दिए। डॉ. आरएन श्रीवास्तव ने संयोजन किया।पी-2

Jabalpur News: विद्यार्थियों ने जाना कि रिमोट सेंसिंग बता सकती है फसल में लगे रोग की स्थिति

जबलपुर, नईदुनिया रिपोर्टर। जवाहर लाल नेहरू कृषि विवि के अंतर्गत कृषि अभियांत्रिकी संकाय से भारत सरकार से प्राप्त परियोजना नेशनल एग्रीकल्चर हायर एजुकेशन प्रोजेक्ट (एनएएचईपी) द्वारा स्कूली विद्यार्थियों के लिए रिमोट सेंसिंग और जीआइएस का कृषि में अनुप्रयोग आयोजित किया गया। यह कार्यक्रम कृषि अभियांत्रिकी संकाय के अधिष्ठाता डॉ. आरके नेमा के नेतृत्व में व डॉ. मनोज कुमार अवस्थी (प्रिंसिपल साइंटिस्ट) के निर्देशन में आयोजित किया गया। कौशल विकास कार्यक्रम के अंतर्गत हुए इस आयोजन में स्कूल विद्यार्थियों को रिमोट सेंसिंग और जीआइएस के बारे में जानकारी दी गई। साथ ही इसमें कृषि और कृषि प्रौद्योगिकियों में भी अब तक की प्रगति पर चर्चा की गई। इस जागरूकता अभियान में क्राइस्ट चर्च गर्ल्स, क्राइस्ट चर्च बॉयज, संत अलॉयसियस, संत जोसफ कॉन्वेंट के 87 विद्यार्थी शामिल हुए। यहां विद्यार्थियों को बताया गया कि वे कृषि शिक्षा में कैसे आगे बढ़ सकते हैं। किस तरह कृषि क्षेत्र में अपना करियर बना सकते हैं।

इसके साथ ही उन्हें रिमोट सेंसिंग व जीआइएस की कार्यप्रणाली के बारे में भी बताया गया। उदाहरण के तौर पर यदि किसी खेत में लगी फसल में कोई रोग लग गया है तो इसे रिमोट सेंसिंग का उपयोग करके हम यह पता लगा सकते हैं कि खेत के कितने क्षेत्र की फसल रोग से खराब हुई है। इसी तरह जीआइएस से खेतों के, वनों के भौगोलिक क्षेत्रों की जानकारी ली जा सकती है। कई किलोमीटर लंबी नहरों को एक ही स्थान से नहीं देखा जा सकता। लेकिन यदि रिमोट सेंसिंग व जीआइएस का उपयोग करें तो एक ही स्थान पर बैठकर पूरी नहर की वास्तविक स्थिति का पता लगाया जा सकता है। विद्यार्थियों ने भी बड़े उत्साह से सारी बातों को समझा। साथ ही इच्छा जताई कि वे कृषि क्षेत्र में अपना करियर बनाना चाहते हैं।

डॉ. आरएन श्रीवास्तव ने इस प्रशिक्षण कार्यक्रम का संयोजन किया। इस जागरूकता कार्यक्रम में डॉ. सौरभ नेमा और डॉ. मीनाक्षी मेश्राम ने रिमोट सेंसिंग व जीआइएस टेक्नोलॉजी के कृषि में अनुप्रयोग और कृषि शिक्षा के विभिन्न आयामों पर व्याख्यान दिया।

Training on Remote Sensing & GIS

पौधे भी उचित मात्रा में ही उपयोग करते हैं जल

कृषि विवि में विश्व जल दिवस पर हुई संगोष्ठी

जबलपुर।

जवाहरलाल नेहरू कृषि विश्वविद्यालय स्थित कृषि विज्ञान केन्द्र में कुलपति डॉ. प्रदीप कुमार बिसेन के मार्गदर्शन एवं संचालक विस्तार सेवायें डॉ. (श्रीमति) ओम गुप्ता के निर्देशन और वरिष्ठ वैज्ञानिक व प्रमुख डॉ. (श्रीमति) रश्मि शुक्ला के नेतृत्व में विश्व जल दिवस पर "जल अनमोल है" विषय पर आयोजित संगोष्ठी में भारतीय कृषि अनुसंधान परिषद नई दिल्ली का वेब कास्टिंग कार्यक्रम प्रसारित किया गया। इसमें केन्द्रीय कृषि राज्य मंत्री पुरूषोत्तम रूपाला एवं महानिदेशक आईसीएआर डॉ. टी. महापात्रा ने उद्बोधन में कहा कि पौधे भी केवल उचित मात्रा में ही जल का उपयोग करते है, ज्यादा या कम होने पर वे बीमार पड़ जाते है। जल अमूल्य है। हमें जल बचाना होगा। केन्द्र प्रभारी डॉ. रश्मि शुक्ला ने कहा कि हमें जल का महत्व समझना होगा, जल व्यर्थ नहीं गंवाना है। कार्यक्रम में "जल अनमोल है" विषय पर कृषि महाविद्यालयीन छात्रों ने विचार रखे। इस वर्ष विश्व जल दिवस-जल अनमोल है थीम रही। कार्यक्रम में डॉ. ए.के. सिंह, डॉ. डी.के. सिंह, डॉ. नीलू विश्वकर्मा, डॉ.अक्षता तोमर,

पानी बहाने वाली सिंचाई पद्धतियों का उपयोग बंद होना चाहिए

जनेकृविवि में विश्व जल दिवस का आयोजन

जबलपुर। जवाहरलाल नेहरू कृषि विवि के अंतर्गत कृषि अभियांत्रिकी महाविद्यालय में भारत सरकार से प्राप्त योजना नेशनल हायर एजुकेशन प्रोजेक्ट द्वारा कुलपति डॉ. प्रदीपकुमार बिसेन के मुख्य आतिथ्य में विवि अधिकारियों, संकाय सदस्यों, कृषि विज्ञान केन्द्र के वैज्ञानिकों, कृषकों एवं छात्रों के साथ विश्व जल दिवस का आयोजन किया गया। इस कार्यक्रम में मुख्य अतिथि की आसंदी से बोलते हुए डॉ. प्रदीपकुमार बिसेन ने भविष्य का जल प्रबंधन का रोड मेप बताया और इसमें कृषि प्राध्यापकों व वैज्ञानिकों को अपनी भूमिका सुनिश्चित करने को कहा। उन्होंने कहा अब समय आ गया है कि हमें सप्लाईड साइड के साथ साथ डिमांड साइड मैनेजमेंट पर भी ध्यान देना होगा। कुलपति डॉ. बिसेन ने चेताया कि अब पानी बहाने वाली सिंचाई पद्धतियों का उपयोग बंद कर देना चाहिए। विशिष्ट अतिथि अधिष्ठाता कृषि संकाय डॉ. धीरेन्द्र खरे ने जल के महत्व को बताया। इस कार्यक्रम में मुख्य वक्ता के रूप में अपना उद्बोधन देते हुए अवधेश कुमार नेमा संयुक्त संचालक कृषि कल्याण व कृषि विकास विभाग म.प्र. शासन ने सिंचाई के विभिन्न साधनों के बारे में बताते हुए इस बात पर जोर दिया कि धरती को हम अपनी माता बोलते जरूर हैं लिन्तु स्वीकार नहीं करते। अब समय आ गया है कि हम जैसे अस्वस्थ होने पर अपनी मां के स्वास्थ्य की चिंता करते हैं वैसे ही धरती मां के स्वास्थ्य की चिंता करनी होगी। कार्यक्रम के दूसरे मुख्य वक्ता विवेक दवे संयुक्त आयुक्त जल ग्रह क्षेत्र प्रबंधन ग्रामीण विकास विभाग भोपाल ने म.प्र. सरकार की नदी पुर्नजीवन पर प्रकाश डाला। इसी क्रम में विवि की पीएचडी छात्रा अनुश्री त्रिवेदी जो नदी पुर्नजीवन में अपना अनुसंधान कर रहीं है उन्होंने अपने कार्य की रूपरेखा को विस्तार से बताया।

इनका रहा सहयोग

कार्यक्रम के सफल तकनीकी संचालन में प्रो. शरद जैन, डॉ. वायएम शर्मा, डॉ. अनय रावत, इंजी. आलोक राजपूत की सराहनीय भूमिका रही। आभार प्रदर्शन डॉ. एमके हरदहा ने किया। इस पूरे कार्यक्रम के समन्वय में डॉ. आरएन श्रीवास्तव ने बताया कि उनके साथ सौरभ नेमा, अर्पणा मीनाक्षी, रचित कृष्णा, ओम, मुकेश सभी टीम, नाहेप के सदस्यों का सहयोग रहा।

बंद हो पानी बहाने वाली सिंचाई पद्धतियों का उपयोग: डॉ. बिसेन

कृषि यूनिवर्सिटी में विश्व जल दिवस पर कार्यक्रम का आयोजन

राष्ट्रीय वेबिनार में दी जल संरक्षण और संवर्धन की जानकारी

उचित मात्रा में ही जल का उपयोग करते हैं पौधे

ऑनलाइन निबंध स्पर्धा

भूजल रिचार्ज की दी जानकारी

पौधे भी उचित मात्रा में ही करते हैं जल का उपयोग

कृविवि में विश्व जल दिवस का आयोजन

World Water day Celebration

जवाहरलाल नेहरु कृषि विश्वविद्यालय, जबलपुर
सूचना एवं जनसम्पर्क विभाग

प्रेषक : *(signature)*
सूचना एवं जनसम्पर्क अधिकारी

क्रमांक 012
दिनांक 21.01.2021

कृषि विवि में आर्टिफिशियल इंटेलिजेंस और मशीन लर्निंग पर दस दिवसीय प्रशिक्षण शुरू

जबलपुर 21 जनवरी। जवाहरलाल नेहरू कृषि विश्वविद्यालय स्थित कृषि अभियांत्रिकी महाविद्यालय में नेशनल हायर एग्रीकल्चर एजुकेशन प्रोजेक्ट (एन.ए.एच.ई.पी.) के तहत आज से कृषि अनुसंधान में नई तकनीकों के अनुप्रयोग हेतु आर्टिफिशियल इंटेलिजेंस और मशीन लर्निंग विषय पर दस दिनी प्रशिक्षण शुरू किया गया, जिसका समापन 30 तक जनवरी होगा। इसके अन्तर्गत प्रदेश एवं देश के विभिन्न कृषि विश्वविद्यालय व केंद्रीय अनुसंधान संस्थानों के 300 से अधिक स्नाकोत्तर एवं पी.एच.डी. के छात्रों एवं शोधकर्ताओं ने तथा कृषि संकाय के कई प्राध्यापक एवं वैज्ञानिकों ने भी इस प्रशिक्षण के लिये अपना रजिस्टेशन किया है। प्रशिक्षण कार्यक्रम का आयोजन अधिष्ठाता कृषि अभियांत्रिकी संकाय डॉ. आर.के. नेमा के नेतृत्व एवं प्रमुख वैज्ञानिक डॉ. मनोज कुमार अवस्थी के मार्गदर्शन एवं संयोजन में किया जा रहा है।

ज्ञात हो कि वर्तमान में दुनिया गंभीर संकटों का सामना कर रही है जैसे क अनियमित जलवायु परिवर्तन, तेजी से बढ़ती जनसंख्या, पानी की कम उपलब्धता, भूजल में कमी सिकुडते खेत, घटते प्राकृतिक संसाधन और बाजार की मांग में बदलाव। इस सब तथ्यों को देखते हुये भविष्य के लिये टिकाऊ कृषि हेतु नई तकनीक आर्टिफिशियल इंटेलिजेंस और मशीन लर्निंग के उपयोग काफी महत्वपूर्ण है क्योंकि इस तकनीको की मदद से फसल की निगरानी, मौसम की स्थिति, तापमान, पानी के उपयोग या अपने खेत से मिट्टी की स्थिति को बेहतर ढंग से अपने फैसले को सूचित करने के लिये फसल स्वास्थ्य के मुद्दे या पोषक तत्वों की कमी रोग का पता लगाना किसी जगह विशेष पर सटीक निर्णय खाद्य सुरक्षा और गुणवता का आकलन जलवायु पूर्वानुमान एवं भविष्यिक विश्लेषण स्थानिक एवं लोकिक डाटा के विश्लेषण द्वारा पोषक तत्वों कि कमी और कीटनाशकों का कुशल उपयोग जैसे कई अन्य अनुप्रयोग भी किये जा सकते हैं। इन मुद्दों पर प्रशिक्षण के साथ ही गहन विचार विमर्श भी होगा।

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कृषि विवि में आर्टिफिशियल इंटेलिजेंस और मशीन लर्निंग पर प्रशिक्षण

जबलपुर। टिकाऊ खेती के लिये नई आर्टिफिशियल इंटेलिजेंस और मशीन लर्निंग तकनीक महत्वपूर्ण सबित होगी। इस तकनीक से यह बात अधिष्ठाता कृषि अभियांत्रिकी संकाय डॉ. आर.के. नेमा एवं विशेषज्ञों ने जवाहरलाल नेहरू कृषि विश्वविद्यालय स्थित कृषि अभियांत्रिकी महाविद्यालय में 10 दिनी प्रशिक्षण के दौरान व्यक्त किये। इसमें 300 से अधिक छात्रों एवं शोधकर्ताओं ने शिरकत की। प्रमुख वैज्ञानिक डॉ. मनोज कुमार अवस्थी ने संचालन एवं आभार व्यक्त किया। ज्ञात हो कि वर्तमान में दुनिया गंभीर संकटों का सामना कर रही है जैसे की अनियमित जलवायु परिवर्तन, तेजी से बढ़ती जनसंख्या, पानी की कम उपलब्धता, भूजल में कमी सिकुड़ते खेत, घटते प्राकृतिक संसाधन और

बाजार की मांग में बदलाव। इस सब तथ्यों को देखते हुये भविष्य के लिये टिकाऊ कृषि हेतु नई तकनीक आर्टिफिशियल इंटेलिजेंस और मशीन लर्निंग के उपयोग काफी महत्वपूर्ण है क्योंकि इस तकनीकों की मदद से फसल की निगरानी, मौमस की स्थिति, तापमान, जल का उपयोग, मिट्टी की स्थिति, फसल स्वास्थ्य, पोषक तत्वों की कमी, रोगों का पता लगाना, खाद्य सुरक्षा, गुणवता का आकलन, कीटनाशकों का कुशल उपयोग जैसे अनेक अनुप्रयोग भी किये जा सकेंगे। इन मुद्दों पर प्रशिक्षण के साथ ही गहन विचार विमर्श किया गया।

सी टाइम्स
पहली नजर पहले खबर

महत्वपूर्ण खबरें

कृषि विवि की शिवांगी को यूजीसी फैलोशिप

जबलपुर। जवाहरलाल नेहरू कृषि विश्वविद्यालय के अन्तर्गत कृषि महाविद्यालय के पादप प्रजनन एवं आनुवांशिक विभाग में पीएचडी अध्ययनरत छात्रा सुश्री शिवांगी राहांगडाले ने आईसीएआर द्वारा ली जाने वाली एनटीए की परीक्षा में उत्कृष्ट स्थान प्राप्त किया है। कुलपति डॉ. पीके बिसेन ने छात्रा कु. शिवांगी की इस उपलब्धि को अत्यंत सराहनीय निरूपित किया। उल्लेखनीय है कि 84 विषयों में आयोजित की जाने वाली परीक्षा यूजीसी नेट जून 2020 में आयोजित की गई थी जिसमें देश के लाखों छात्रों ने परीक्षा दी जिसमें कु. शिवांगी का चयन शोध कार्य के लिए किया गया। शोध कार्य हेतु छात्रा को 31,000रू प्रतिमाह जूनियर रिसर्च फैलोशिप यूजीसी द्वारा प्रदान की जायेगी।

आर्टिफिशियल इंटेलिजेंस और मशीन लर्निंग पर प्रशिक्षण आयोजित

जबलपुर। टिकाऊ खेती के लिए नई आर्टिफिशियल इंटेलिजेंस और मशीन लनिंग तकनीक महत्वपूर्ण साबित होगी। इस तकनीक से यह बात अधिष्ठाता कृषि अभियांत्रिकी संकाय डॉ. आरके नेमा एवं विशेषज्ञों ने जवाहरलाल नेहरू कृषि विश्वविद्यालय स्थित कृषि अभियांत्रिकी महाविद्यालय में दस दिनी प्रशिक्षण के दौरान व्यक्त किये। इसमें तीन सौ से अधिक छात्रों एवं शोधकर्त्ताओं ने शिरकत की। प्रमुख वैज्ञानिक डॉ. मनोजकुमार अवस्थी ने संचालन एवं आभार व्यक्त किया।

कृषि विवि में मशीन लर्निंग पर प्रशिक्षण

जबलपुर। टिकाऊ खेती के लिये नई आर्टिफिशियल इंटेलिजेंस और मशीन लर्निंग तकनीक महत्वपूर्ण सबित होगी। इस तकनीक से यह बात अधिष्ठाता कृषि अभियांत्रिकी संकाय डॉ. आर.के. नेमा एवं विशेषज्ञों ने जवाहरलाल नेहरू कृषि विश्वविद्यालय स्थित कृषि अभियांत्रिकी महाविद्यालय में दस दिनी प्रशिक्षण के दौरान व्यक्त किये। इसमें 300 से अधिक छात्रों एवं शोधकर्ताओं ने शिरकत की। प्रमुख वैज्ञानिक डॉ. मनोज कुमार अवस्थी ने संचालन एवं आभार व्यक्त किया। ज्ञात हो कि वर्तमान में दुनिया गंभीर संकटों का सामना कर रही है जैसे की अनियमित जलवायु परिवर्तन, तेजी से बढ़ती जनसंख्या, पानी की कम उपलब्धता, भूजल में कमी सिकुड़ते खेत, घटते प्राकृतिक संसाधन और बाजार की मांग में बदलाव। इस सब तथ्यों को देखते हुये भविष्य के लिये टिकाऊ कृषि हेतु नई तकनीक आर्टिफिशियल इंटेलिजेंस और मशीन लर्निंग के उपयोग काफी महत्वपूर्ण है क्योंकि इस तकनीकों की मदद से फसल की निगरानी, मौसम की स्थिति, तापमान, जल का उपयोग, मिट्टी की स्थिति, फसल स्वास्थ्य, पोषक तत्वों की कमी, रोगों का पता लगाना, खाद्य सुरक्षा, गुणवत्ता का आकलन, कीटनाशकों का कुशल उपयोग जैसे अनेक अनुप्रयोग भी किये जा सकेंगे। इन मुद्दों पर प्रशिक्षण के साथ ही गहन विचार विमर्श किया गया।

आर्टिफिशियल इंटेलिजेंस व मशीन लर्निंग का दिया प्रशिक्षण

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टिकाऊ खेती के लिए नई आर्टिफिशियल इंटेलिजेंस और मशीन लर्निंग तकनीक महत्वपूर्ण सबित होगी। उक्त बात अधिष्ठाता कृषि अभियांत्रिकी संकाय डॉ. आरके नेमा एवं विशेषज्ञों ने जवाहरलाल नेहरू कृषि विश्वविद्यालय स्थित कृषि अभियांत्रिकी महाविद्यालय में दस दिनी प्रशिक्षण के दौरान व्यक्त किए। इसमें 300 से अधिक छात्रों एवं शोधकर्ताओं ने शिरकत की। प्रमुख वैज्ञानिक डॉ. मनोज कुमार अवस्थी ने संचालन एवं आभार व्यक्त किया।

महत्वपूर्ण साबित होगी मशीन लर्निंग तकनीक

जबलपुर। टिकाऊ खेती के लिए नई आर्टिफिशियल इन्टेलिजेंस और मशीन लर्निंग तकनीक महत्वपूर्ण साबित होगी। इस तकनीक की जानकारी अधिष्ठाता कृषि अभियांत्रिकी संकाय डॉ. आरके नेमा एवं विशेषज्ञों ने जेएनकेविवि स्थित कृषि अभियांत्रिकी महाविद्यालय में दस दिनी प्रशिक्षण के दौरान व्यक्त की। इसमें 300 से अधिक छात्रों एवं शोधकर्ताओं ने शिरकत की। प्रमुख वैज्ञानिक डॉ. मनोज कुमार अवस्थी ने संचालन एवं आभार व्यक्त किया। वर्तमान में दुनिया गंभीर संकटों का सामना कर रही है, जैसे की अनियमित जलवायु परिवर्तन, तेजी से बढ़ती जनसंख्या, पानी की कम उपलब्धता, भूजल में कमी, सिकुड़ते खेत, घटते प्राकृतिक संसाधन और बाजार की मांग में बदलाव। इन सब तथ्यों को देखते हुए भविष्य के लिए टिकाऊ कृषि हेतु नई तकनीक आर्टिफीशियल इन्टेलिजेंस और मशीन लर्निंग के उपयोग काफी महत्वपूर्ण है। पी-3

Fundamentals of Artificial Intelligence & Machine Learning

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इंजीनियर और कृषि वैज्ञानिक मिलकर लिखेंगे अनुसंधान की नई इबारत

जनेकृविवि और जबलपुर इंजीनियरिंग कालेज के मध्य MOU हस्ताक्षरित

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इंजीनियर और कृषि वैज्ञानिक मिलकर राष्ट्र और जनहित में अनुसंधान की नई इबारत लिखेंगे। इस हेतु जवाहरलाल नेहरु कृषि विश्वविद्यालय और शास. जबलपुर इंजीनियरिंग कालेज के मध्य कुलपति डॉ. प्रदीप कुमार बिसेन की अध्यक्षता में डॉ हस्ताक्षरित हुआ। जनेकृविवि के संचालक षिक्षण डॉ. अभिषेक शुक्ला एवं शास. ईजी. कालेज के प्राचार्य डॉ. अरविन्द कुमार शर्मा ने हस्ताक्षरित प्रतियों का परस्पर आदान-प्रदान किया। ज्ञात हो कि शास. ईजी. कालेज इस वर्ष अपनी हीरक जयंती मनाने जा रहा है। इस मौके पर कुलपति डॉ. प्रदीप कुमार बिसेन ने कहा कि आज की उन्नत खेती रोबोट से होती हुई ड्रोन तक जा पहुँची है। भविष्य में इंजीनियरिंग का समावेष खेती को और भी समुन्नत और समृद्ध करेगा। खेती में एक कुषल इंजीनियर और माटी के स्वास्थ्य के जानकार चिकित्सकों की मांग बढ़ जायेगी। डॉ. बिसेन ने आगे कहा कि दोनों संस्थानों की एतिहासिक पृष्ठभूमि है जहाँ जनेकृविवि एक समय एषिया का सबसे बड़ा विष्वविद्यालय था वहीं जबलपुर इंजीनियरिंग कालेज मध्य भारत का सबसे सषक्त इंजीनियरिंग कालेज है। दोनों की क्षमता का उपयोग जनहित खिषेषकर कृषि से जुडे. कार्यों में हो सकेगा। प्राचार्य डॉ. अरविन्द कुमार शर्मा ने कहा कि प्रदूषण पर बहुत काम करने की आवष्यकता है, आने वाले 5-6 वर्षों में प्रदूषण की समस्या बहुत बढ़ जायेगी। इसका निदान हमें मिलजुल कर करना होगा। साथ ही खाना, पानी, हवा की क्वालिटी में इम्प्रूवमेन्ट करना समय की बड़ी मांग है। इस MOU से षिक्षकों, शोधकताओं और छात्रों के लिये नये रास्ते खुलेंगे। एक ओर जहां इंजीनियरिंग के क्षेत्र में आर्टीफिषिल इंटेलीजेन्सी, इन्टरनेट आफ थिंग्स, सूचना प्रौद्योगिकी, इमेज प्रोसेसिंग मेकाट्रानिक, विद्युत एवं इंडस्ट्रीयल प्रदूषण नियंत्रण आदि क्षेत्रों में जनेकृविवि के स्नातकोत्तर व पीएचडी के छात्रों को नवीन जानकारियों हासिल होंगी, वहीं दूसरी ओर इंजीनियरिंग छात्रों को वानिकी, हार्टीकल्चर, प्रोसेसिंग, जल संरक्षण, जीआईएस (जियोग्राफिकली इंफारमेषन सिस्टम) आदि क्षेत्रों में मार्गदर्षन मिल सकेगा। साथ ही दोनों संस्थान मिलकर कोलेबोरेटिव रिसर्च प्रोजेक्ट पर अनुसंधानात्मक और शोधपरक कार्य कर सकेंगे। इस दौरान अधिष्ठाता कृषि संकाय डॉ. धीरेन्द्र खरे, संचालक अनुसंधान सेवायें डॉ. पी.के. मिश्रा, संचालक विस्तार सेवायें डॉ. (श्रीमति) ओम गुप्ता, संचालक प्रक्षेत्र डॉ. दीप पहलवान, अधिष्ठाता छात्र कल्याण डॉ. अमित षर्मा, विभागाध्यक्ष डॉ. अतुल श्रीवास्तव, डॉ. मनोज अवस्थी उपस्थित रहे। कार्यक्रम का संचालन डॉ. अनिल कुमार राय संचालक उपकरण एवं आभार प्रदर्षन अधिष्ठाता कृषि अभियाँत्रिकी संकाय डॉ. आर.के. नेमा ने किया।

JNKVV signs MoU with Govt Engineering College for technological growth

■ Staff Reporter

A MEMORANDUM of Understanding (MOU) was signed between Jawaharlal Nehru Krishi Vishwavidyalaya (JNKVV) and Government Engineering College (GEC). The MoU was signed under the leadership of Vice-Chancellor Dr Pradip Kumar Bisen. JNKVV'S Director, Education, Dr Abhishek Shukla and GEC Principal Dr. Arvind Kumar Sharma exchanged the signed copies of the MoU.

Speaking on the occasion, Vice-Chancellor Dr Pradip Kumar Bisen said that involvement of engineering would increase scope in agriculture. The demand for engineer and agriculture scientists will increase in future Dr. Bisen added that both the institutes have a historic background.

Principal Dr. Arvind Kumar Sharma said that it is necessary to curb pollution. In the coming years, the problem of pollution is likely to increase. He added that the quality of food and air needs improvement.

The MOU will pave way for teachers, researchers and students. On one hand, the PhD students of JNKVV will learn about Artificial Intelligence, Internet of things, Image processing mechatronics etc. On the other hand, engineering students will get a chance to learn about Horticulture, Processing, Water Conservation and Geographically Information System (GIS). The institutes will be able to conduct collaborative research projects in future.

Faculty of Agriculture Dr Dheerendra Khare, Technical Services Director Dr P K Mishra, Extension Services, Director Om Gupta, Student Welfare Director Dr Amit Sharma were present. Faculty of Agriculture Engineering Dr R K Nema proposed a vote of thanks.

अच्छी खबर · · कृषि यूनिवर्सिटी एवं शास. जबलपुर इंजीनियरिंग कॉलेज के बीच एमओयू हस्ताक्षरित

इंजीनियर व कृषि वैज्ञानिक मिलकर लिखेंगे अनुसंधान की नई इबारत

जबलपुर ■ राज न्यूज नेटवर्क

इंजीनियर और कृषि वैज्ञानिक मिलकर राष्ट्र और जनहित में अनुसंधान की नई इबारत लिखेंगे। इस हेतु जवाहरलाल नेहरु कृषि यूनिवर्सिटी और शास. जबलपुर इंजीनियरिंग कालेज के मध्य कुलपति डॉ. प्रदीप कुमार बिसेन की अध्यक्षता में एमओयू हस्ताक्षरित हुआ। कृषि यूनिवर्सिटी के संचालक शिक्षण डॉ. अभिषेक शुक्ला एवं शास. इंजी. कालेज के प्राचार्य डॉ. अरविन्द कुमार शर्मा ने हस्ताक्षरित प्रतियों का परस्पर आदान-प्रदान किया।

उल्लेखनीय है कि शास. इंजी. कालेज इस वर्ष अपनी हीरक जयंती मनाने जा रहा है। इस मौके पर कुलपति डॉ. बिसेन ने बताया कि आज की उन्नत खेती रोबोट से होती हुई ड्रोन तक जा पहुंची है। भविष्य में इंजीनियरिंग का समावेश खेती को और भी समुन्नत और समृद्ध करेगा। खेती में एक कुशल इंजीनियर और माटी के स्वास्थ्य के जानकार चिकित्सकों की मांग बढ़ जायेगी। डॉ. बिसेन ने आगे कहा कि दोनों संस्थानों की एतिहासिक पृष्ठभूमि है। दोनों की क्षमता का उपयोग जनहित विशेषकर कृषि से जुड़े कार्यों में हो सकेगा। प्राचार्य डॉ. अरविन्द कुमार शर्मा ने कहा कि प्रदूषण पर बहुत काम करने की आवश्यकता है, आने वाले 5-6 वर्षों में प्रदूषण की समस्या बहुत बढ़ जायेगी। इसका निदान हमें मिलजुल कर करना होगा। साथ ही खाना, पानी, हवा की क्वालिटी में इम्प्रूवमेंट करना समय की बड़ी मांग है।

अनुसंधान के लिए खुलेंगे नए रास्ते

इस एमओयू से शिक्षकों, शोधकर्ताओं और छात्रों के लिये नये रास्ते खुलेंगे। एक ओर जहां इंजीनियरिंग के क्षेत्र में आर्टिफिशल इंटेलीजेन्सी, इंटरनेट ऑफ थिंग्स, सूचना प्रौद्योगिकी, इमेज प्रोसेसिंग मेकाट्रानिक, विद्युत एवं इंडस्ट्रीयल प्रदूषण नियंत्रण आदि क्षेत्रों में कृषि यूनिवर्सिटी के स्नातकोत्तर व पीएचडी के छात्रों को नवीन जानकारियों हासिल होंगी, वहीं दूसरी ओर इंजीनियरिंग छात्रों को वानिकी, हार्टीकल्चर, प्रोसेसिंग, जल संरक्षण, जीआईएस (जियोग्राफिकली इंफारमेशन सिस्टम) आदि क्षेत्रों में मार्गदर्शन मिल सकेगा। साथ ही दोनों संस्थान मिलकर कोलेबोरेटिव रिसर्च प्रोजेक्ट पर अनुसंधानात्मक और शोधपरक कार्य कर सकेंगे।

ये रहे मौजूद

एमओयू हस्ताक्षर के दौरान अधिष्ठाता कृषि संकाय डॉ. धीरेंद्र खरे, संचालक अनुसंधान सेवायें डॉ. पी.के. मिश्रा, संचालक विस्तार सेवायें डॉ. (श्रीमति) ओम गुप्ता, संचालक प्रक्षेत्र डॉ. दीप पहलवान, अधिष्ठाता छात्र कल्याण डॉ. अमित शर्मा, विभागाध्यक्ष डॉ. अतुल श्रीवास्तव, डॉ. मनोज अवस्थी उपस्थित रहे। संचालन डॉ. अनिल कुमार राय संचालक उपकरण एवं आभार प्रदर्शन अधिष्ठाता कृषि अभियांत्रिकी संकाय डॉ. आर.के. नेमा ने किया।

आरडीयू और वेटनरी यूनिवर्सिटी के बीच एमओयू हस्ताक्षरित

रानी दुर्गावती यूनिवर्सिटी एवं नानाजी देशमुख पशु चिकित्सा एवं विज्ञान यूनिवर्सिटी के बीच एमओयू हस्ताक्षरित हुआ। जिसके अंतर्गत आरडीयू के यूनिवर्सिटी प्रबंधन संस्थान के साथ वेटनरी यूनिवर्सिटी के पंचगव्य उत्पादों का प्रचार एवं प्रसार करेंगे तथा उसका मार्केटिंग रिसर्च भी करेंगे, इसके साथ ही आरडीयू का फायो डिजाइन सेंटर व आईपीआर का भी एमओयू के अंतर्गत सहयोग रहेगा। इस एमओयू से छात्रों व शिक्षकों को शैक्षणिक अवसर प्राप्त होंगे। इस एमओयू में वेटनरी यूनिवर्सिटी कुलपति प्रो. एसपी तिवारी, आरडीयू कुलपति प्रो. कपिल देव मिश्रा का मार्गदर्शन प्राप्त हुआ। एमओयू को सफल बनाने में वेटनरी यूनिवर्सिटी के प्रो. श्रीकांत जोशी कुलसचिव प्रो. मधु स्वामी, प्रो. आरपीएस बघेल व प्रो. महाजन तथा आरडीयू के प्रो.शैलेश चौबे व डॉ.आशीष शर्मा का भी योगदान रहा।

इंजीनियर और कृषि वैज्ञानिक मिलकर लिखेंगे अनुसंधान की नई इबारत

जबलपुर। इंजीनियर और कृषि वैज्ञानिक मिलकर राष्ट्र और जनहित में अनुसंधान की नई इबारत लिखेंगे। इस हेतु जवाहरलाल नेहरू कृषि विश्वविद्यालय और शासकीय इंजीनियरिंग कालेज के मध्य कुलपति डॉ. प्रदीपकुमार बिसेन की अध्यक्षता में एमओयू हस्ताक्षरित हुआ। कृषि विवि के संचालक शिक्षण डॉ. अभिषेक शुक्ला एवं शास. इंजी. कालेज के प्राचार्य डॉ. अरविंद कुमार शर्मा ने हस्ताक्षरित प्रतियों का परस्पर आदान प्रदान किया। ज्ञात हो कि शास. इंजी. कालेज इस वर्ष अपनी हीरक जयंती मना रहा है। इस मौके पर कुलपति डॉ. बिसेन ने कहा कि आज की उन्नत खेती रोबोट से होती हुई ड्रोन तक जा पहुंची है। भविष्य में इंजीनियरिंग का समावेश खेती को और भी समुन्नत और समृद्ध करेगा। उन्होंने कहा कि दोनों संस्थाओं की ऐतिहासिक पृष्ठभूमि है। जहां कृषि विवि एक समय एशिया का सबसे बड़ा विश्वविद्यालय था वहीं जबलपुर इंजीनियरिंग कालेज मध्य भारत का सबसे सशक्त इंजीनियरिंग कालेज है। प्राचार्य डॉ. शर्मा ने कहा कि प्रदूषण पर बहुत काम करने की आवश्यकता है। आने वाले 5-6 वर्षों में प्रदूषण की समस्या बहुत बढ़ जाएगी। इसका निदान हमें मिलजुल कर करना होगा।

जनेकृविवि और जबलपुर इंजीनियरिंग कालेज के मध्य एमओयू हस्ताक्षरित

एमओयू से खुलेंगे नए रास्ते

इस एमओयू से शिक्षकों, शोधकर्ताओं और छात्रों के लिए नए रास्ते खुलेंगे। एक ओर जहां इंजीनियरिंग के क्षेत्र में आर्टिफिशियल इंटेलिजेंसी इंटरनेट ऑफ थिंग्स सूचना प्रोद्योगिकी इमेज प्रोसेसिंग मेकाट्रानिक, विद्युत एवं इंडस्ट्रियल प्रदूषण नियंत्रण आदि क्षेत्रों में कृषि विवि के स्नातकोत्तर व पीएचडी के छात्रों को नवीन जानकारियां हासिल होंगी, वहीं दूसरी ओर इंजीनियरिंग छात्रों को वानिकी, हार्टीकल्चर, प्रोसेसिंग जल संरक्षण, जीआईएस आदि क्षेत्रों में मार्गदर्शन मिल सकेगा।

इनकी रही उपस्थिति

इस दौरान अधिष्ठाता कृषि संकाय डॉ. धीरेंद्र खरे, संचालक अनुसंधान सेवाएं डॉ. पीके मिश्रा, संचालक विस्तार सेवाएं डॉ. श्रीमती ओम गुप्ता, संचालक प्रक्षेत्र डॉ. दीप पहलवान, अधिष्ठाता छात्र कल्याण डॉ. अमित शर्मा, डॉ. अतुल श्रीवास्तव, डॉ. मनोज अवस्थी आदि उपस्थित रहे। कार्यक्रम का संचालन डॉ. अनिलकुमार राय ने किया।

MoU Signed with Government Engineering College

Connecting students and farmers with science in Agriculture

World water day

4.2.2 Television coverage: activities under CAAST-CSDA is yet to start

4.2.3 Social media coverage:

Activities of CAAST-CSDA were covered on different social media platforms: Following are the links of CAAST-CSDA on different social media platforms.

- Website: https://nahep-jnkvv.org
- Twitter: https://www.twitter.com/nahep
- Facebook: https://facebook.com/Jnkvvnahep
- Instagram: https://www.instagram.com/nahepjnkvv/

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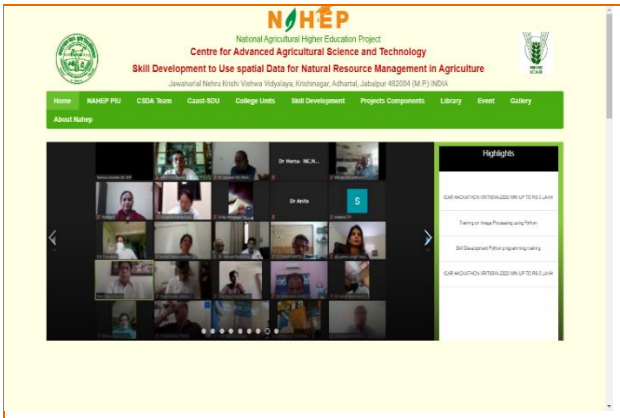
<td> 
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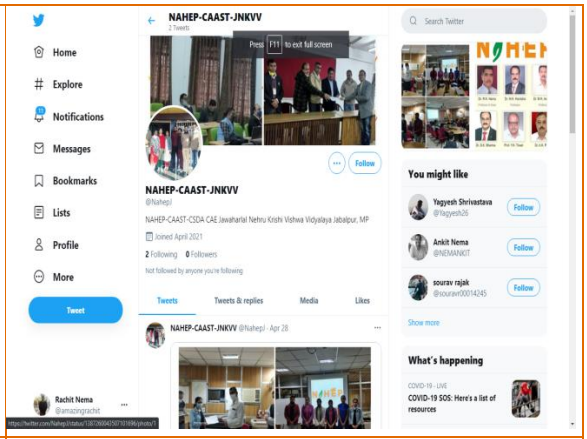
<td> 
</td>
</tr>
<tr>
<td>Website of CAAST-CSDA, JNKVV, Jabalpur (https://nahep-jnkvv.org/)</td>
<td>Twitter Handle of CAAST-CSDA,JNKVV,Jabalpur (twitter/nahepJ)</td>
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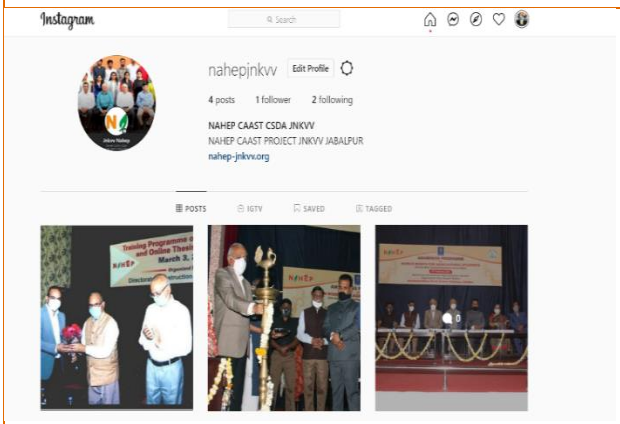
<td> 
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<tr>
<td>Instagram account of CAAST-CSDA, JNKVV (instagram /nahepjnkvv/)</td>
<td>Facebook Page of CAAST-CSDA, JNKVV, Jabalpur (facebook/Jnkvvnahep)</td>
</tr>
</table>

4.3 Establishment of facilitative centers:

BLDG.	lab	DWG No.	AR-01
TITLE:	PHYSICS LAB		
PROJECT :- ANA/2020		REV :	XX
CHK BY :- Er. AWANEESH MEHA		DATE:	Tue,25 Aug, 2020
DRAWN BY:- xx		SCALE :	N.T.S
PURPOSE			
FOR APPROVAL			

R.NO	DESCRIPTION	DATE
xx	xx	xx
xx	xx	xx
xx	xx	xx

GENERAL NOTES

1. EXECUTIVE AUTHORITY SHALL CHECK ALL THE DRAWINGS BEFORE EXECUTION OF THE WORK AND IF ANY, DISCREPANCY IS FOUND IN THE DRAWINGS SHALL BE BROUGHT TO THE NOTICE OF M/S AWANEESH MEHA & ASSOCIATES BEFORE EXECUTION OF THE WORK.
2. FIGURED DIMENSION SHALL BE FOLLOWED.
3. IN CASE OF DOUBT PLEASE ASK.
4. ALL DIMENSIONS ARE GIVEN IN METER & MM UNLESS OTHER- WISE SPECIFIED.
5. RELEVANT SERVICES DRAWINGS ARE TO BE READ SIMULTANEOUSLY AND PROVISION OF CUTOUTS / SLEEVES TO BE PROVIDED AS REQUIRED.
6. ALL MATERIALS / FINISHES TO BE AS SPECIFIED AND APPROVED BY THE CONSULTANTS.

CLIENT:

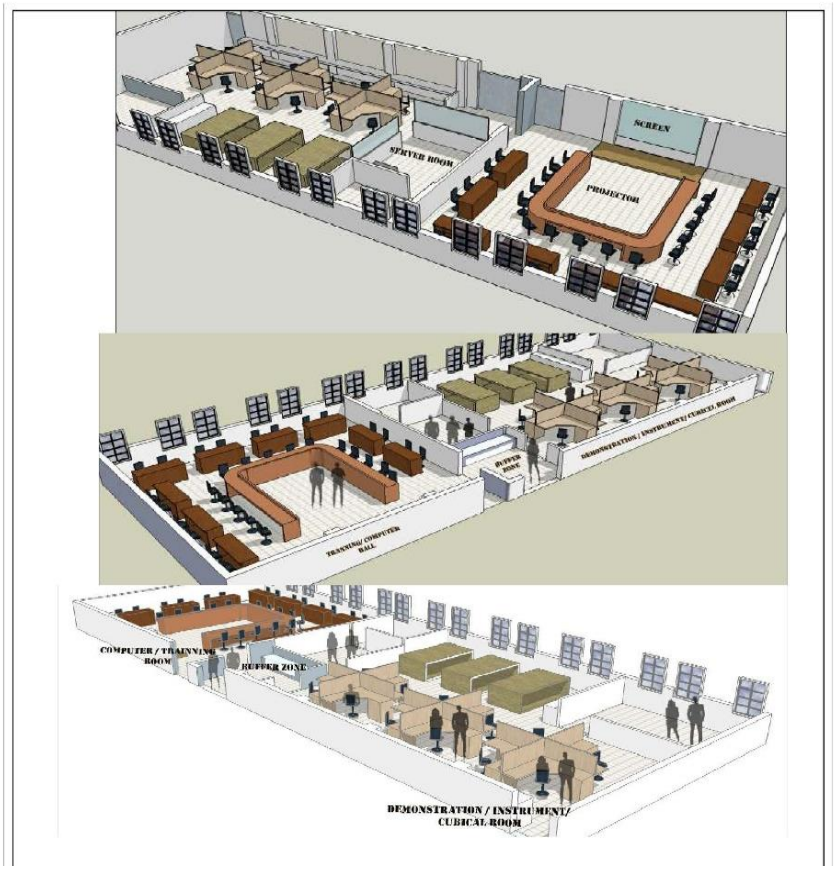
J.N.K.V.V.

PROJECT:

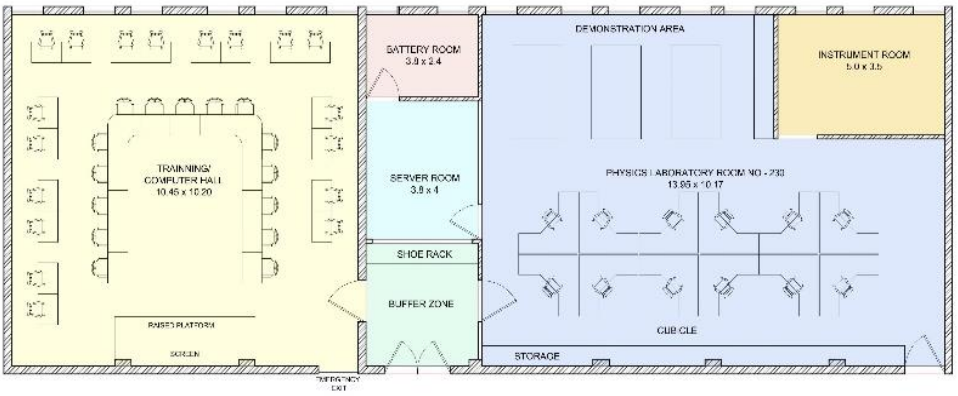
RENOVATION OF PHYSICS LAB AT JNKVV JABALPUR

AWANEESH MEHA & ASSOCIATES

CONSULTING ARCHITECTS & STRUCTURAL ENGINEERS,
INTERIOR DESIGNERS & CONTRACT CONSULTANTS,
DIST. APPROVED VALUERS.

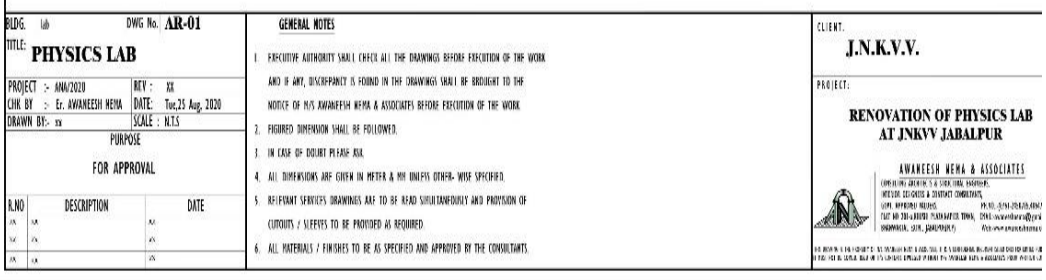


4.3.1 Spatial Data lab / Centre



RENOVATION WORK OPT-1

RENOVATION WORK OPT-2



4.3.2 Capacity Building Centre

- **Upgradation of computers in Remote Sensing & GIS and ARIS laboratories**: The M.Tech and PhD students of Agriculture Engineering College, JNKVV, Jabalpur uses following laboratories for their academic and research work. As the Laboratories were established in 2009-10, the hardware configuration of the computers in theses labs did not support to latest software. Therefore, the hardware configuration has been upgraded through CAAST- CSDA project in 2020-21 as mentioned below table. Upon this up-gradation, the students are able to use these laboratories for the projects and trainings related to Remote Sensing & GIS.

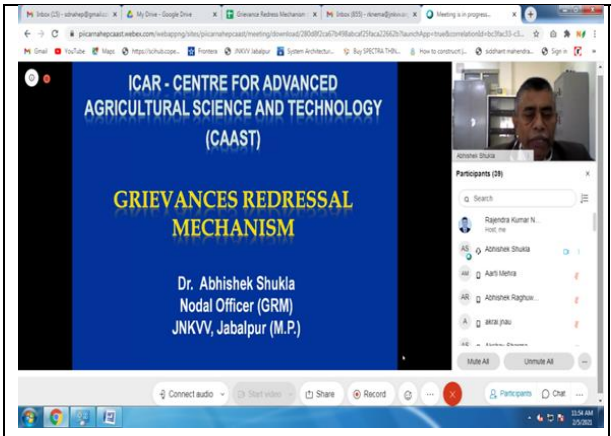
Remote Sensing and GIS laboratory, Department of Soil and Water, Agriculture Engineering College, JNKVV, Jabalpur		**ARIS laboratory, Department of Soil and Water, Agriculture Engineering College, JNKVV, Jabalpur**	
Item	**No**	**Item**	**No**
RAMDDR2 type (4GB) [For 06 Desktop Computer shaving 2 Slots] with installation and testing.	06	RAMDDR2type(4GB) with installation and testing.	06
Wi-Fi Adapterof 6 port and Ethernet Cable withinstallationandtestingfor06 computers.	06	UPS APC make UPS RS 600 with installation and testing	25
ROM Hard disk for Desktop Computer with installation and testing Compatible with PC.	02	Switched Mode Power Supply (SMPS) of Desktop Computers with installation and testing Compatible with PC.	01
UPS Batteries - APC make UPS RS 600 Compatible with PC.	03	Wi-Fi Adapter with installation and testing.	45
Switched Mode Power Supply (SMPS) of Desktop Computers with installation and testing Compatible with PC.	03		

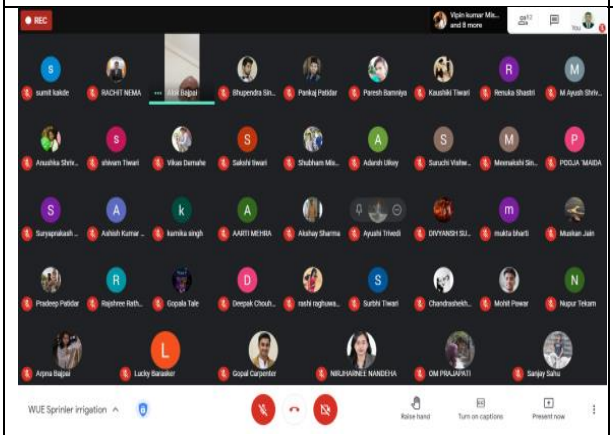
4.3.3 Online meeting platform

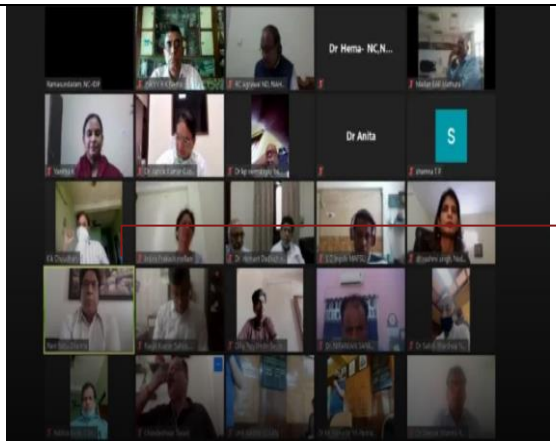
Webex, google meet, Zoom for regular meetings and training classes

Strengthening e-governance activities: Developed and implemented online open learning for students and faculties, Video lectures & web training classes. Platform we are using for different training and workshops are webex, google meet, Microsoft meet and Zoom. Due to CoVID 19 restrictions all trainings and skill development programs were organized on these online platforms, through webex.

Online platforms are very much useful to deliver impactful online trainings and keep online learners engaged during and after the sessions. Share presentations, stream webinars, and encourage participation using tools like whiteboard and chat.







Shows the participation of student through online platform.

4.4 Digital initiatives undertaken

a. Initiated development of Application (Mobile / Web based)

Under this objective, the initiatives has been taken to develop user friendly spatial data product as:

S.N	Application Name	Year of development	Objective	Beneficiaries	Platform
1	Ground water Potential Zoning	Under process	To facilitate ground water exploration and Recharge	Field functionaries and Policy makers	Web GIS and Mobile application
2	Evaluation of Watershed Activities	Under process	To appreciate Watershed works	Field functionaries and Policy makers	Web GIS and Mobile application
3	Watershed prioritization	Under process	To initiate watershed development works	Field functionaries and Policy makers	Web GIS &Mobile application

4.5 Innovations and out of box initiatives undertaken

Started working on revival of rivers

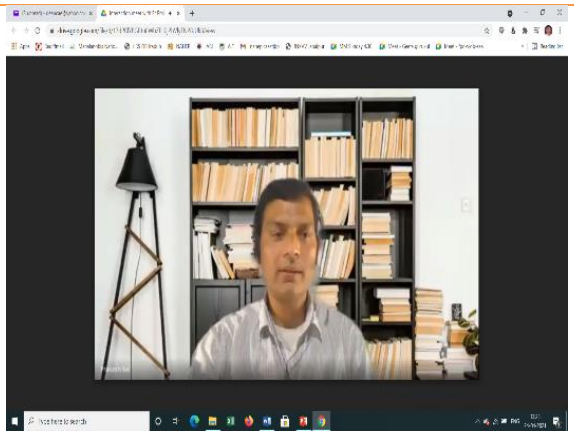
Ms. Ayushi Trivedi, working for her Ph.D. received Augmenting Writing Skill for Articulating Research (AWSAR) Award by Department of Science and Technology (DST) for excellent article including cash prize of 10000/- for science story entitled "Reviving Hopes: Re-Establishment of a Lost River".

Entrepreneurship through Students participation in Machine Competition TIFAN

CAE team achieved award low cost onion harvesting machine in technical innovation-based competition Sep 2020-March 2021(TIFAN) amongst 42 teams at national level at MPKV Rahuri organised by Society of Automotive Engineers

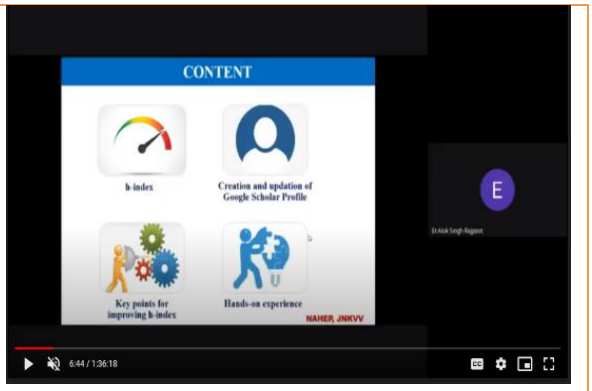
Entrepreneurship development awareness among stakeholders

Created awareness among stakeholders through webinar organized on entrepreneurship about options and opportunities to start their own venture. The resource person was Mr Prakash Rai from John Deer Tractor co. Interacted with UG and PG Students on Agricultural Engineering, Farm Mechanization and for timely need of technology and placements.



Students Research aptitude

Ayushi Trivedi Ph D Student achieved Best Paper Award at National Web-Conference on Technological Approaches for Resource Conservation and Management for Environmental Sustainability organized online on August 16-17, 2020, on 'Determination of Quantum Recharge Requirement by Utilizing Spatial Data for Revival of Kanari River'.

Publication initiatives One day webinar on H–index organized on 28 June 2020 attended by 140 PG and Ph.D. students including faculty. The webinar covered understanding the H-index, determination of H-index, creation and updating, key points for improving H-index of individual and of university, and then hands on experience	
Technical writing skill development One Day Basic Awareness Program on "Thesis Writing and online Thesis Evaluation" organized on 3rd March, 2021. Renowned academicians explained the components of thesis from conceptualization of the problem, review, synopsis, methodology, analysis and interpretation as well as on line thesis evaluation.	

4.6 Hands on Training to Students:

Training cum orientation program on Geo-informatics:

Training cum orientation program on "Geoinformatics" has been organized for the Assistant Professors (Course Teachers of Subject Geo-informatics. Basic of remote sensing and GIS was covered with online session on GIS software (QGIS Software The pre and post training evaluation test was conducted for the assessment of training program. shares the presentation of Remote sensing process, Details about EMR Spectrum, Satellites, Sensors and space programs, About GPS, Brief about GIS and its functionalities, Image interpretations, Applied RS and GIS application in field of Agriculture, Opportunities in the field of RS and GIS, How to get the admission in Agriculture Education, Carrier opportunities and Scopes.

Hands on training on Geo-informatics:

Offline training entitled "Remote Sensing & Geographical Information System" has been organized for Faculty. The orientation program was assisted by RA. During this training basic of remote sensing and GIS was covered with Hands-on session on the open-source GIS software (QGIS Software). The procedure for downloading satellite imagery from an open-source platform and basic processing of the satellite image using QGIS software. The pre and post training evaluation test was conducted for the assessment of training program and there were improvement seen after post evaluation of participants as they have refreshed their knowledge and learnt new things about QGIS.

5. Capacity Building

5.1 Awareness programs

Seventeen awareness programs as shown below in Table-5.1 were conducted for enhancing the awareness and knowledge of faculties and student for using RS & GIS process and its application to agriculture. Details of these programmes is appended in appendix 11.1.1 to 11.1.9

Table5.1.1 List of Awareness programs conducted by NAHEP-CAAST-CSDA

S. N.	Topics	Date	No of Participants		Category wise participation %	Impact	Resource Person	Coordinator
			Student	Faculty				
1	Introduction to RS & GIS	28 June, 2020	49	14	-	Enhanced Awareness of RS and GIS among faculty, PG & Ph.D. students	Dr. R K Nema	Dr. M K Awasthi
2	Application of RS and GIS	27 July 2020	22	0	-	Participants gained the understanding of different application aspects of RS & GIS especially in Agriculture farm machinery &power	Er. M Patel	Dr S K Sharma
3	Webinar on H-index	28 July 2020	117	26	-	Participants understood the significance of H-Index, which measures both the productivity and citation impact of the publications	Er. M Patel	Dr M Patel

S. N.	Topics	Date	No of Participants		Category wise participation %	Impact	Resource Person	Coordinator
			Student	Faculty				
4-12.	Awareness Programme at Departmental level	23-July to 12th Aug 2020	212	0	-	Capacity building of Resources Person/faculties /Students lecture series on RS & GIS applications in all relevant Agriculture Disciplines.	Dr S K Pyasi, Dr A K Bajpai, Dr M K Awasthi Dr S K Sharma, Prof C M Abrol, Dr. D Rathi, Dr. G S Tagore, Dr M Bhan, Dr P B Sharma, Dr S B Das, Dr S K Pandey, Er. M Patel, Dr. S. krishnan, Dr. A K Rai	Dr S K Pyasi, Dr A K Bajpai, Dr M K Awasthi Dr S K Sharma, Prof C M Abrol, Dr. D Rathi, Dr. G S Tagore, Dr M Bhan, Dr P B Sharma, Dr S B Das, Dr S K Pandey, Er. M Patel, Dr. S. krishnan, Dr. A K Rai
13	Path Finding Workshop for Students Research	28 Oct 2020	18		M-8 F-10 UR- 45%, SC- 11%, ST- 11% OBC- 33%.	Students were guided for their research paths, also being briefed about NAHEP project overview and objectives and future opportunities	Dr. M. K. Awasthi	Dr. M. K. Awasthi

S. N.	Topics	Date	No of Participants		Category wise participation %	Impact	Resource Person	Coordinator
			Student	Faculty				
14	Hands on- "Basics of Satellite Images Processing	05-12 Nov 2020	6	0	M-1 F-5 UR- 33%, SC- 17%, ST- 17% OBC- 33%.	Students have gained knowledge by doing hands-on practical's on RS & GIS	Dr. R.K. Nema Dr. S.K. Sharma Dr. P.S. Pawar Aniket Rajput Dr. D Vasht Pratiman Patel Ankit Yadav	Dr. S K Sharma
15	Awareness Program on use of RS & GIS	27-28 Nov 2020	107	0	M-7 F-100 UR- 42%, SC- 19%, ST- 13% OBC- 26%.	Enhanced awareness of RS & GIS and their application in agriculture among Higher secondary students to promote them to opt for higher agriculture education	Dr. S Nema Dr.M. Meshram	Dr. R.N.Srivastava
16	Awareness Program for Modern Agriculture	03-Dec-20	2088	0	M-877 F-1211 UR- 36%, SC- 17%, ST- 8% OBC- 39%	High Sec. School participants gained knowledge about agriculture education, India's status and so far progress in Agriculture	Dr. S Nema Dr.M. Meshram	Dr. R.N.Srivastava

S. N.	Topics	Date	No of Participants		Category wise participation %	Impact	Resource Person	Coordinator
			Student	Faculty				
17	Awareness Program on use of RS & GIS	28 Jan21	156	0	M-86 F-70 UR- 37%, SC- 15%, ST- 13% OBC- 35%.	Enhanced awareness of RS & GIS among under graduate participants of B.Tech & B.Sc. Ag. Students	Dr. R.N. Srivastava	Dr. R.N. Srivastava

Note : Details are in appendix 11.1.1 to 11.1.9

Table 5.1.2 Educative Learning for Executives

S. N.	Topics	Date	Students	Faculty	Category wise participation %	Impact	Resource Person	Coordinator
1	Exposure to RS & GIS	18-Feb	0	68	M-45 F-23 UR- 56%, SC- 15%, ST- 4% and OBC- 25%.	KVK staff, scientist and faculties gained the knowledge about RS & GIS applications and extraction of the information from spatial products for better decision making	Dr. R K Nema	Dr. R.K.Nema

Note : Details are given in Appendix 11.1.10

5.2 Capacity Building Training Programs:

Eight trainings for spatial data application in Agriculture along with specialized trainings for faculties and post graduate students to new technologies like Python, AI & ML techniques and data analytics in research and other technological trainings like mobile app developments to make NAHEP-CAAST to serve it's objectives and make university globally competitive and locally relevant. The list of skill development training is given in Table-5.2.

Table-5.2.1 List of Skill Development training conducted by NAHEP-CAAST-CSDA

S.N.	Topics	Date	No of Participants		Category wise participation %	Impact	Resource Person	Coordinator
			Students	Faculty				
1	RS and GIS Technology and Applications for University Teachers	13 June to 1 July 2020	0	19		Better insight and understanding of RS and GIS processes and their applications aspects in agriculture	IIRS Dehradun Faculty	Dr. M.K. Awasthi
2	Training on Python Language for RS &GIS use	08-17 Dec	195	79	M-179 F-95 UR-50%, SC-12%, ST-5% OBC- 33%	Participants learnt python programming and data analytics basics useful in their research	Er. S. Singh	Dr. M.K. Awasthi
3	Training cum orientation programme on Geo Informatics	14-15 Dec	0	9	M-8 F-1 UR-78%, SC- 0%, ST-11% OBC- 11%.	Participants were educated for Geoinformatics including RS & GIS processes.	Dr. S. K. Sharma	Dr. S. K. Sharma

S.N.	Topics	Date	No of Participants		Category wise participation %	Impact	Resource Person	Coordinator
			Students	Faculty				
4	Training on Image Processing using Python	11-15 Jan	106	39	M-77 F-68 UR-45%, SC-16%, ST-3% OBC- 36%	Participants learnt the process of satellite image processing using Python	Er. S. Singh	Dr. M.K. Awasthi
5	Fundamentals of Artificial Intelligence & Machine Learning	21 - 31 Jan	261	86	M-255 F-92 UR- 45%, SC- 13%, ST- 3% and OBC-39%.	Enhanced awareness among participants on AI & ML techniques and their applications in agriculture	Er. S. Singh	Dr. M.K. Awasthi
6	Lectures on Spatial Data use in Agriculture	8-12 Feb	144	57	M-140 F-61 UR- 44%, SC- 35%, ST- 14% OBC- 7%.	Participants gained the understanding to process the spatial data for hydrological application, LULC, Soil mapping, Microwave RS, Crop mapping and crop monitoring, yield modelling etc.	Faculty from IIT Roorkee, IIRS Dehradun and JAU Junagarh	Dr. M.K. Awasthi

S.N.	Topics	Date	No of Participants		Category wise participation %	Impact	Resource Person	Coordinator
			Students	Faculty				
7	Introductory Course on Mobile based App	9-11 Feb	211	73	M-181 F-103 UR-50%, SC-8%, ST-32% OBC-10%.	Participants got an approach to build android app for Farmers and other agriculture communities	Er. V S Rajput	Dr. A.K.Rai
8	Downscaling of Climate Data and different climate model for analysis	9-12 Mar	180	66	M-163 F-83 UR-44%, SC-12%, ST-8% OBC- 36%	Participants got educated about GCM, RCM climate models and open source data availability	Dr. A.P. Dimri Dr. S. Nema	Dr. M.K. Awasthi

Note : Details are given in Appendix 11.1.11 to 11.1.19

5.3 Trainings conducted under Environment sustainability plan (ESP)

Training and awareness programs which are conducted under environment sustainability plan are given in Table-5.3& Table-5.4 respectively. The details are given in Appendix 11.1

Table-5.3.1 List of Skill Development training conducted under ESP

S. N.	Topics	Date	No of Participants		Impact	Resource Person	Coordinator
			Students	Faculty			
1	Biosafety and waste disposal	18.09.2020	48	M-36 F-12 UR-36.1%, SC-13.9%, ST-2.8% OBC-47.2%	Participants enhanced the knowledge about Biosafety & waste disposal measures	Dr. K. Tantwai	Dr. S. B. Das
2	Road to Reach for NABL ACCREDITATION	03.10.2020	44	M-28 F-26 UR-54.5%, SC-13.6%, ST-9.1% OBC-22.7%	Enriched understanding about NABL accreditation	Dr. M. K. Agrawal	Dr. S. B. Das

S. N.	Topics	Date	No of Participants		Impact	Resource Person	Coordinator
			Students	Faculty			
3	Rain water harvesting & its efficient use	01.12.2020	22	M-11 F-11 UR-27.3%, SC-4.5%, ST-0% OBC-68.2%	Enhanced understanding of water harvesting process, design and its efficient use	Dr. S. K. Pyasi	Dr. S. B. Das
4	Promotion of soil health	03.12.2020	31	M-21 F-10 UR-29%, SC-16.1%, ST-3.2% OBC-51.6%	Participants awareness improved to promote soil health for higher productivity	Dr. G. S. Tagore	Dr. S. B. Das
5	Food safety & standard Act 2006	08.12.2020	15	M-9 F-6 UR-38.5%, SC-7.7%, ST-15.4% OBC-38.5%	Awareness improved for Food safety and standards among participants	Dr. S.S. Shukla	Dr. S. B. Das
6	Integrated farming system	26.12.2020	19	M-12 F-7 UR-45%, SC-5%, ST-0% OBC- 50%	Better insights of integrated farming methods among participants	Dr. P. B. Sharma	Dr. S. B. Das
7	Integrated Nutrient & Weed Management	08.01.2021	19	M-13 F-6 UR-31.6%, SC-0%, ST-10.5%	Improved understanding of participants on Integrated Nutrient &	Dr. P. B. Sharma	Dr. S. B. Das

S. N.	Topics	Date	No of Participants		Impact	Resource Person	Coordinator
			Students	Faculty			
				OBC-57.9%	Weed Management		
8	Biodiversity conservation	31.01.2021	22	M-13 F-9 UR-22.7%, SC-22.7%, ST-13.6% OBC-40.9%	Biodiversity conservation awareness were improved	Dr. A. Babbar	Dr. S. B. Das
9	NABL guidelines for accreditation of laboratories	01.03.2021	47	M-21 F-26 UR-34%, SC-19.1%, ST-8.5% OBC-38.3%	Process for NABL guidelines for accreditation were understood by participants	Dr. Sharad Tiwari,	Dr. S. B. Das
10	Integrated Management of Insect pests & mites & Diseases	08.03.2021	37	M-27 F-10 UR-21.6%, SC-5.4%, ST-5.4% OBC-67.6%	Better understanding of Integrated Management of Insect pests & mites & Diseases among participants	Dr. S. B. Das	Dr. S. B. Das
11	Vocational course on Enhancing Water Use Efficiency Through Installation, Maintenance & Monitoring of Sprinkler and Drip Irrigation System	14.01.2021 – 22.01.2021	230	M-159 F-71 UR-62%, SC-10%, ST-16% OBC-13%	Enhanced Knowledge of participants to improve WUE by micro irrigation using drip and sprinkler	Dr. A K Bajpai	Dr. S. B. Das

Note : Details are given in Appendix 11.1.20 to 11.1.30

Table-5.3.2 Awareness programs conducted under Environment sustainability plan (ESP)

S.N.	Topics	Date	Student	Category wise participation	Impact	Resource Person	Coordinator
1	Green technology theme- Plantation / Green taken up- Horticultural crops	29.08.2020	30	M-13 F-17 UR-40%, SC-23.3%, ST-20% OBC-16.7%	Enhanced knowledge among participants regarding green technology & horticulture crops	Rahul Dongre	Dr. S. B. Das
2	Process of Registration of FASSAI license	11.12.2020	16	M-11 F-5 UR-56.3%, SC-6.3%, ST-0% OBC-37.5%	Participants awareness on process of FASSAI registration	Dr. S.S. Shukla	Dr. S. B. Das

Note : Details are given in Appendix 11.2

5.4 Awareness advisory

Table 5.4. Awareness Advisory:

S.No.	Date	Work plan	Action to be taken by	Impact
1.	**30.6.20**	Green technology theme- Plantation / Green taken up	Dr.S.K. Pandey	Awareness for green plantation
2.	**30.12.20**	Civil construction / renovation work – Colleges, Research & Farms	Er. S.S.Gour	Created awareness about precautions and labor management
3.	**30.6.20**	Safe use of Pesticides	Dr.S.B.Das	Created Awareness for Banned Chemicals at Research farms

Note : Details are enclosed as Appendix 11.3

5.5 Awareness Programmes for SSM

Table 5.5.1Awareness Programmes for SSM

S.N.	Topics	Date	Student	Faculty	Category wise participation %	Impact	Resource Person	Coordinator
1	Awareness Program on Grievance Redressal Mechanism	05-Feb-21	168	43	M-140 F-71 UR- 44%, SC- 11.4%, ST- 10.6% OBC- 34.6%.	Participants enhanced the knowledge about the process and responsible persons for Grievance Redressal	Dr. A. Shukla	Dr. D.Rathi
2	Awareness program on Human Rights for Agricultural Students	20-Feb-21	96	0	M-59 F-37 OBC-44.7% UR-34.4%, SC- 12.5%, ST-11.5%	Students understood about the human rights. Specially in Agricultural Education	Mr. P. Dubey	Dr. D. Rathi
3	Awareness Program on "Thesis Writing and online Thesis Evaluation	03-Mar-21	325	167	M-287 F-205 UR- 37%, SC-15%, ST- 13% OBC- 35%.	Students gained the knowledge about writing good, specific and informative thesis & research articles	Dr. M. N. Khare, Dr. D. Khare, Dr. A. Shukla, Dr. S. B. Das, Dr.R.K. Nema	Dr. D. Rathi
4	Improving Language Competency through Capacity Building in Spoken English	23 Nov - 2 Dec	463	0	M-299 F-164 UR-32.61% OBC- 39.3% SC-13.6% ST-14.5%	Enriched with various strategies of oral communication and enhanced confidence and ability to communicate effectively	Dr. D.Rathi	Dr. D.Rathi

S.N.	Topics	Date	Student	Faculty	Category wise participation %	Impact	Resource Person	Coordinator
5	Improving Language Competency through Capacity Building in Writing Skill	7-18 Dec	149	0	M-97 F-52 UR-32.88 OBC-32.21 SC-14.76 ST-20.13	Enhanced the competency among participants to improve the articulation of English in their writing	Dr. D.Rathi	Dr. D Rathi

Note : Appendix 11.4 shows details of SSM Programs

5.6 Social Safeguard Measures

Table 5.6.1 Progress on the Social Safeguard Measures and guest faculty delivered lecture

S. No.	Indicators	Activities	
		Target	Achievement
1	Number of Program conducted on social themes / concepts	7	5
		Improving Language Competency through Capacity Building in Spoken English	Improving Language Competency through Capacity Building in Spoken English 23rd Nov to 2nd Dec 2020
		To identify means to attract students to higher agriculture Education	To identify means to attract students to higher agriculture Education day on December 3rd 2020
		Improving Language Competency through Capacity Building in Writing Skill	Improving Language Competency through Capacity Building in Writing Skill 07th to 18th Dec 2020
		Awareness program on Human Rights for Agricultural Students	Awareness program on Human Rights for Agricultural Students on 20th February, 2021
		The training programme on Thesis Writing and online Thesis	The training programme on Thesis Writing and online Thesis on 03rd March, 2021
		Training of faculty in subject matter and pedagogy, particularly to	

S. No.	Indicators	Activities	
		Target	**Achievement**
		improve the performance of weak students	
		Formation of peer Learning Groups of students	
2.	Number of faculties trained on social themes / concepts	2	2
		Introduction and exposure of three tier grievance redress mechanism (GRM)	Online awareness program entitled "On Grievance Redressal Mechanism (GRM)" was held on 5th Feb 2021
		Innovation and knowledge sharing workshop yearly	Innovation and knowledge sharing workshop yearly -: First Annual Workshop: The 1st Annual workshop was held on 12th February 2021 at Kotilya Hall, Agri-Business Management & Development, JNKVV, Jabalpur
4.	Number of guest faculties delivered lectures or lessons on social / equity aspects	5	5
		The training programme on Thesis Writing and online Thesis	Yogita Gharde, Scientist, DWR, Jabalpur
		Awareness program on Human Rights for Agricultural Students	Mr. Praveen Dubey, Former Deputy Advocate General, M. P. High Court, Jabalpur Aishwarya Singh, Advocate, M. P. High Court, Jabalpur Mr. Siddharth Seth, Advocate, M. P. High Court, Jabalpur Mr. Parag Chaturvedi, Advocate, M. P. High Court, Jabalpur

5.7 Overall Distribution of Participants

NAHEP-CAAST at JNKVV conducted more than 40 programmes under various heads as awareness programmes, capacity building, vocational courses, environmental safeguards and for social safeguards with total participation of 6258 including 60% male and around 40% female. In overall participation there was a share of about 22% for schedule tribes and schedule caste category.

Table 5.7.1 Distribution of Participants

	Number of Participation					Percentage of participation of Category				Total %	
Category	UR	SC	ST	OBC	Total	UR	SC	ST	OBC	Male	Female
Numbers/ %	2554	851	590	2263	6258	44.13	12.10	9.72	37.08	60.62	38.86

	Gender wise Participation of different Category										
	UR		SC		ST		OBC		Total		
Gender	M	F	M	F	M	F	M	F	M	F	Total
Total No	1506	1048	459	392	344	246	1206	1057	3515	2743	6258
Percentage	38.6	49.5	12.7	13.7	9.4	9.9	39.3	26.8	60.6	39.4	100

5.8 Initiative for River Revival

Table 5.8.1 Initiative for River Revival

S. No	Topics	Date	Total registered Participants	Category wise participation %	Impact	Resource Persons	National Training Coordinator
1.	World water day celebration	22 Mar 2021.	310	M-222 F-88 UR-44%, SC-12%, ST-3% OBC-41%	Discussion on water crisis and its importance and suggested roadmap for water management	Dr. P.K. Bisen, Dr. D. Khare, Dr. Awadhesh Nema, Mr. Vivek Dave	Dr. M.K. Awasthi

5.9 Awareness program for faculty at out campus of JNKVV

Table 5.9.1 Awareness program for faculty at out campus of JNKVV

S. No.	Location	Date	Resource Persons	Topics
1.	College of agriculture, Powarkheda	23/02/2021	Dr. M.K. Awasthi Dr. M.L. Sahu	RS & GIS application in agriculture for UG students & faculty.
2.	College of agriculture, Balaghat	15/03/2021	Dr. M.K. Hardaha, Er. C.M. Abroal Dr.R.K. Nema	RS & GIS application in agriculture for UG & PG students & faculty.
3.	College of agriculture, Rewa	26/03/2021	Dr.P.B. Sharma Dr.R.N. Shrivastava	RS & GIS application in agriculture for UG students & faculty.

5.10 Faculty Development programs

Table 5.10.1 Training programs attended by faculty

S.No.	Topic	Name of Scientist	Organization	Duration
1.	Teaching Tools to Knockdown the Lockdown	Dr. Shivramakrishnan	Dept. of Plant Breeding & Genetics, JNKVV, Jabalpur	16th to 20th May 2020
2.	Application on Data Science and Applied Statistics	Er. Manish Patel FMP	International webinar on Application on Data Science and Applied Statistics Society of Education India, Council of Research & Sustainable Development of India	21st May 2020
3.	Application of Remote sensing & GIS in Digital Agriculture	Er. Manish Patel FMP	NAHEP-CAAST for Center of Excellence for Digital Farming Solutions for Enhancing Productivity by Robot, Drones & AGVS Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, (MS)	04th to 08th June 2020
4.	Application of Geospatial Technology	Er. Manish Patel FMP	Amity Institute of Geo- Informatics and Remote Sensing, Amity University, Noida, (UP.	11th to 25th June 2020
5.	Faculty development program	Er. Manish Patel FMP	Govt. Narmada college Hoshangabad	20th to 31st July 2020
6.	Drone Remote Sensing in Agriculture	Dr. Y. K. Tiwari SWE	Indian Society of Agrophysics, ICAR-Indian Agricultural Research Institute, New Delhi	9th Sept, 2020
7.	Intellectual Property Rights in Agricultural Research and Education in India	Dr A. K. Rai, Director Instrumentation	ICAR-NAHEP-Intellectual Property & Technology Management (IRTM Unit) New Delhi	12th to 28th Sept 2020

6. Ongoing projects:

Problem Identification: The following problems were identified in realizing process with satellite and ground data with techniques available.

Sr. No.	Problem Identified	Techniques used to realize the problems
1	**To plan priority of Watershed Development works:** Utilization of natural resources (i.e. soil and water) with poor management practices is a prime causative factor for the watershed deterioration that directly affects ecosystem stability. Quantitative values of soil erosion rate are the most preferred criterion for identifying the erosional status of the watershed. Although, such criteria require historical data on hydrological observations which are generally not available for smaller watershed units due to several constraints. The morphometric parameters of a watershed thus help in areas where adequate information about the hydrological observations is not available. The manual method of morphometric analysis makes use of toposheets for the extraction of morphometric parameters. It is extensively time-consuming, tedious, cumbersome that ultimately leads to boredom in the investigation and is highly susceptible to human error.	Satellite remotely sensed data of high spatial resolution provides information about the Earth's features in a more precise manner. Such data can help in identifying the utilization pattern of land resources with a greater degree of confidence with which the relative relationship of different LULC classes with soil erosion can be established more accurately. Digital Elevation Model (DEM) data provides spatial information of elevation values in raster format that aids in the extraction of morphometric parameters of the watershed in a more convenient and fast manner. The integration of morphometric and LULC factors would be used for prioritization of the watershed.
2	**Demarcation of Ground Water potential zones:** Groundwater is a precious natural resource having limited extent and volume. Unsustainable groundwater utilization is becoming an evident problem. It is happening because of the absence of updated spatial information on the quantity and distribution of groundwater resources. The effective planning of groundwater requires the knowledge of groundwater resource potential assessment before using and managing it.	Remote Sensing and GIS are modern techniques that can effectively be used for groundwater management. The overlay analysis of different thematic layers, such as geology, geomorphology, drainage density, slope, soil, water table fluctuations or depth to water level, lineament density and rainfall, etc., for demarcation of different groundwater potential areas. A set of weights for the different themes will be decided and integrated with a GIS framework to identify suitable zones for artificial groundwater recharge.

3	**Declining Flow in Rivers:** Rejuvenation of the River is a major challenge in India. Recent evidence shows that monsoon flows in Indian rivers are almost unaffected, but the non-monsoon flows show a declining trend. It is important to understand the relationship between water table and non-monsoon flow of rivers and initiate the flow revival movement through combined efforts by the government and the community. The real challenge for river revival is maintaining the continuous discharge of groundwater into the river. For flow revival, it is necessary to determine the components: Natural indicators, Average annual rainfall run-off, Monsoon recharge, Non-monsoon flow in the river and its relation with the decline of water table, Factors responsible for the decline of water table and their quantification, Quantity of water required, its duration and source of availability, Proportionate recharge (During rain and after the rainy season).	To overcome the mentioned problems, spatial data involving topographical maps, DEM data, and historical satellite images can be used to decide the course of the river and accordingly identify the watershed. The climatic data, LULC map, soil map, topographic maps and their integration can be used to understand the factors responsible for the decline of water table and their quantification.
4	**Addressing Rainfall variability:** Temporal and spatial distribution of rainfall is very important for the systematic study of climate change and its impact on natural resources. Detailed studies based on long-term rainfall data give a better understanding of the rainfall trends and variability at the micro level for effective management of the resources and to take socioeconomic decisions. In developing countries, the long-term rainfall data with the fine spatial resolution are scarcely available due to limited ground observations and access to such data is not always ensured.	The long-term gridded rainfall products are available free of cost on the various online platform. GIS techniques can be used to represent spatial and temporal variability of rainfall at the micro level. Such studies will also be helpful for drought monitoring and forecasting.
5	**Non-Availability of spatial crop area maps:** The monitoring of agricultural areas is very important in reference to worldwide challenges such as increasing food demand, population growth and climate change. The	Identification and mapping of the different crops have been one of the most common applications of RS and GIS. Multiple images corresponding to various cropping stages are generally used for this purpose. The different

	early information on crop type and acreage are necessary to forecast crop yield. Generally, government officials provide the crop information (figure and statistics) after the end of the growing season, since data have to be collected, verified and compiled into a database. Therefore, there is a need to provide near real-time information on crop type and acreage for effective strategic planning.	crop stages are also identified due to the utilization of frequent time interval satellite images. Different classification algorithms can be used for crop classification in a GIS environment.
6	**Lacking of Land use planning based on Natural Resources:** In recent years, land use/cover changes have become a key subject to have proper planning and utilization of natural resources and their management. Traditional methods for gathering information of LULC classes are not adequate for multicomplex environmental studies and also involve great complexity of handling the multidisciplinary data set.	Satellite remote sensing and Geographical Information Systems provide data to study and monitor the dynamics of LULC classes for natural resources management.
7	**Inappropriate values of hydrological components:** Hydrological models simulate the flow of rainfall water through a network of streams over time. The flow of water depends on several characteristics of climate and watershed. So it involves a lot of complexity. To address this complexity, there is a need to develop the hydrological model by using existing software tools to simulate water flow effectively.	Remote sensing and GIS techniques are used to estimate the spatially distributed hydro-meteorological state variables that are required for the rainfall-runoff modeling. The software tools such as HEC-RAS, HEC- HMS, Q-GIS, Q-SWAT, WEAP, Arc-SWAT, etc. can be used for the development of hydrological models.

6.1 Research Work Undertaken

6.1.1 Theme based maps for the development of integrated decision-making applications

Case studies were taken for preparation of Land use land cover classification**.** High-resolution satellite images are increasingly becoming freely available for several applications at local and national scales. The study aims at investigating the potential of spectral derived indices to accurately differentiating the land use land cover classes using Sentinel2 satellite data. Four spectral indices namely bare soil index, Modified Normalized Difference Water Index, Normalized Difference Tillage Index, Red-Edge Normalized Difference Vegetative Index were derived using “overlay” function in R environment. These indices were used for differentiating the agriculture land, bare land, water and settlement class.

In this study, by analyzing the spectral profiles of the six typical land cover types in Mandla, it was

found that a regular pattern exits for mean reflectance. The mean reflectance of open land and fallow land have similar reflectance pattern at each band. The spectral indices NDTI and BSI discriminate the bare soil, fallow land and settlement effectively due to differences between their indices values for respective classes.

6.1.2 Land use land Cover mapping using Sentinel-2 data by unsupervised classification

The study was carried out for Land Use Land Classification of the Balaghat and Jabalpur District, Madhya Pradesh, India, employing the unsupervised Classification technique. Sentinel-2 imagery has been taken and individual bands of 10 m spatial resolution from NIR, Red, Green and Blue bands were stacked together to create a multispectral image cube. Once the stacked image is generated, a single pixel contains a 4-dimensional vector containing spectral values corresponding the considered bands. Reference dataset has been taken with the help of high-resolution Google earth images.

The atmospherically corrected images are used for unsupervised classification using K- mean clustering techniques and Iterative self-organizing analysis (ISODATA). Total area of Balaghat district is 922900 ha classified into six land use land cover classes. These classes are agriculture land, forest, fallow land, open land, settlement and water body. The maximum accuracy was found in forest which is 94 percent. In case of the Jabalpur district, land area mainly comprised Agriculture land i.e. 48.91%, settlement land 1.75 %, and water bodies 2.18% and remaining area comes under fallow land, forest land and others.

6.1.3 Crop Classification maps:

The crop classification maps were prepared at district level using multidate satellite imagery to classify the major crops in Narsinghpur and Jabalpur district Madhya Pradesh India, by applying the unsupervised classification technique. A time series data of sentinel -2 data was used for the generation of classified maps using K- mean clustering techniques and Iterative self-organizing analysis (ISODATA). We found overall accuracy of Narsinghpur district is 83.57%.

Total area of Narsinghpur district is 512575.25 ha, divided into eight classes namely wheat, gram, sugarcane, forest, other crops, fallow land, open land and water body. The maximum accuracy was found in gram and wheat, which is 94 and 92 percent. For February 2019 classified maps shows that, agricultural land of Jabalpur district having wheat crop 83.07 %, Gram/ Pulses 14.64 % and other crop (2.28%).

6.1.4 Spatio-temporal rainfall variability analysis over the Madhya Pradesh

This study was carried out to investigate the spatial and temporal variability of rainfall at 52 districts of the Madhya Pradesh (MP), India over the period of 119 years (1901–2019) on annual and seasonal basis. The daily gridded rainfall data (0.25 ^{o} x 0.25 ^{o}) for the period of 1901-2019 was obtained from Indian Meteorological Department. The information was extracted as the gridded daily rainfall for Madhya Pradesh state. The daily rainfall for each district were obtained by averaging the gridded rainfall over the district boundary. The daily rainfall was then converted into the monthly, seasonal and annual rainfall data for each district. According to the IMD, four meteorological seasons over India are winter season: January–February, summer season: March–May, monsoon season: June–September, and post-monsoon season: October–December.

Annual and seasonal rainy days were also computed for analysis purpose. There were considerable differences observed in seasonal and annual rainfall at 52 districts for the 119 years of rainfall record. The

maximum monsoon rainfall was observed for district Balaghat (2214.84 mm in the year 1961) and minimum monsoon rainfall for district Niwari (31.28 mm in the year 1976). The post-monsoon rainfall was varied from 0 to 386.84 mm, winter rainfall varied from 0 to 257.98 mm and summer rainfall varied from 0 to 293.18 mm at district level during the period 1901-2019. Similarly, annual rainfall at district level ranges between 33.46 mm (Niwari) and 2354.65 mm (Balaghat) during the period 1901-2019.

There is more spatial and temporal variability of post-monsoon, winter and summer rainfall and rainy days over the Madhya Pradesh during the entire period of rainfall record. Also, there is very less contribution of post-monsoon, winter and summer rainfall over the Madhya Pradesh. The seasonal and annual rainfall variability analysis depicted through the maps would be useful for effective planning and efficient use of water resources and also for district-level water management.

6.1.5 Long term trend analysis of rainfall for Sindh river basin

Regional spatiotemporal analysis of rainfall and drought has to gain much more attention under the climate change scenario worldwide. The present study was taken to analyze regional level long term trend analysis of rainfall, rainy days, and drought over the Sindh river basin. Sindh river is a tributary of Yamuna river, passes through two states of India namely Madhya Pradesh and Uttar Pradesh. Rainy days, monthly, seasonal, and annual rainfall series were prepared from daily rainfall data for thirty-eight grid points.

The nonparametric Mann-Kendall/modified Mann-Kendall test was used to analyze the trend of rainfall, rainy days, and SPI series of different timescales (1, 3, 6, 9, and 12-month SPI series) at a 95% confidence level. The modified Mann-Kendall test was performed only for the autocorrelated time series.

The trend analysis of rainfall and rainy days showed a significant decreasing trend for the north-eastern part of the basin. A similar pattern of trends for rainfall, rainy days, and drought was observed over the basin. The results of the SPI trend analysis indicate that a large portion of the basin has a rising trend of drought. Almost all grid points of the basin showed decreasing trends for rainfall and rainy days during the winter season. The maximum number of drought incidence was found for the SPI-3 series, whereas the minimum number of drought incidence was found for the SPI-12 series.

The spatial and temporal trend analysis of rainfall, rainy days, and drought can help policymakers to understand the behavior of rainfall and drought patterns over the Sindh river basin and accordingly to build planning and mechanism to deal with the drought effectively.

6.1.6 Hydrological Modelling of Banjar River Watershed using HEC-HMS

Soil and water are the two most important natural resources which are essential for agricultural production. Hydrologic Engineering Centre's Hydrologic Modeling System (HEC-HMS) is employed to simulate rainfall runoff process in Banjar river watershed, which is situated in between Mandla and Balaghat district of Madhya Pradesh, India.

The CartoDEM is processed using HEC-GeoHMS to generate sub-watersheds and channel characteristics. The curve number is generated using the LULC and the HSG provided by the Natural Resources Conservation Service.

The performance of the model is assessed using performance evaluation indicators such as Nash-Sutcliffe efficiency (NSE), Percentage Error in Peak and Coefficient of Determination (R^2).

6.1.7 Soil map:

The soil maps of scale of 1:500000 were procured from National Bureau of soil survey and land use planning, Nagpur. The soil map has been digitized at district levels and creates vector layer of soil type with the help of GIS Software. Soil characteristics information such as soil depth, drainage, texture, slope, erosion, soil series number etc., has been filled in its attribute table. The soil map is very important input parameter for the studies related to rainfall-runoff process, ground water hydrology, agriculture planning etc

6.1.8 Geospatial Techniques for assessing recharge requirement regarding river revival

Groundwater is a ubiquitous geologic agent and its age and residence time determines its impact on geologic processes and also controls the feedbacks of these processes on groundwater flow and transport. River Science refers to the study of a variety of processes affecting river systems. This is a truly interdisciplinary science and requires the explicit joining of two or more areas of understanding into a single conceptual-empirical structure. A revival strategy should identify a long-term vision for the river basin, the desired outcome of the strategy over the planning horizon (goals), and specific, measurable targets to be achieved over the short to medium term (objectives).

For this an accurate estimation of groundwater recharge is required to properly manage aquifers. To determine the aquifer capacity is the most important step to know about the current situation of the aquifers so that the future planning can be done accordingly regarding installation of water harvesting structure and other conservation. The proposed area of interest is

- Application of Geospatial Techniques for assessing recharge requirement.
- Determination of aquifer capacity to accommodate recharge water.
- Estimation of quantum recharge in the watershed.

6.2 Students Research Projects:

Students Research Projects: The student undergoing master and doctoral degree program have been involved to undertake research project work on different problems relevant to various departments. The details of research topic student involved, advisor for guidance, objectives and progress of work are presented below.

Involvement of students for post graduate research under NAHEP theme

S. No	Problem to be addressed	Topics	Student	Department	Advisor	Course
1	Heat stress in crop and planning solution	Plant growth regulators mediated amelioration of high temperature stress in chickpea by studying spectral reflectance pattern of canopy through hyperspectral sensors in chickpea	Supriya Debnath	Plant Physiology	Dr. R. Shiv Ramakrishnan	Ph. D.
2	Contribution of orchard in Carbon	Computation of carbon sequestration of orchards in Jabalpur	Shreesty Pal	Fruit Science, and Horticulture	Dr. S. K. Pandey	Ph. D.

	Sequestration	district using Remote Sensing and GIS				
3	Spatial Mapping of Orchards	Characterization of orchards in Jabalpur district using GIS and remote sensing	Govind Madariya	Fruit Science, and Horticulture	Dr. S. K. Pandey	M.Sc.
4	Insect infestation in maize crop	Characterization of fall army worm (FAW) infestation in maize crop through ground based hyperspectral remote sensing under field conditions.	Kumari Pragya	Entomology,	Dr. S. B. Das, Principal	Ph. D.
5	Revival of River	Assessment of Spatial Recharge Quantum Requirement for Revival of Kanari River	Ayushi Trivedi	Soil and Water Engineering	. M. K. Awasthi	Ph. D.
6	Imbalance in Ground water Utilization	Ground Water Potential Zoning in Ken River Basin using RS and GIS	Deepak Patle	Soil and Water Engineering	.M. K. Awasthi	Ph. D.
7	Depleting Ground water availability	Assessment of Groundwater Potential Zones and planning for vulnerable zones by using RS and GIS	Neelam Bunkar	Soil and Water Engineering	Dr. R. K. Nema	Ph.D.
8	Fixing Priority of Watershed development Works	Study on Prioritization of Sub-watersheds through Integration of Land Use Land Cover Factors with Morphometric Parameters	J Himanshu Rao	Soil and Water Engineering	Dr. S. K. Sharma	Ph.D.
9	Monitoring Irrigated command	Land Use and Land Cover Mapping Using Spatial Data in Betwa Basin	Vipin Kumar Mishra	Soil and Water Engineering	Dr. M.K. Awasthi	M. Tech.
10	Spatial Monitoring of field Crops	Spectral Characteristics of Wheat as Influenced by Differential Nitrogen Levels	Payal Soni	Soil Science and Agricultural Chemistry	Dr. G.S. Tagore	M.Sc.

11	Assessment of Carbon foot prints of various cropping Systems	Assessment of Soil Carbon Footprints in Dominant Cropping System of Madhya Pradesh Using Hyper Spectral Remote Sensing and GIS	Rajneesh Khargharia	Soil Science and Agricultural Chemistry	Dr. G.S. Tagore	M.Sc.

7. Industry Institution Interaction Cell

Industries having expertise in area of application of RS and GIS techniques for betterment of Agriculture, robotics, drones application, precision agriculture and Natural Resources Management are being contacted for interaction and collaboration through Industry-Institution Interaction cell through Agri-Business Management Institute at JNKVV. Regular business incubation programs are organized with the ICAR collaboration on modern technologies advanced Agriculture for students and farmers.

7.1 Efforts to develop entrepreneurship

The university is having well functional Institute of Agribusiness Management for activities related to Agribusiness Development. The following are the major functional units under the institute

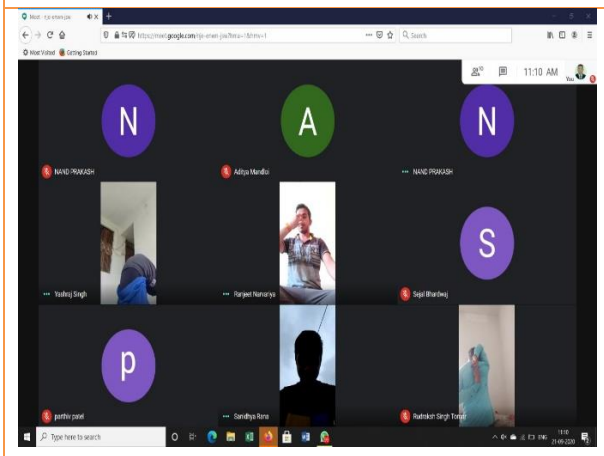
- ✓ Business Planning & Development Unit for promotion of Agri-entrepreneurship among agricultural graduates and rural youth. So far conducted about 25 awareness and training programs with 30-35 participants in each program (total 800 participants).
- ✓ Nodal Training Center of Agri-clinic and Agribusiness Centers (ACABC Scheme of GOI). So far completed training of four batches with 95 participants.
- ✓ Agribusiness Incubation Center of RKVY, GOI (Named as Jawahar RABI) is established in the Institute during 2019-20. So far 54 startups were oriented-incubated and 24 startups were received grant in aid from GOI for scaling up their agri-business. About 5 startups of Jawahar RABI developed apps for backward and forward linkages with farmers for providing various services and technical backstopping

The different collaborating industries planned for involvement with NAHEP are as follows:

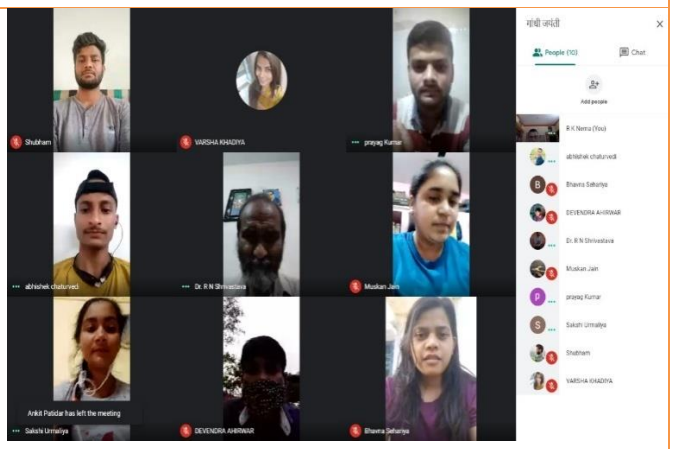
- John Deere India Pvt. Ltd, Pune
- Jain Irrigation Ltd, Jalgaon
- Netafim Irrigation India Pvt Ltd.
- Agro-processing center
- IFFCO
- Jabalpur-Agro
- Premier Irrigation
- Solar Power Generation Plants Manufacturing
- Chemical/organic industries
- Sugar Industries
- Pump Industries
- Farm Implements manufacturers
- Organized Horticultural and vegetable growers

Project Activities at a glance

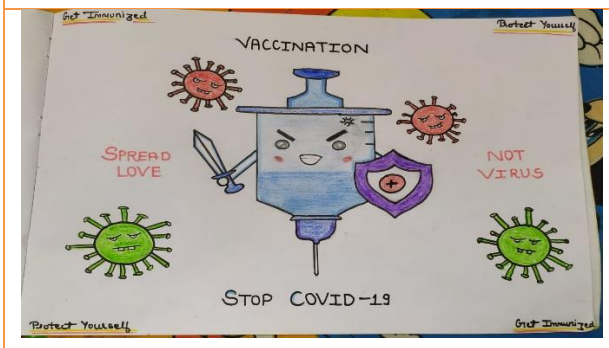
First Annual Workshop of NAHEP, CAAST at JNKVV Jabalpur.



Celebration of International Yoga Day 2020



Celebration of International Day of Non-Violence 2020



Awarness program by students for CoVID 19 Vaccination

8. Challenges faced and lessons learnt under Component:

1. Yearly plan uploading not available
2. Limited engagement of stakeholders
3. Conducting evaluation –network connectivity is not available at all places
4. No contact with 10 percent students in remote places
5. Uploading of procurement plan on STEP – modification is difficult, takes time
6. Contact signed but payment is due after delivery and verification
7. Delegation of financial powers and procurement rules are different than VV
8. Working in Lock down period was biggest hurdle since day 1
9. Conducting trainings and capacity building online and guiding students
10. Connecting students through Internet 60 to 70 percent success

9. Plan ahead (Key activities) for next reporting period

Roadmap ahead for procurement

11. Identifying and engaging consultants.
12. Procurement process for Lab equipment's and machines etc.
13. Refurbishment of lab.
14. Focus on Procurement of the items as planed and approved.

Roadmap ahead for technical progress

- Upgradation and well-equipped spatial data lab
- Identifying more students for working on thematic areas of the project.
- Capacity building of students and faculty for RS and GIS applications.
- Capacity building of Departmental staff
- Creating atmosphere for awareness of advantages and ease of working with spatial data among stakeholders.
- Exposure visits to students and faculty
- Focus on Industry linkage, collaboration and MoUs.
- Development of mobile based applications and Spatial data products for agriculture and applied sector for users specially students' farmers, and policy makers.

10. Work Plan for 2021-22

10.1 Capacity Building

To build basic capacity for using RS & GIS techniques applied for betterment of Natural Resource Management particularly in Agriculture and allied sectors, activities are listed below

S.No.	Activity
1.	Awareness program for One Day for • Students of Twelfth class to attract them for education in Agriculture • Students of UG to attract them for taking admission in PG with RS and GIS application

	• Students of PG to help them doing their research with use of spatial data. • Project preparation, writing technical reports and presentation
2.	Introductory program for administrators- One Day program for • Higher level administrators to show capabilities of spatial data use and make them convinced to depute their respective staff for recent developments in their fields.
3.	Educative learning for executives (7 days) • One week Learning on use of spatial data for NRM and Agricultural management for officials of line department on Groundwater potential zoning, watershed prioritization, crop discrimination, crop acreage estimation and other relevant applications
4.	Capacity building for Scientists, Teachers, officials, students and young professionals -21 days comprises of • Application of RS and GIS in Agriculture for students • RS and GIS research tools -hands on for scientists and teachers • Introductory remote sensing and GIS and basic software learning. • Specific Applications suitable to individual

The basic capacity building program for using RS & GIS techniques applied for betterment of Natural Resource Management particularly in Agriculture and allied sectors have been scheduled for year 2021-22. The training activities have been scheduled for four different categories, e.g. School Students, Administrators, Executives and Scientists, staff as well as UG & PG students and accordingly training days have been scheduled for these different activities as given below.

Awareness program – One awareness program scheduled in each quarter: The target audience will be students of schools, educated for introductory RS & GIS, their process understanding and their different applications especially in agriculture and allied fields. Students will also be made aware on agriculture education, modern agriculture facts & researches, future scopes in Agriculture education in order to promote the Agriculture education among higher secondary students.

Introductory program for administrators – One day training scheduled in each quarter: It is especially designed to acquaint administrators about capabilities of RS & GIS with spatial data in their area of interest

Educative learning for executives – 7 days training scheduled in each quarter: The target audience will be Line staff of KVK to give them practical application knowledge to develop skilled man power acquainted with remote sensing and GIS capability and can use spatial data for application areas.

S. No.	Activity	Proposed capacity building plan 2021-22											
		First Quarter			Second Quarter			Third Quarter			Fourth Quarter		
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
		(No. of Days given as planned in each month for capacity building)											
1.	Awareness program for Students			1			1		1		1		
2.	Introductory program for administrators			1			1		1			1	
3.	Educative learning for executives			7		7				7			7
4.	Capacity building for Scientists, Teachers, officials, students and young professionals			21	21	21	21	21	21	21	21	21	21

Capacity building training program –

Twenty-one days training in every month scheduled from1st working day of month: This training has been scheduled for capacity building for Scientists, Teachers, officials, students and young professionals. Detailed Training Modules for each day is as below

S. No	Topics
	Week 1
Day 1	Definition and Overview of Remote Sensing and Remote Sensing Systems
	Electromagnetic Radiation, Terms and Definitions
	Laws of Radiation, EM Spectrum,
	Introduction to RS Hardware + Software
Day 2	Source of EMR, Interaction between EM Radiation and matter,
	Reflection, Absorption and Transmission
	Spectral Signatures for common LULC features
	Study of spectral and image characteristics of optical data for identification/ characterization of major land cover features
Day 3	Type of remote sensing: active and passive remote sensing
	Sensor types characteristics: characteristics of optical sensors
	Hands on visual interpretation Earth Observation Satellite for land, ocean & their characteristics
Day 4	Concept of Resolutions in RS-Spatial, Spectral, Radiometric and temporal
	Geometric and atmospheric errors
	Orbits and platforms for Earth Observation
	Geoportals Indian and Global
Day 5	Types of Data Products
	Assessing Indian Data Products
	Assessing NASA and ESA Data Products
Day 6	Introduction to GIS
	Application of GIS
	Types of GIS data format
	Creating a Geodatabase and shapefile

Week 2	
Day 1	Georeferencing
	Projections and coordinates
	Adding a scanned Image
	Georeferencing and adding Projections to the scanned image
Day 2	Digitization of Polygons and Points
	Digitization of lines
Day 3	GIS operations: Split, merge, join
	GIS operations: Interpolation
Day 4	Creating and adding attributes
	Basics of Mapping
	Hands on editing of shapefiles
	Creating Maps
Day 5	Pre-processing of Satellite Imagery
	Sub-setting and masking of satellite imagery
	Supervised and unsupervised classification
	Digitization of Training samples for supervised classification
Day 6	Digitization of Training samples for supervised classification
	supervised classification using Random Forest
	Hands on supervised classification
Week 3:	
Day 1	Hands on supervised classification
	Unsupervised
	Unsupervised
Day 2	Accuracy Assessment
	Hand on Accuracy Assessment of the Classified Imagery
	Statistics of thematic map
	Mapping the Classified Thematic Map
Day 3	Importing CSV files
	Converting Vector to Raster
	Converting Raster to Vector
	Map Overlays
Day 4	Introduction to remote sensing indices
	Vegetation Indices of Landsat 8
	Water and Soil Indices of Landsat 8
	Hands on Vegetation Indices
Day 5	Problem Solving Sessions
Day 6	Problems Solving Sessions/Pre-discussion of the Projects
Week 4:	
Day 1	Allotment of Project Work
Day 2	Project Work
Day 3	Project Work
Day 4	Project Work
Day 5	Discussion/Presentation of the Project Work
Day 6	Discussion/Presentation of the Project Work
	Feedback, Valedictory Function and Closing Ceremony

10.2 Theme based celebration

Date	Programme	Event
Jan 12	RS and GIS: Prospects for youth in agriculture sector	National Youth Day
Feb 28	Application of satellite data for agriculture and enhancing farmer's income.	National Science Day
Mar 8	Women workforce in agriculture sector	International Women's Day
Mar 15	Consumers protection using in Agriculture sector	World Consumers Protection Day
Mar 22	Application of spatial data in water resource management.	World Water Day
Apr 14	Social safeguard in Agriculture sector	Ambedkar Jayanti
Apr 22	Observing of earth using spatial data	World Earth Day
June 5	Environmental safeguard planned with the help of RS and GIS	World Environment Day
June 21	Yoga for students	International Yoga Day
Aug 29	Motivation of students for National spirit	National Sports Day
Sept 15	Engineering application of Satellite data in Agriculture sector	Engineers Day
Oct 16	Storage technology and value addition in Agricultural products	World Food Day
Dec 03	Strengthening Agriculture Education using modern application in research and learning.	National Agriculture Education Day
Dec 14	Green Energy – Clean Energy	Energy Conservation Day

10.3 Environmental Safeguard Plan

Activities planned under Environmental Safeguard are creating awareness through advisory, advisory program for one day, capacity building program for one day and a weak long vocational certificate programs as listed below:

10.3.1 Awareness advisory

Quarterly activities (FY 2021-2022) for Q1 (April –June), Q2 (July –Sept), Q3 (Oct – Dec) and Q4 (Jan – March)

S.No.	Work plan	Resource Person	Activities quarterly wise			
			Q1	Q2	Q3	Q4
1.	Civil construction / renovation work: Colleges, Research & Farms	Er. S.S. Gour & Dr. S.B. Das	√		√	
2.	Research & Farms: Safe use of					

S.No.	Work plan	Resource Person	Activities quarterly wise			
			Q1	Q2	Q3	Q4
	Pesticides	Dr. S.B. Das	√		√	
3.	Research & Farms: Green technology theme- Plantation / Green taken up – Agroforestry	Dr. R.K. Bajpai	√		√	
4.	Research & Farms: Green technology Plantation horticulture	Dr. S.K. Pandey	√		√	
5.	Green technology theme- Plantation Medicinal & Aromatic	Dr. Gyanendra Tiwari	√		√	

10.3.2 Vocational Certificate Program (7 days)

S.No.	Work plan	Course Coordinator	Activities quarterly wise			
			Q1	Q2	Q3	Q4
1.	Installation, maintenance & monitoring of solar power system	Dr.A.K.Rai & Dr.R.N. Shrivastava		√		
2.	Enhancing water use efficiency through installation, maintenance & monitoring of sprinkler and drip irrigation system	Dr.A.K. Bajpai & Dr.R.N. Shrivastava			√	
3.	Saving energy through installation, operation and maintenance of irrigation pumps	Dr.R.N. Shrivastava				√
4.	Assessment Methods for Soil Carbon And Greenhouse Gas Emissions In Agriculture	Dr.Shiv Ramakrisna Mudaliyar		√		
5.	Agronomic Interventions for Enhancing Nutrient Use Efficiency and Nutritional Quality in major Field and Vegetable Crops	Dr.P.B.Sharma			√	
6.	Production of biofertilizers & biopesticides	Dr.N.G.Mitra , Dr.P.B.Sharma & Dr.S.B.Das				√

10.3.3 Capacity Building & Trainings (one day)

S.No.	Work plan	Resource Person	Activities quarterly wise			
			Q1	Q2	Q3	Q4
1.	Rain water harvesting & its efficient use	Dr. S.K. Pyasi	√		√	
2.	Good Laboratory Practices for safety against laboratory hazards	Dr. Kirti Tantwai	√		√	
3.	Biosafety, Waste disposal	Dr. Kirti Tantwai	√		√	
4.	Green technology theme-Plantation / Green taken up – Agroforestry	Dr. R.K. Bajpai	√		√	
5.	Green technology theme-Plantation / Green taken up – Horticulture	Dr. S.K. Pandey	√		√	
6.	Green technology theme-Plantation / Green taken up – Medicinal & Aromatic	Dr. Gyanendra Tiwari	√		√	
7.	Green & Efficient energy use	Dr. A.K. Rai		√		√
8.	Biodiversity conservation	Dr. Anita Babbar		√		√
9.	Energy auditing & management	Dr. A.K. Rai		√		√
10.	Application of Remote Sensing & GIS In Digital Agriculture	Dr. S.K. Sharma		√		√
11.	Application of RS software	Dr. S.K. Sharma		√		√
12.	Food safety	Dr. S.S. Shukla		√		√
13.	NABL guidelines for accreditation of laboratories	Dr. M.K. Agarwal		√		
14.	Promotion of soil health	Dr. G.S. Tagore		√		√
15.	Integrated farming system	Dr. P.B. Sharma & Dr. M.K. Awasthi		√		√
16.	Integrated Nutrient & Weed Management	Dr. P.B. Sharma		√		√
17.	Integrated Disease Management	Dr. V.K. Yadav	√		√	
18.	Seed Act	Dr. S.B. Nahatkar		√		√
19.	FSSAI Registration	Outside JNKVV	√			√
20.	Registration of Pesticides	Dr. S.B. Das	√			√

S.No.	Work plan	Resource Person	Activities quarterly wise			
			Q1	Q2	Q3	Q4
21.	Procedure for Organic Registration at State level	Dr. P.B. Sharma	√			√
22.	How to improve H- index of Institute – Creation & Updation of Google Scholar Profile & Strategies to Improve H-index	Er. Manish Patel	√		√	
23.	Parthenium – its impact and biocontrol	Dr. Sushil Kumar DWR		√		√
24.	Apiculture for entrepreneurship development	Dr. S.B. Das		√		
25.	Precision farming	Dr. G.S. Tagore		√		
26.	Digital farming with reference to precision water management	Dr. R.N. Shrivastava		√		
27.	Advances in micro irrigation system	Dr. R.N. Shrivastava			√	
28.	Bioenergy: Present Status and Future Prospects	Dr. V.K. Gour			√	
29.	Environmental protection for improving animal health	Dr. Shekhawat			√	
30.	Impact of climate change on insect	Dr. S.B. Das	√			
31.	Groundwater monitoring & management	Dr. R.K. Nema	√			
32.	Impact of e- waste on environment	Dr. A.K. Rai			√	
33.	Sub surface drainage and reclamation of soil	Dr. R.N. Shrivastava			√	
34.	Fundamentals of Pressurized Irrigation Methods	Dr. R.N. Shrivastava			√	

10.3.4 Awareness program (one day)

S. No	Work plan	Coordinators	Activities quarterly wise			
			Q1	Q2	Q3	Q4
1.	An application of Mobile in survey	Dr. M.K. Awasthi		√		√
2.	NABL guidelines for accreditation of laboratories	Outside JNKVV		√		√
3.	FSSAI Registration	Dr. S. S .Shukla			√	

10.4 Equity Action Plan: (EAP)

S.No.	Items	Coordinators	Activities quarterly wise			
			Q1	Q2	Q3	Q4
1.	To identify weakness in all students and take remedial steps	Dr. D. Rathi	√	√	√	√
2.	Labor Management plan	Er. S.S. Gour	√		√	
3.	A three-tier grievance redress mechanism (GRM)	Dr. A. Shukla	√			√
4.	To improve language competency, soft skills and confidence levels. (Linguistic classes including courses on communication skill and personality development)	Dr. D. Rathi		√		√
5.	Training of faculty in subject matter and pedagogy, particularly to improve the performance of weak students.	Dr. D. Rathi			√	
6.	To identify means to attract students to higher agriculture education	Dr. R. N. Shrivastava			√	
7.	Hold Innovation and knowledge sharing workshop	Dr. D. Rathi	√			√

10.5 Procurement of Lab Equipment

Equipment, plant & Machinery	No	Total (Lakh)	Justification
Hyper Spectral Radiometer (350-2500nm) along with accessories	2	120.00	For monitoring environmental stress to assess agricultural vegetation condition as ground remote sensing experiments are necessary to evaluate the possibility of hyper spectral reflectance spectroscopy this facilitate the studies for identification of spectral window for different applications.
Drone with multispectral sensor and application equipment's	1	20.00	To create high quality 3D maps using multi spectral cameras and laser scanners on field basis for precision farming.
Thermal Imaging Camera	1	15.00	Required for doing practical and research on use of thermal remote sensing for crop stress and soil water

			management
Server with software	2	10.00	To store, process and serve for multi terminals during training programme.
Network Attached Storage (100 – 150 TB)	1	10.00	Required for storage of images and data analysis across different labs and users.
Stereo head phones, microphones, Patch Bay, Head phone distribution amplifier, digital portable recorder, sound proofing and control room for audio visual recording and webcasting of programmes.	1	30.00	To disseminate skilled technical knowledge to various stake holders in real time at different campus through outreach program. To save time, energy and money of the beneficiaries as well as resource person.
Wall mounted smart LED display TV meeting room	1	1.50	For display of training material during the trainings to trainees and trainers.
Large Format Plotter A0 Size	1	10.00	To print high quality large size maps.
Drone Image Processing Software Pix4D	1	10.00	Required for pre-processing of drone images collected from sensors for use in different applications
Geo-server software for windows with web server	1	60.00	To develop web-based geo portal for development of web applications
High Power Computing (HPC) system	1	50.00	Required for extracting information precisely from the huge data especially for big data analysis. High-performance computing (HPC) is the ability to process data and perform complex calculations at high speeds.
Digital Terminals	50	20.00	Terminals connected with the server to be used by individuals in training for learning and practicing the technology and its application.
A0 Scanner	1	10.00	To scan large size maps. As large size map scanning is required for making the maps in digital format for further processing in GIS.
Interactive LED Display with Digital Podium 8X6 feet 120" diagonal	2	10.00	For presentation during trainings, project meeting, student seminar etc.
Camera 45 mega Pixel with Zooming facility and all accessories.	4	4.00	To take high quality photographs and to make video recording of project activities.
Soil moisture meter with 50 sensors	1	7.00	Soil moisture monitoring for enhancing water use efficiency in field.
Off Line UPS 10 KVA	5	5.00	For maintaining uninterrupted power supply to

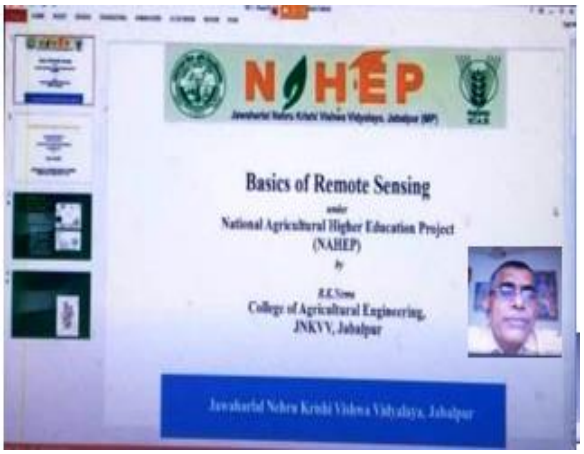
			training unit.
Digital planimeter and chartometre	30	12.00	Required for area and length measurement on maps
File cabinet	4	1.00	Placing of files.
Furnishing items	-	2.80	For office assistants.
Portable Hard Disks and other Storage Devices and Wifi modem with internet	20	2.00	For Computer works
Other peripherals	-	2.00	For Computer works

11. Appendix A

11.1 Capacity building program

11.1.1 One day Lecture on "Introduction to RS and GIS

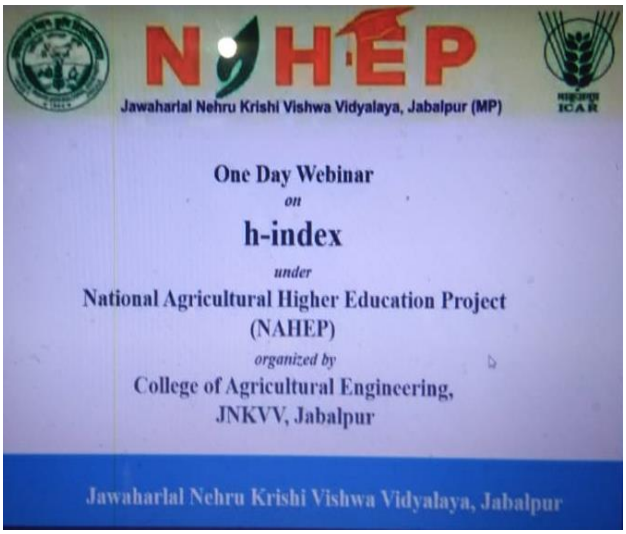
One day lecture on Introduction to RS & GIS was organized and conducted under NAHEP project on month of June 2020. This introductory Lecture on RS & GIS was conducted on Google Meet platform and presented by Dr. R.K. Nema, Dean College of Agril. Engg & PI-NAHEP and attended by the 14 faculties and 49 students of PG and Ph.D. students of JNKVV Jabalpur. The core theme of the lecture was to introduce the participants to Basics of RS & GIS process and applications.



11.1.2 Applications of RS and GIS in Farm Machinery & Power:

It was organized and conducted by Department of Farm Machinery and Power Engineering, College of Agricultural Engineering, JNKVV, Jabalpur under NAHEP project on 27 July 2020 at 4.00 PM. This Lecture was conducted on Google Meet platform and presented by Er. Manish Patel, Assistant Professor (FMPE), Member NAHEP-JNKVV in the presence of Dr. A.K. Shrivastava, Professor & Head (FMPE) ; Dr. M. K. Awasthi, Professor (SWE), Co-PI -Skill Development- National, NAHEP-JNKVV and Er. D. M. Kadam, Assistant Professor (FMPE) and attended by the PG and Ph.D. students of FMPE department which totaled near 22 participants. The core theme of the lecture was to understand and apply the concept of remote sensing and GIS for enhancing farm mechanization and precision farming through unmanned aerial/ground vehicles, robots, machine vision, artificial intelligence, big data, GPS, microcontrollers, different proximity sensors etc.

11.1.3 Online one day webinar on H-index:



One day webinar on H–index was organized by College of Agricultural Engineering, JNKVV, Jabalpur under NAHEP project on 28 June 2020**.** This webinar was conducted on Google Meet platform in the presence of Dean Faculty of Agriculture, JNKVV and Dean, College of Agricultural Engineering, JNKVV and attended by about 140 participants including all the members of JNKVV-NAHEP project, faculties/scientists from JNKVV Jabalpur campus and from outside campuses including PG and Ph.D. students. The core theme of the webinar was to understand the H-index which covered knowing about the H-index, determination of H-index, creation and updating of Google scholar profile, adding articles, adding co-author, exporting articles, following authors, Google scholar library, creating alerts, key points for improving H-index.

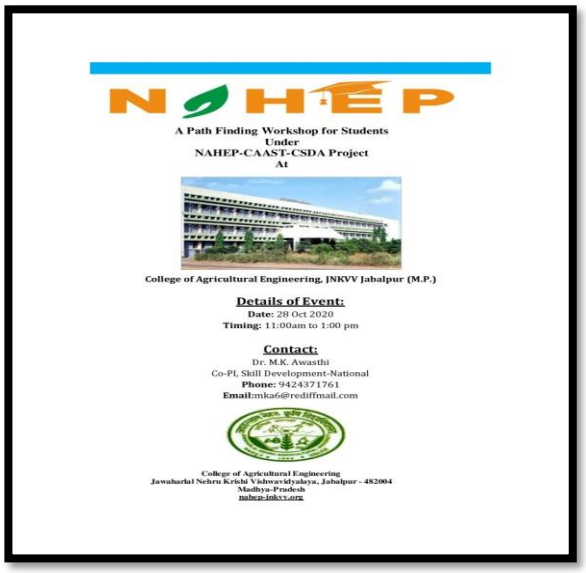
11.1.4 Lecture Series – Application of RS & GIS in different disciplines

In order to disseminate the knowledge learnt by associated scientist of project from IIRS Dehradun, A lectures series was conducted form 23.07.2020 to 12.08.2020 to brief the learnings during training and its possible applications to research projects of the PG & Ph.D. students of department in particular as well as for students from others departments too. The department shall be exposed to the work plan for NAHEP project for the year 2020-21 for more understanding and possible suggestions from faculty for improvement.

Date	Facilitator	Topic
23.07.2020	Dr. A.K. Bajpai	Applications of RS in Soil & Water Engineering
24.07.2020	Dr. S.K. Pyasi	Applications of GIS in Soil & Water Engineering
25.07.2020	Dr. M.K. Awasthi	An application of Mobile in survey
27.07.2020	Dr. Manish Patel	Applications of RS & GIS in Farm Machinery & Power
28.07.2020	Dr. C.M. Abroal	Applications of RS & GIS in Post-Harvest Process & Food Engineering
29.07.2020	Dr. P.B. Sharma	Applications of RS & GIS in Agronomy
30.07.2020	Dr. Shiv Ramakrishnan	Applications of RS & GIS in Plant Breeding
31.07.2020	Dr. Gyanendra Tiwari	Applications of RS & GIS in Crop Physiology
04.08.2020	Dr. S.B. Das	Applications of RS & GIS in Entomology
05.08.2020	Dr. R. Bajpai	Applications of RS & GIS in Forestry
06.08.2020	Dr. Deepak Rathi	Applications of RS & GIS in Economics
07.08.2020	Dr. A.K. Rai	Applications of RS & GIS in Basic Sciences
10.08.2020	Dr. Manish Bhan	Applications of RS & GIS in Agro meteorology
11.08.2020	Dr. S.K. Pandey	Applications of RS & GIS in Horticulture
12.08.2020	Dr. H.L. Sharma	Applications of RS & GIS in Big Data Analysis

11.1.5 A Path Finding Workshop for Students Research:

A Path Finding Workshop for Students Research under NAHEP-CAAST-CSDA Project held on 28th Oct, 2020 from 11:00am to 01:00 pm. In this workshop PI, Co-PI's, Associate scientists of (Natural Resource Management, Plant science and Big data analysis) RA and SRF working under project and PG and Ph.D. students interacted with each other. Under this workshop, PG and Ph.D. students were aware about the overview and objective of the NAHEP CAAST project. Also they got the information of opportunities of training in India and abroad. They have got the clear path guidance about the topics they have selected for their research work.



Total male participants were 8 and 10 female participants attended the session. The percentage of participants in different categories were UR- 45%, SC- 11%, ST- 11% and OBC- 33%. Students were benefited with their research path guidance and possible opportunities for them in future.

Training Schedule

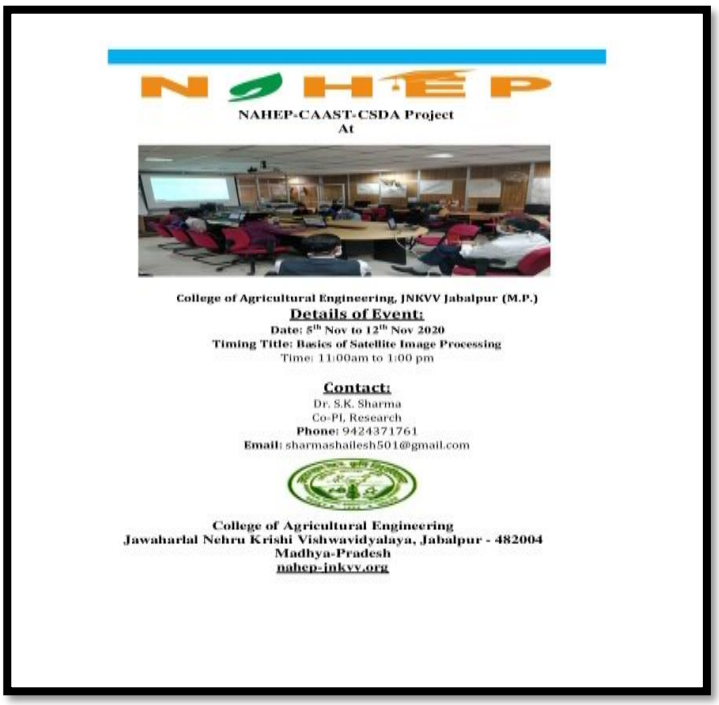
Sr. No.	Title of Training	Coordinator	Venue	Participants	Date of Training	Online/ Offline
1	A Path Finding Workshop for Students Research	Dr. M.K. Awasthi, Professor, COAE, JNKVV, Jabalpur	*College of Agriculture Engineering JNKVV, Jabalpur*	PG &Ph.D. Students	28.10.2020	Online

Distribution of participants

Table: Path Finding programme									
Number of Participants						% of participants in diff. category			
Gender	UR	SC	ST	OBC	Total	UR	SC	ST	OBC
Male	3	1	2	2	8	37.5	12.5	25.0	25.0
Female	5	1	0	4	10	50.0	10.0	0.0	40.0
Total	8	2	2	6	18	45.0	11.0	11.0	33.0

11.1.6 Training on Basics of Satellite Image Processing:

An offline training programme entitled Hands on –"Basics of Satellite Image Processing" was held from 5th Nov to 12th Nov 2020 for PG & Ph.D. Students. Different topics were elaborated by speakers such as Basics of Remote sensing and GIS, Introduction of QGIS software, Georeferencing of toposheets and their digitization, Geoportals, Downloading of Landsat 8 imagery, image interpretation, Pre-processing of Landsat 8 imagery, creating training dataset for supervised classification, Supervised Classification using SAGA GIS. The participants were given hands-on training on advanced system administration options in Remote Sensing as well as GIS analysis techniques. Out of total 6 participants, 1 male participant and 5 female participants attended the training and percentage of participants in different categories were observed as UR- 33%, SC- 17%, ST- 17% and OBC- 33%. The participants found this training very beneficial as they can do hands-on on RS & GIS independently for their research.



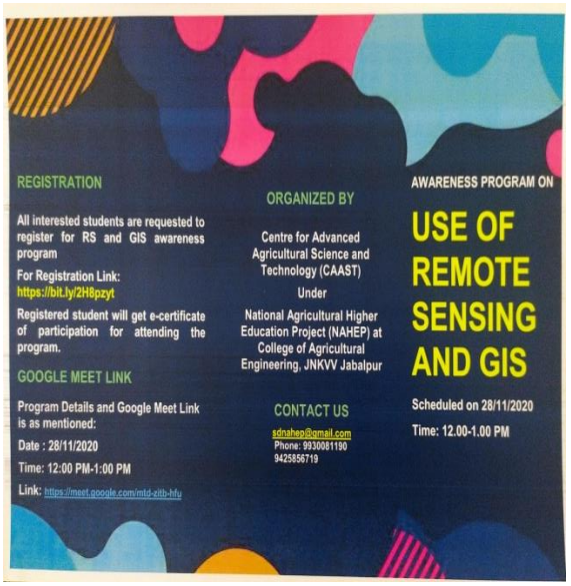
Training Schedule

Date	Speaker	Topic
5th Nov	Dr. R.K. Nema	Basics of Remote Sensing
	Dr. S.K. Sharma	Basics of GIS
6th Nov	Dr. P.S. Pawar	Introduction to QGIS
7th Nov	Aniket Rajput/ Dr. Devendra Vasht	Georeferencing of Toposheet and digitization
9th Nov	Pratiman Patel	Geoportals, downloading of Landsat 8 imagery, image interpretation
10th Nov	Pratiman Patel	Pre-processing of Landsat 8 imagery, creating training dataset for supervised classification
11th Nov	Ankit Yadav	Supervised Classification using SAGA GIS
12th Nov	Ankit Yadav	Supervised Classification using SAGA GIS, Validatory Function

Statistical distribution of participants

Table: Basics of satellite image processing									
Number of Participants						% of participants in diff. category			
Gender	UR	SC	ST	OBC	Total	UR	SC	ST	OBC
Male	0	0	0	1	1	0.0	0.0	0.0	100.0
Female	2	1	1	1	5	40.0	20.0	20.0	20.0
Total	2	1	1	2	6	33.3	16.7	16.7	33.3

11.1.7 Awareness program on use of RS & GIS:



An online awareness program entitled "Use of RS & GIS" was held on 27th and 28th Nov 2020. Total 107 students of four convent schools of Jabalpur namely Christ Church Girls Higher Secondary, Christ Church Boys Higher Secondary, St. Joseph Senior Secondary School and St. Aloysius Senior Secondary School had participated in it. Under this program Dr. Sourabh Nema and Dr. Minakshi Meshram had given their lectures on Remote sensing process, GPS and GIS functionalities, India's Agriculture status and Agriculture education overview, Agriculture technologies developed so far. Also, carrier opportunity and prospects of agriculture education were discussed among students to promote awareness about agriculture education. Students got the knowledge of RS & GIS Spectrum in Agriculture. Online certificates were issued to the participants. Total 7 male participants and 100 female participants were attended the awareness program and percentage of participants in different categories were found as UR- 42%, SC- 19%, ST- 13% and OBC- 26%. As per feedback received from participants, 86% respondent found RS & GIS techniques interesting and they have learnt new things. 78% respondent rated excellent & 16% rated as good experience on the lecture topics.

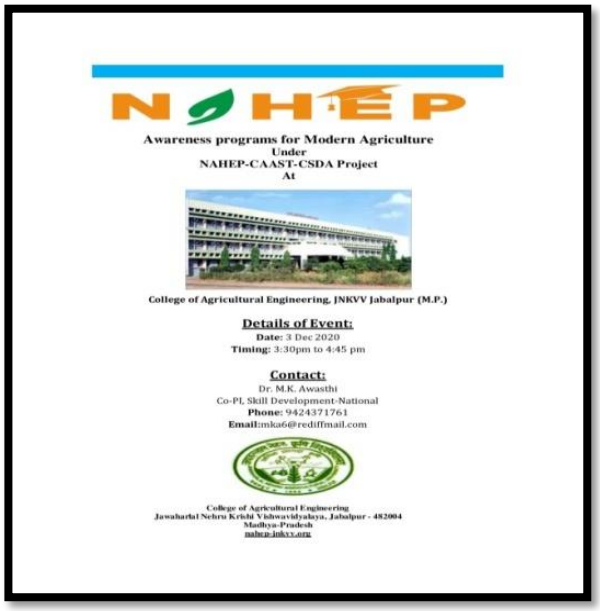
Training Schedule

Date	Speaker	Topic
27th Nov	Dr. Sourabh Nema and Dr. Minakshi Meshram	Remote sensing process, GPS and GIS functionalities, Agriculture in India
28th Nov	Dr. Sourabh Nema and Dr. Minakshi Meshram	Remote sensing process, GPS and GIS functionalities, Agriculture in India

Statistical distribution of participants

Table: Awareness Programme on use of RS & GIS									
Number of Participants						% of participants in diff. category			
Gender	UR	SC	ST	OBC	Total	UR	SC	ST	OBC
Male	2	1	2	2	7	28.6	14.3	28.6	28.6
Female	43	19	12	26	100	43.0	19.0	12.0	26.0
Total	45	20	14	28	107	42.0	19.0	13.0	26.0

11.1.8 Awareness programs for Modern Agriculture:



An online awareness program entitled "Agriculture Education Day" was held on 3rd Dec 2020, on kind remembrance of Birth Anniversary of Dr. Rajendra Prasad, the first President of Republic of India. A number of programme like Agriculture awareness quiz, Essay and slogan writing were organized online. Total 2088 students of 67 schools from Jabalpur Division participated in online quiz competition in releavance to Mordern Agriculture and various Agriculture Mechanization Techniques. 97 students participated in essay writing and slogan competition titled "Contribution of Modern Agriculture in building the Self-Reliant India". Total count of male participants were 877 and the count of female participants were 1211 and classification of participants under different category wise were found as UR- 36%, SC- 17%, ST- 8% and OBC- 39%. As per feedback received from participants, 62% respondent found the awareness session excellent and 26% found session as good and 74% said that have learnt new things about agriculture, provided in Agriculture awareness quiz.

Training Schedule

Sr. No.	Title of Training	Coordinator	Venue	Participants	Date of Training	Online/ Offline
1	Awareness programs for Modern Agriculture	Dr. R.N Shrivastava, Associate Professor, COAE, JNKVV, Jabalpur	*College of Agriculture Engineering JNKVV, Jabalpur*	School Students	03.12.2020	Online

Statistical distribution of participants

Table: Awareness programs of Modern Agriculture for students									
Number of Participants						% of participants in diff. category			
Gender	UR	SC	ST	OBC	Total	UR	SC	ST	OBC
Male	432	155	97	193	877	49.3	17.7	11.1	22.0
Female	320	200	70	621	1211	26.4	16.5	5.8	51.3
Total	752	355	167	814	2088	36.0	17.0	8.0	39.0

11.1.9 Awareness Programme on use of RS & GIS:

An online training program entitled "Use application of RS & GIS" was held on 28th Jan 2021, under the guidance of Dr. M. K. Awasthi. The lecture was delivered by Dr. R. N. Shrivastava. He discussed about Remote sensing process, Details about EMR spectrum, Satellites, Sensors and space programs, About GPS, Brief about GIS and its functionalities, Image interpretations, Applied RS and GIS application in field of Agriculture, Opportunities in the field of RS and GIS. One hundred fifty-six participants registered for the awareness programme on Remote Sensing & GIS. Out of the 152 students, total male participants were 82 and female participants were 70 and percentage of participants in different categories were UR- 37%, SC- 15%, ST- 13% and OBC- 35%. As per feedback received from participants, 84% respondent found RS & GIS session excellent.

Training Schedule

Sr. No.	Title of Training	Coordinator	Venue	Participants	Date of Training	Online/ Offline
1	Awareness programs on Application of RS and GIS	Dr. R.N Shrivastava, Associate Professor, COAE, JNKVV, Jabalpur	*College of Agriculture Engineering JNKVV, Jabalpur*	UG Students	28.01.2021	Online

Statistical distribution of participants

Table: Awareness program on Application of RS & GIS									
	Number of Participants					% of participants in diff. category			
Category	UR	OBC	SC	ST	Total	UR	OBC	SC	ST
Male	22	40	13	11	86	26	46	15	13
Female	35	14	11	10	70	50	20	16	14
Total	**57**	**54**	**24**	**21**	**156**	**37**	**35**	**15**	**13**

11.1.10 Exposure to RS & GIS Application in Agriculture:

Online program entitled "Exposure to RS & GIS Application in Agriculture" was held on 18th Feb 2021. Discussed for Remote sensing process area and application of RS in the agricultural sector, capabilities of RS and GIS, Details about EMR Spectrum, Satellites, Sensors and space programs, About GPS, Brief about GIS and its functionalities, Image interpretations, Applied RS and GIS application in field of Agriculture, Preparation of integrated maps for decision making. Sixty-Eight participants registered for the Exposure on Remote Sensing & GIS. Total 53 participants have attended the training. Total male participants were 45 and female participants were 23. Percentage of participants in different categories were reported as UR- 56%, SC- 15%, ST- 4% and OBC- 25%. As per feedback received from participants, 72% respondent said that they have found session interesting. 82% respondent rated excellent experience of the lecture and 12% rated the session with good experience.

Training Schedule

Date	Speaker	Course Topic
18st Feb 2021	Dr. R.K. Nema Dean, CAE, JNKVV & PI, NAHEP	Remote sensing and GIS application in agriculture

Statistical distribution of participants

Table: Exposure to RS & GIS Application in Agriculture									
	Number of Participants					% of participants in diff. category			
Gender	General	OBC	SC	ST	Total	General	OBC	SC	ST
Male	27	13	03	02	45	60	29	07	4
Female	11	04	07	01	23	48	17	30	5
Total	38	17	10	03	68	56	25	15	4

Capacity building of Resources Persons

11.1.11 RS and GIS Technology and its application:

The training was held on 13th June to 1st July 2020 entitled "RS and GIS Technology and its application" organized by Indian Institute of Remote Sensing, Dehradun. 19 scientists participated in the training are Dr. A.K. Bajpai, Dr. C.M. Abrol, Dr. Deepak Rathi Dr. G.S. Tagore Dr. M.K. Awasthi Dr. Manish Bhan Dr.P.B. Sharma, Dr. R.N.Shrivastava Dr.S.B.Das, Dr. S.K. Pandey Dr.M.L.Sahu, Dr.Y.K.Tiwari, Er. Manish Patel Dr. S.K.Pyasi, Dr. Shivramakrishnan Dr.A.K.Rai Dr. Pramod K Gupta Dr. Rakesh Kumar Prajapati, Mr. Ramdeen Barpete.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE
INDIAN SPACE RESEARCH ORGANISATION
INDIAN INSTITUTE OF REMOTE SENSING, DEHRADUN

CERTIFICATE OF PARTICIPATION IN
ONLINE COURSE

This is to certify that DR. MANOJ KUMAR AWASTHI has been awarded this certificate on having participated in the online course on "Remote Sensing & GIS Technology and Applications for University Teachers & Government Officials" which was conducted by Indian Institute of Remote Sensing (IIRS),ISRO Dehradun, during 13-06-2020 to 01-07-2020 .

Date: 22-07-2020
Place: Dehradun

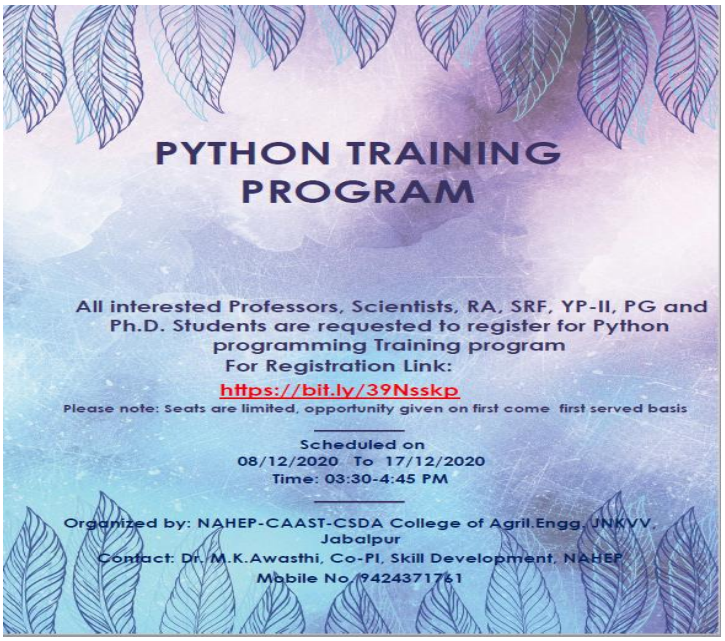
Director
IIRS, Dehradun

Training Schedule

Date	Topic	Speaker
13/06/2020	Inauguration	
13/06/2020	Basic Principles of Remote Sensing	Dr. Manu Mehta
15/06/2020	Earth Observation Sensors & Platforms	Mr. Vinay Kumar
15/06/2020	Spectral Signatures of Different Land Cover Features & Visual Image Interpretation	Dr. Hina Pande
16/06/2020	Data Image Processing: Basic Concepts, Rectification & Registration	Mrs. Minakshi Kumar
16/06/2020	Image Enhancement Techniques: Contrast, Filtering Transformations	Mrs. Minakshi Kumar
17/06/2020	Image Classification Techniques: Unsupervised, Supervised & Separability Analysis	Dr. Poonam S Tiwari.
17/06/2020	Digital Change Detection & Accuracy Assessment	Dr. Poonam S Tiwari.
18/06/2020	Introduction to GPS & GNSS	Dr. Ashutosh Bhardwaj
18/06/2020	GPS Receivers, Processing Methods, Errors & Accuracy	Dr. Ashutosh Bhardwaj
19/06/2020	Satellite Based Augmentation Systems & GPS Aided & Geo Augmented Navigation (GAGAN)	Dr. Ashutosh Bhardwaj

19/06/2020	Indian Regional Navigation Satellite System (IRNSS)/NaviC	Dr. Ashutosh Bhardwaj & Shri Kamal Pandey
20/06/2020	Introduction To GIS	Dr. Sameer Saran
20/06/2020	Geographic Phenomena, Concepts & Examples	Shri Prasun Kumar Gupta
22/06/2020	Data Inputting & Editing In GIS	Shri Shiva K. Reddy
22/06/2020	GIS Data Models (Spatial & Non – Spatial)	Shri Ashutosh Kumar Jha
23/06/2020	Map Projection Concepts & Use In GIS & RS	Dr. Ashutosh Shrivastava
23/06/2020	Spatial Analysis – Introductory Concepts & Overview	Shri Prabhakar Alok Verma
24/06/2020	Spatial Analysis – Functionality & Tools	Shri Kapil Oberai
24/06/2020	Data Quality & Policies OGC, NSDI & GSDI Initiatives.	Dr. Harish Chandra Karnatak
25/06/2020	Demonstration on QGIS- Basic GIS operations and Analysis	Mr. Prasun Kumar Gupta
25/06/2020	Concept of Online GIS – An Introduction to Geoweb Services	Dr. Harish Chandra Karnatak
26/06/2020	Mobile GIS – An overview	Dr. Kamal Pandey
26/06/2020	Geodata Processing using Python- An overview	Mr. Ravi Bhandari
27/06/2020	RS GIS applications in Natural Hazards and Disaster Risk Management	Dr. Arijit Roy
27/06/2020	RS and GIS Applications in Forest Resources & Ecosystem Analysis	Dr.Hitendra Padalia
29/06/2020	RS and GIS Applications in Geosciences	Dr. R.S.Chatterjee
29/06/2020	RS and GIS Applications in Agriculture & Soils	Dr Suresh Kumar
30/06/2020	RS & GIS Applications in Coastal & Ocean Sciences	Dr. D.Mitra
30/06/2020	RS and GIS Applications in Urban & Regional Studies	Mr. Pramod Kumar
01/07/2020	RS and GIS Applications in Water Resources	Dr. S.P. Agarawal
01/07/2020	Role of Geospatial Technology in Health GIS: Use Case on COVID-19	Dr. Sameer Saran
01/07/2020	Panel Discussion & Announcement about Examination	

11.1.12 Training on Python Programme:



An online training programme on Python was held from 8th Dec to 17th Dec 2020.Registration of 274 participants received and finally 124 regularly attended the course and other assigned activities. By learning python, the participants understand about the python programing, its application in data analysis and map/graph creation and capable to integrate the similar kind of analysis for their research and can use this language for short programming's. In this programme, total count of male participants were 179 and total female participants count were 95 and percentage of participants in different category were observed as UR- 50%, SC- 12%, ST- 5% and OBC- 33%. As per feedback received from participants, 71% respondent found the python programming session as excellent and 14% rated the session good. They have learnt new things about programming and will be useful in their research. The resource person in this programe was Mr Satish Singh

Training Schedule

S. No	Date	Course Topic
1	8th Dec	Anaconda Download and environment set up, Introduction to Jupyter Notebook, The Basics of Python
2	9th Dec	Basics of Python Dictionary, Tuples, Sets and their examples
3	10th Dec	Basics of Python Dictionary, Tuples, Sets and their examples
4	11th Dec	Conditional programming (if-else, Lopping for a while, Comprehension, Functions)
5	12th Dec	Python functions, Map reduce, DIfy
9	13th Dec	Numpy Basics, array, Slicing dicing, merging sorting and Operations of Numpy array with examples
7	14th Dec	Panda Basics, Merging concatenating, Grouping and Summarizing, Lambda function pivot table, handling missing data
8	15th Dec	Introduction to matplotlip, cluster dimension, market fact, order dimension
9	16th Dec	Production dimension, shipping dimension, lending club
10	17th Dec	Drop rows with null value, Standardizing value, Split column for more data: split address to get address to get state and city to analyze each separately.

Distribution of participants

Table: Training on Python Programme									
Number of Participants						% of participants in diff. category			
Gender	UR	SC	ST	OBC	Total	UR	SC	ST	OBC
Male	87	20	10	62	179	48.6	11.2	5.6	34.6
Female	51	13	3	28	95	53.7	13.7	3.2	29.5
Total	138	33	13	90	274	50.4	12.0	4.7	32.8

11.1.13
11.1.14
11.1.15 Training cum orientation program on Geo-informatics:
11.1.16

Training cum orientation program on "Geoinformatics" was organized for the Assistant Professors (Course Teachers of Subject Geo-informatics) from 14/12/2020 to 15/12/2020 under NAHEP-CAAST, at College of Agricultural Engineering, JNKVV, Jabalpur. During this training basic of GIS was covered with online session on GIS software (QGIS Software The pre and post training evaluation test was conducted for the assessment of training program. It includes Remote sensing process, Details about EMR Spectrum, Satellites, Sensors and space programs, About GPS, Brief about GIS and its functionalities, Image interpretations, Applied RS and GIS application in field of Agriculture, Opportunities in the field of RS and GIS. In this programme total male participants were 8 and female participants 1 and percentage of participants in different category was UR- 78%, SC- 0%, ST- 11% and OBC- 11%. As per feedback received from participants, 88% respondent rated the program excellent. The resource person in this programe was Dr S. K. Sharma

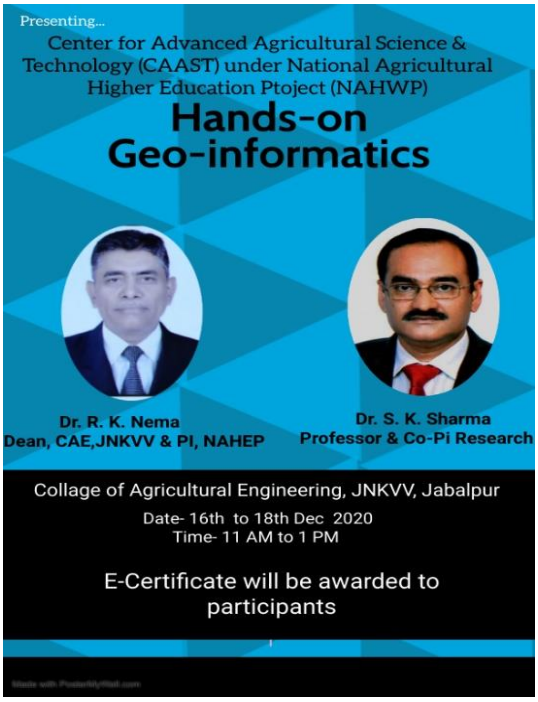
Training Schedule

Sr. No.	**Date**	**Course Topics**	**Online/ Offline**
1	14th Dec	Basic of Remote Sensing & GIS	Online
2	15th Dec	Brief about GIS & its functionalities	Online

Distribution of participants

Table: Training cum orientation programme on Geo-informatics									
Number of Participants						% of participants in diff. category			
Gender	UR	SC	ST	OBC	Total	UR	SC	ST	OBC
Male	6	0	1	1	8	75.0	0.0	12.5	12.5
Female	1	0	0	0	1	100.0	0.0	0.0	0.0
Total	7	0	1	1	9	77.8	0.0	11.1	11.1

11.1.17 Hands on training on Geo-informatics: 11.1.18



Offline training entitled "Remote Sensing & Geographical Information System" for Faculty was held on 16th Dec to 18th Dec 2020. During this training basic of remote sensing and GIS was covered with Hands-on session on the open-source GIS software (QGIS Software), the procedure for downloading satellite imagery from an open-source platform and basic processing of the satellite image using QGIS software. The pre and post training evaluation test was conducted for the assessment of training program and there was improvement seen after post evaluation of participants. They refreshed their knowledge and learnt new things about QGIS. Total 9 participants attended with 8 male participants and one female participant. Percentage of participants in different category was UR- 78%, SC- 0%, ST- 11% and OBC- 11%. The resource person in this programe was Dr S. K. Sharma

Training Schedule

Sr. No.	Date	Course Topics	Online/Offline
1	16th Dec	Open-source GIS software (QGIS Software)	offline
2	17th Dec	Downloading satellite image through open-source	offline
3	18th Dec	Process of satellite image using QGIS software	offline

Statistical distribution of participants

Table: Training cum orientation programme on Geo-informatics									
Number of Participants						% of participants in diff. category			
Gender	UR	SC	ST	OBC	Total	UR	SC	ST	OBC
Male	6	0	1	1	8	75.0	0.0	12.5	12.5
Female	1	0	0	0	1	100.0	0.0	0.0	0.0
Total	7	0	1	1	9	77.8	0.0	11.1	11.1

11.1.19 Training on Image processing using Python:

Five days online training program entitled "Image processing using python" was held on 11th Jan to 15th Jan 2021. The lecture was delivered by Mr. Sathish Singh. He discussed about the satellites images vs Normal images, Libraries specifically used for satellite images, Introduction of raster, satellite image processing using rasterio and different command used in raster file etc. They create python application that reads list of images, modifies their size and appearance and saves the images in another directory. One hundred and forty-five participants registered for the course and out of these fifty-nine students have attended the training regularly. Total male participants were 77 and female participants 68. Percentage of participants in different category was UR- 45%, SC- 16%, ST- 3% and OBC- 36%. As per feedback received from participants, 78% respondent said that they have learnt new things on image processing. 66% respondent rated excellent and 18% rated good experience of the lecture topics.

Training Schedule

S. No	Date	Course Topic
1	11th Jan	Satellites image vs. normal image
2	12th Jan	Libraries specific to satellite image
3	13th Jan	Introduction to rasterio
4	14th Jan	Satellite image processing using rasterio
5	15th Jan	Rasterio, rasterstates, geopandas, geoplots, Fiona, matplotlip, pandas, numpy

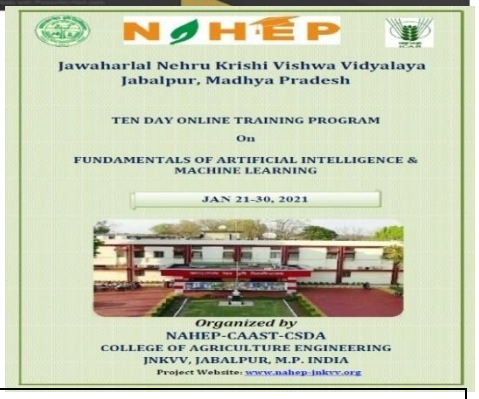
Statistical distribution of participants

Table: Training on Image processing using Python

	Number of Participants					% of participants in diff. category			
Category	UR	OBC	SC	ST	Total	UR	OBC	SC	ST
Male	42	13	19	03	77	55	17	25	3
Female	23	39	05	01	68	34	57	8	1
Total	65	52	24	04	145	45	36	16	3

11.1.20 Fundamentals of Artificial Intelligence and Machine Learning:

Ten days online training program entitled "Image processing using python" was held on 21th Jan to 30th Jan 2021. The lecture was delivered by Mr. Sathish Singh. It included Understanding - AI and MI, Classification using ML algorithms (KNN, SVM, ANN), Data pre-processing using python, Introduction to deep learning, understanding convolution neural networks, Deploying CNN for classification of aerial images and recent trends in AI. Three hundred forty-seven participant's registered two hundred ninety-four students have attended regularly.



Total male participants were 255 and female participants were 92 and percentage of participants in different categories were UR- 45%, SC- 13%, ST- 3% and OBC- 39%. As per feedback received from participants, 72% respondent found AI & ML techniques interesting and learnt new things. 58% respondent rated training as excellent and 30% rated the good experience of the lecture topics.

Training Schedule

S. No	Date	Course Topic
1	21st Jan	Understanding - AI and Machine learning
2	22nd Jan	Feature extraction from images
3	23rd Jan	Classification using ML algorithms (KNN, SVM, ANN)
4	24th Jan	Classification using ML algorithms (KNN, SVM, ANN)
5	25th Jan	Data pre-processing using python.
6	27th Jan	Introduction to deep learning
7	28th Jan	Understanding convolutional neural networks
8	29th Jan	Deploying CNN for classification of aerial images
9	30th Jan	Understanding object detection
10	31st Jan	Discussing recent trends in AI

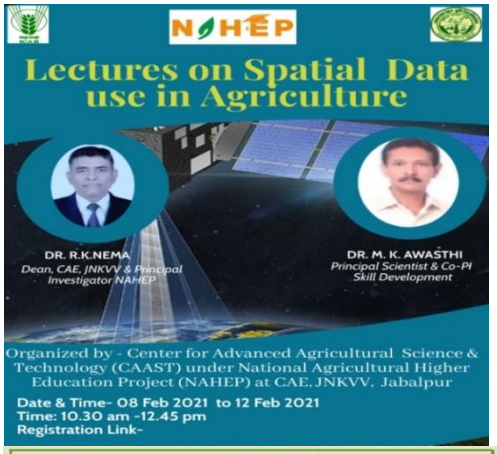
Distribution of participants

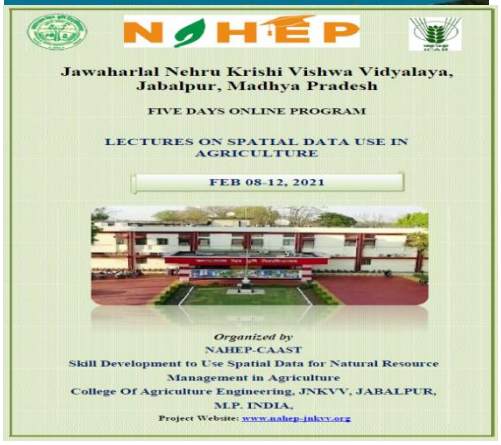
Table: Fundamentals of Artificial Intelligence and Machine Learning

Number of Participants						% of participants in diff. category			
Category	General	OBC	SC	ST	Total	General	OBC	SC	ST
Male	113	113	23	06	255	44	44	9	2
Female	43	23	20	06	92	47	25	22	6
Total	156	136	43	12	347	45	39	13	3

11.1.21 Lectures on Spatial Data use in Agriculture:

5 days online program entitled "Lectures on Spatial Data use in Agriculture" was held on 8th Feb to 12th Feb 2021. The lectures were delivered by guest Scientists from IIT, Roorkee, NIH Roorkee, IIRS Dehradun, and Dean JAU. They discussed different aspect and application of the Basic of RS, Satellites Data & GIS, Hydrological application, Land use and land cover classification, crop discrimination and acreage estimation, crop condition assessment: biotic and abiotic stress, Microwave RS in crop inventory and RS & GIS application in crop water requirement. 201 participants registered for the course and out of these 180 participants attended regularly. Total male participants were 140 and female participants were 61. The percentage of participants in different categories were UR- 44%, SC- 35%, ST- 14% and OBC- 7%.





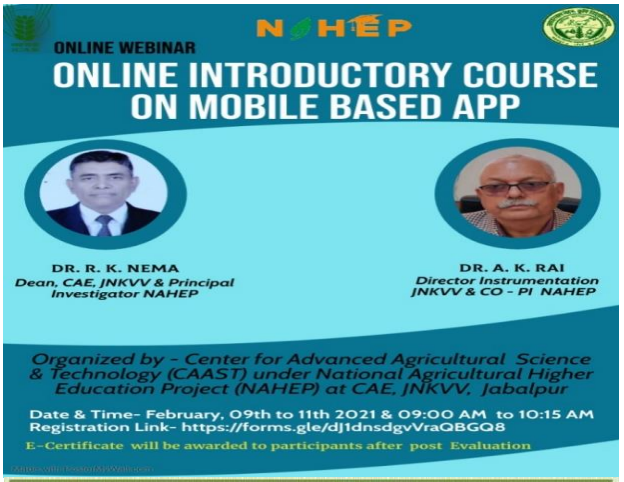
Training Schedule

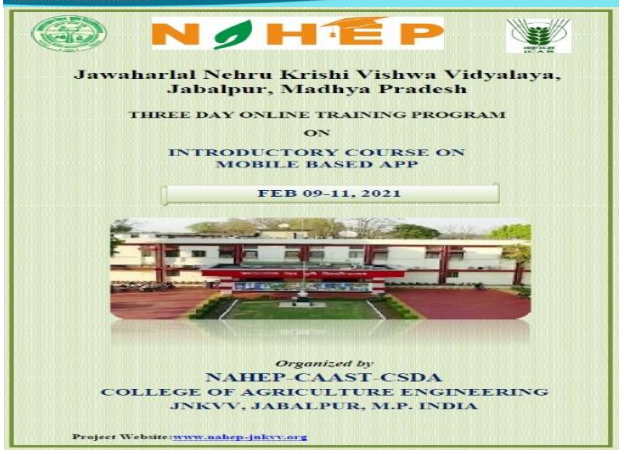
S. No	Date	**Speaker**	**Course Topic**
1	8th Feb	Dr. Manish Nema, Scientist-D, NIH Roorkee	Basics of Remote Sensing (RS), Satellites Data and GIS
2	8th Feb	Dr. Manish Nema, Scientist-D, NIH Roorkee	Hydrological application of remote sensing and GIS
3	9th Feb	Dr. S K Jain, Scientist-G, NIH Roorkee	Remote sensing applications in sediment yield and reservoir sedimentation
4	9th Feb	Dr. Manoj Kumar Jain, Professor & Head, Hydrology, IIT Roorkee	Land use and Land Cover classifications: Visual and Digital methods
5	10th Feb	Dr. Suresh Kumar, Scientist-SG, IIRS Dehradun	RS applications in Soil Mapping and Land Use Planning
6	10th Feb	Dr. N R Patel, Scientist-SG, IIRS Dehradun	Crop discrimination and Acreage estimation
7	11th Feb	Dr. N R Patel, Scientist-SG, IIRS Dehradun	RS in crop condition Assessment: biotic & abiotic stress
8	11th Feb	Dr. Dipanwita Haldar, Scientist-SD IIRS Dehradun	Microwave RS in Crop Inventory
9	12th Feb	Dr. N K Gontia, Professor & Dean, JAU, Jungaurh	RS in crop Yield Modeling: Spectral Vegetation Index based Yield Model
10	12th Feb	Mr. Abhishek Danodia, Scientist-SD, IIRS Dehradun	RS and GIS applications in crop water requirement

Statistical distribution of participants

Table: Lectures on spatial data use in Agriculture									
Number of Participants						% of participants in diff. category			
Gender	UR	SC	ST	OBC	Total	UR	SC	ST	OBC
Male	57	54	18	11	140	41	38	13	8
Female	31	17	10	03	61	51	28	16	5
Total	88	71	28	14	201	44	35	14	7

11.1.22 Introductory course on Mobile Based App:





Three days online program entitled "Introductory course on Mobile based app" was held on 09th to 11th Feb, 2021. The lectures were delivered by Vikram Singh Rajput, Database Developer, Center of Excellence, MAP_IT. With an Overview of Mobile Devices and Developing Mobile Applications he explained Scope of Mobile App, Development Environment, Overview of Android Versions & advanced system administration options in Mobile based app. Two hundred eighty-four participants registered (out of these one hundred five students and faculties have attended regularly) with 181 male participants and 103 female participants. Percentage of participants in different category was UR- 50%, SC- 8%, ST- 32% and OBC- 10%. As per feedback received from participants, 78% respondent found Mobile app development a new experience and they have learnt new things which will be useful for them. 72% respondent rated the session as excellent and 20% rated as good.

Training Schedule

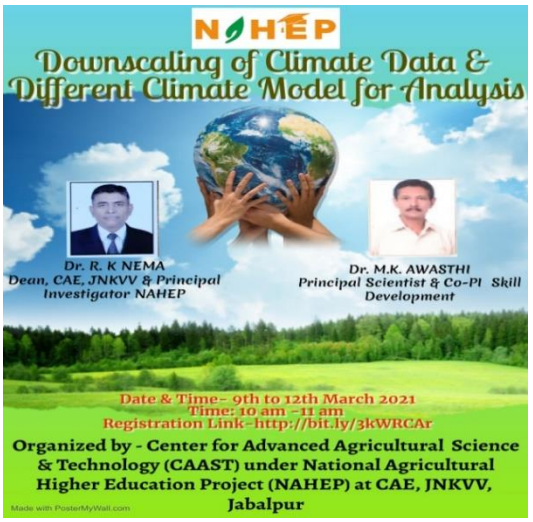
S. No.	Day	Topics
1.	09th Feb	An Overview of Mobile Devices and Developing Mobile Applications, Introduction of Mobile Apps, Why Mobile Apps Needed, Scope of the Mobile App and Mobile Devices: Advantages & Dis-Advantages
2.	10th Feb	How to Prepare Mobile App, Development Environments, Overview of Android Versions
3.	11th Feb	Where Can I Get Apps?, How to Use Mobile Applications and Some Common Application.

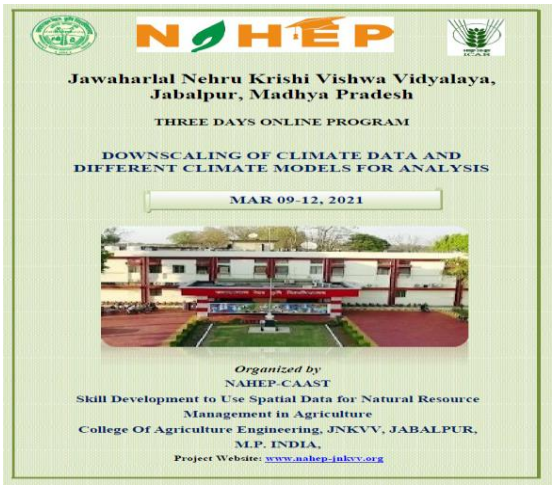
Statistical distribution of participants

Table: Introductory course on Mobile based app									
Number of Participants						% of participants in diff. category			
Category	General	OBC	SC	ST	Total	General	OBC	SC	ST
Male	80	21	16	64	181	44	12	9	35
Female	63	8	6	26	103	61	8	6	25
Total	143	29	22	90	284	50	10	8	32

11.1.23 Downscaling of climate data and different climate models for analysis:

Three days online program entitled "Downscaling of climate data and different climate models for analysis" was held on 9th to 12th March 2021. The lectures were delivered by guest Professor from School of Environmental Science, JNU, New Delhi, Dr. A.P. Dimri. He covered the topic Different Climate Models (GCM/RCM) and their applicability in Agriculture and downscaling of climate data and Dr. Sourabh Nema, delivered lecture on open source data for Down scale of Climate Data & different Climate Model for Analysis. 246 participants registered for the course and out of these 123 students have attended the training regularly. Total male participants were 163 and female participants were 83. Percentage of participants in different categories were UR- 44%, SC- 12%, ST- 8% and OBC- 36%. The participants get benefitted about GCM & RCM Models, Climate Data availability and their downscaling process. As per feedback received from participants, 84% respondent said that they have learnt new things on the session and found useful for research. 70% respondent rated the programme as excellent and 22% rated as good.





Training Schedule

Date	Speaker	Course Topic
09th March	Dr. A.P. Dimri	Climate Data & different Climate Model (GCM/RCM). for Analysis- & their applicability in Agriculture
10th March	Dr. A.P. Dimri	Climate Data & different Climate Model for Analysis-Downscaling of Climate Data
12th March	Dr. Sourabh Nema,	Climate Data & different Climate Model for Analysis

Statistical distribution of participants

Table: Downscaling of climate data and different climate models for analysis									
Number of Participants						**% of participants in diff. category**			
Category	General	OBC	SC	ST	Total	General	OBC	SC	ST
Male	72	56	19	16	163	44	34	12	10
Female	37	33	9	4	83	45	40	11	4
Total	109	89	28	20	246	44	36	12	8

11.1.24 Biosafety & Waste Disposal

Date	**Speaker (Designation &Organization)**	**Theme / Topic**	**Participants attended**			**Impact**
			Total	**Female**	**Male**	
18.09.2020	Dr. Keerti Tantwai, Assistant Professor, Biotechnology Centre, JNKVV, Jabalpur	Biosafety & Waste Disposal	**48**	**12**	**36**	As per 48 feedback forms more than 62% respondents got new information regarding "Biosafety and Waste Disposal". More than 50% participants were aware, showing interest and rated excellent experience of the lecture topic

Category wise distribution:

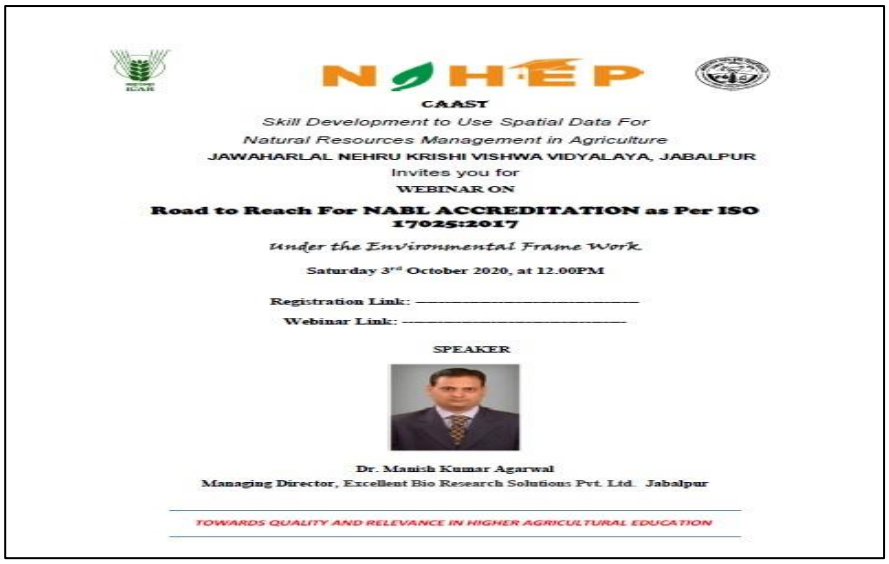
Number of Participation						Percentage of participation of Category			
Gender	UR	SC	ST	OBC	Total	UR	SC	ST	OBC
Male	13	5	1	17	36	36.1	13.9	2.8	47.2
Female	7	1	1	3	12	58.3	8.3	8.3	25.0
Total	20	6	2	20	48	41.7	12.5	4.2	41.7

11.1.25 Road to Reach for NABL ACCREDITATION as Per ISO 17025:2017

Date	Speaker (Designation &Organization)	Theme / Topic	Participants attended			Impact
			Total	Female	Male	
03.10.2020	Dr. M. K. Agrawal, Managing Director, Excellent Bio Research Solutions Pvt. Ltd. Jabalpur	Road to Reach for NABL ACCREDITATION as Per ISO 17025:2017	44	16	28	Enhanced awareness among students towards NABL Accreditation. All the faculty members and students have got benefited from this lecture, views on the subject.

Category wise distribution:

Number of Participation						Percentage of participation of Category			
Gender	UR	SC	ST	OBC	Total	UR	SC	ST	OBC
Male	16	4	2	6	28	57.1	14.3	7.1	21.4
Female	8	2	2	4	16	50.0	12.5	12.5	25.0
Total	24	6	4	10	44	54.5	13.6	9.1	22.7

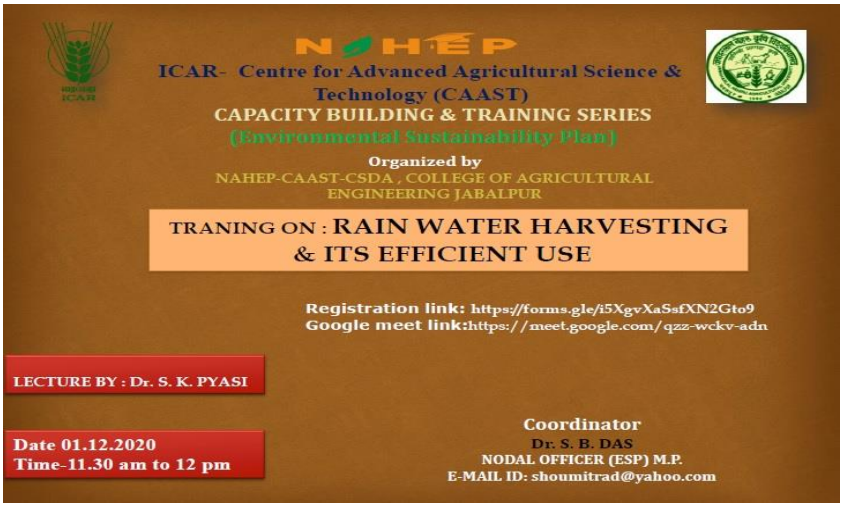


11.1.26 Rain water harvesting & its efficient use

Date	Speaker (Designation &Organization)	Theme / Topic	Participants attended			Impact
			Total	Female	Male	
01.12.2020	Dr. S. K. Pyasi, Professor, JNKVV, Jabalpur	Rain water harvesting & its efficient use	22	11	11	Enhanced awareness among students towards technique of RWH& trained about ground water, world water distribution, objective of watershed treatment. It created interest among students/research scholars to perform research in the field of water harvesting.

Category wise distribution:

Number of Participation						Percentage of participation of Category			
Gender	UR	SC	ST	OBC	Total	UR	SC	ST	OBC
Male	1	0	0	10	11	9.1	0.0	0.0	90.9
Female	5	1	0	5	11	45.5	9.1	0.0	45.5
Total	6	1	0	15	22	27.3	4.5	0.0	68.2

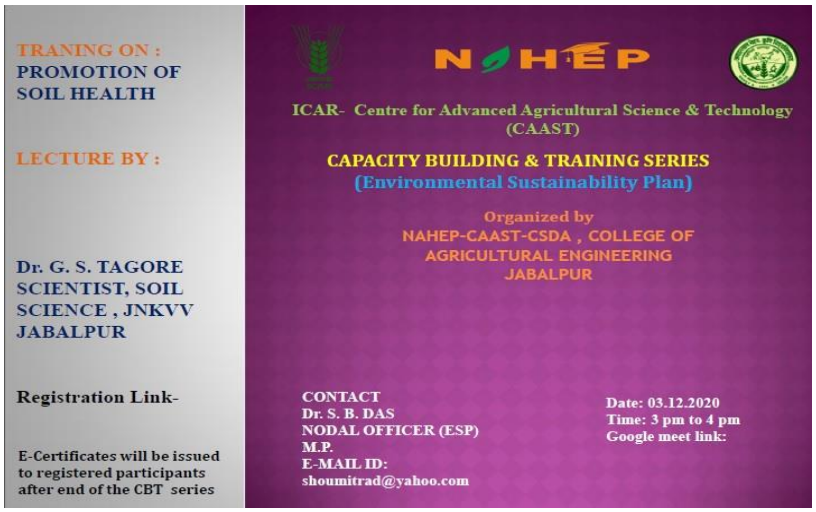


11.1.27 Promotion of soil health

Date	Speaker (Designation &Organization)	Theme / Topic	Participants attended			Impact
			Total	Female	Male	
03.12.2020	Dr. G. S. Tagore Scientist, Soil Science, JNKVV, Jabalpur	Promotion of soil health	31	10	21	Students got information regarding "Promotion of Soil Health'. Participants showed interest and rated excellent experience of the lecture topic

Category wise distribution:

Number of Participation						Percentage of participation of Category			
Gender	UR	SC	ST	OBC	Total	UR	SC	ST	OBC
Male	5	3	1	12	21	23.8	14.3	4.8	57.1
Female	4	2	0	4	10	40.0	20.0	0.0	40.0
Total	9	5	1	16	31	29.0	16.1	3.2	51.6

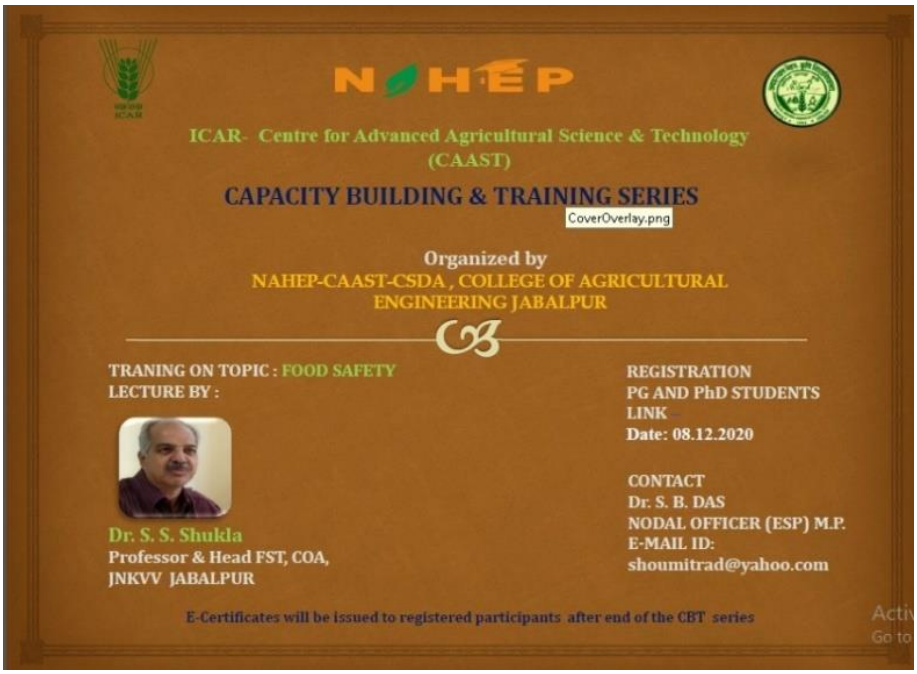


11.1.28 Food safety & standard Act 2006

Date	Speaker (Designation &Organization)	Theme / Topic	Participants attended			Impact
			Total	Female	Male	
08.12.2020	Dr. S.S. Shukla, Professor & Head , Food Science &Technology , JNKVV, Jabalpur	Food Safety & Standard Act 2006	15	06	09	Student got information regarding "Food Safety Its Measure, Regulations standard Act" & rated excellent experience of the graphical informative lecture

Category wise distribution:

Number of Participation						Percentage of participation of Category			
Gender	UR	SC	ST	OBC	Total	UR	SC	ST	OBC
Male	2	1	1	4	8	25.0	12.5	12.5	50.0
Female	3	0	1	1	5	60.0	0.0	20.0	20.0
Total	5	1	2	5	13	38.5	7.7	15.4	38.5

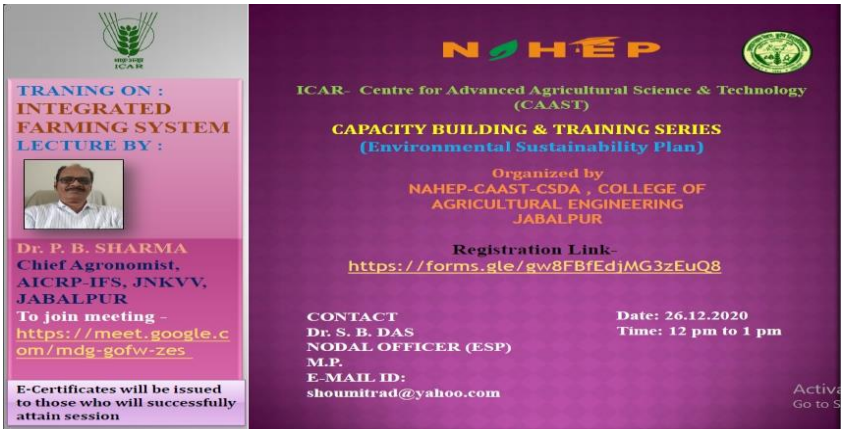


11.1.29 Integrated farming system

Date	Speaker (Designation &Organization)	Theme / Topic	Participants attended			Impact
			Total	Female	Male	
26.12.2020	Dr. P. B. Sharma Chief Agronomist, AICRP-IFS, JNKVV, Jabalpur	Integrated Farming System	19	06	13	Student got information regarding "IFS & its principles. Students got detail information about IFS and advised to aware farmers to enhance & adopt the IFS system

Category wise distribution:

Number of Participation						Percentage of participation of Category			
Gender	UR	SC	ST	OBC	Total	UR	SC	ST	OBC
Male	7	0	0	4	11	63.6	0.0	0.0	36.4
Female	2	1	0	6	9	22.2	11.1	0.0	66.7
Total	9	1	0	10	20	45.0	5.0	0.0	50.0

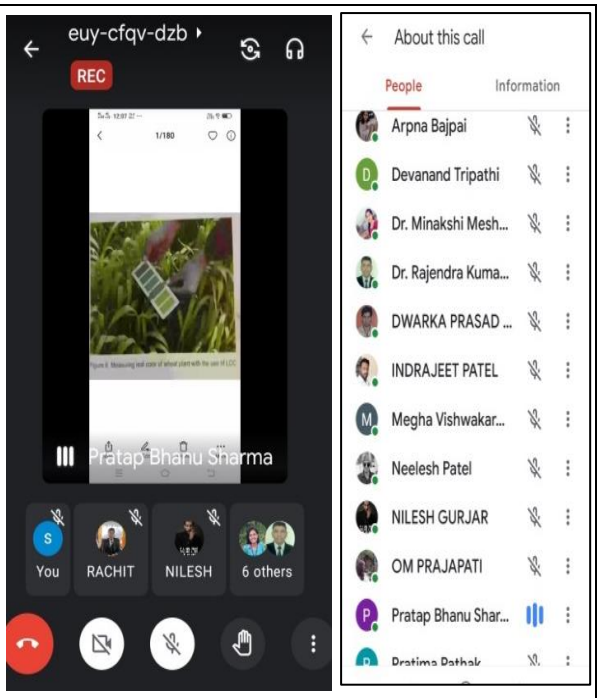


11.1.30 Integrated Nutrient & Weed Management

Date	Speaker (Designation &Organization)	Theme / Topic	Participants attended			Impact
			Total	Female	Male	
08.01.2021	Dr. P. B. Sharma Chief Agronomist, AICRP-IFS, JNKVV, Jabalpur	Integrated Nutrient Management	19	09	12	Student got information regarding "INM& its classifications. need of INM, what is INM, sources of nutrients for INM. Awareness among the student to do and aware to farmers towards INM

Category wise distribution:

Number of Participation						Percentage of participation of Category			
Gender	UR	SC	ST	OBC	Total	UR	SC	ST	OBC
Male	3	0	1	9	13	23.1	0.0	7.7	69.2
Female	3	0	1	2	6	50.0	0.0	16.7	33.3
Total	6	0	2	11	19	31.6	0.0	10.5	57.9



11.1.31 Biodiversity conservation

Date	Speaker (Designation &Organization)	Theme / Topic	Participants attended			Impact
			Total	Female	Male	
30.01.2021	Dr. Anita Babbar JNKVV, Jabalpur	Biodiversity conservation	22	9	13	Student got information regarding "biodiversity and factors affecting biodiversity Students made aware of need of biodiversity conservation with merits & limitations of in situ conservation

Category wise distribution:

Number of Participation						Percentage of participation of Category			
Gender	**UR**	**SC**	**ST**	**OBC**	**Total**	**UR**	**SC**	**ST**	**OBC**
Male	3	2	1	7	13	23.1	15.4	7.7	53.8
Female	2	3	2	2	9	22.2	33.3	22.2	22.2
Total	5	5	3	9	22	22.7	22.7	13.6	40.9

11.1.32 NABL guidelines for accreditation of laboratories

Date	Speaker (Designation &Organization)	Theme / Topic	Participants attended			Impact
			Total	Female	Male	
01.03.2021	Dr. Sharad Tiwari, Professor & Director, Biotechnology Centre, JNKVV, Jabalpur	NABL guidelines for accreditation of laboratories	47	26	21	Enhanced awareness among students towards NABL Accreditation. All the faculty members and students have got benefited from this lecture, views on the subject.

Category wise distribution:

Number of Participation						Percentage of participation of Category			
Gender	UR	SC	ST	OBC	Total	UR	SC	ST	OBC
Male	5	3	3	10	21	23.8	14.3	14.3	47.6
Female	11	6	1	8	26	42.3	23.1	3.8	30.8
Total	16	9	4	18	47	34.0	19.1	8.5	38.3

11.1.33 Integrated Management of Insect pests & mites & Diseases

Date	Speaker (Designation &Organization)	Theme / Topic	Participants attended			Impact
			Total	Female	Male	
08.03.2021	Dr. S. B. Das Professor, Dept. of Entomology, JNKVV, Jabalpur	Integrated Management of Insects pest, mites and diseases	**37**	**10**	**27**	Student got information regarding "integrated management of insects, pest, mites and diseases. Students made aware about integrated management with different method like cultural, mechanical, chemical and biological control.

Category wise distribution:

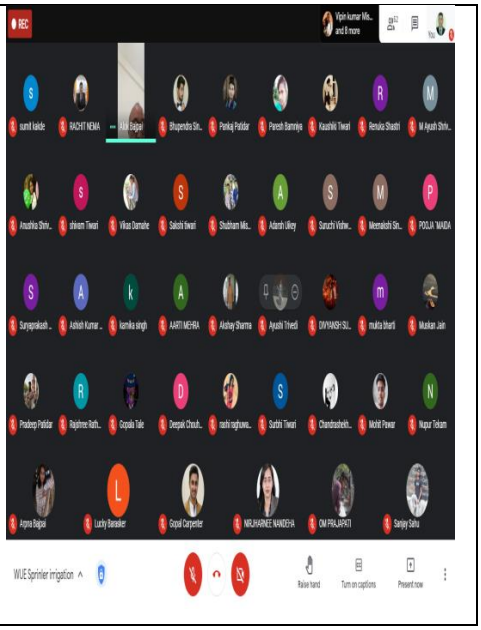
Number of Participation						Percentage of participation of Category			
Gender	UR	SC	ST	OBC	Total	UR	SC	ST	OBC
Male	4	1	1	21	27	14.8	3.7	3.7	77.8
Female	4	1	1	4	10	40.0	10.0	10.0	40.0
Total	8	2	2	25	37	21.6	5.4	5.4	67.6

11.1.34 VCP on Enhancing Sprinkler and Drip Irrigation System

Date	Coordinator	Theme / Topic	Participants attended			Impact
			Total	Female	Male	
14.01.2021 to 22.01.2021	Dr. A. K. Bajpai Associate Professor, SWE, JNKVV, Jabalpur	Enhancing Water Use Efficiency Through Installation, Maintenance & Monitoring of Sprinkler and Drip Irrigation System	**230**	**71**	**159**	Student got information regarding water use efficiency, Importance characteristics of soil, Movement of water in soil, Measurement of soil moisture, Evapotranspiration and consumptive use, equation used for measurement of crop water requirement and irrigation, Irrigation efficiencies, Soil water plant relationship, Crop water requirement and Fertigation

Category wise distribution:

Number of Participation						Percentage of participation of Category			
Gender	**UR**	**SC**	**ST**	**OBC**	**Total**	**UR**	**SC**	**ST**	**OBC**
Male	107	14	19	19	**159**	67	9	12	12
Female	35	8	18	10	**71**	49	11	25	14
Total	**142**	**22**	**37**	**29**	**230**	**62**	**10**	**16**	**13**



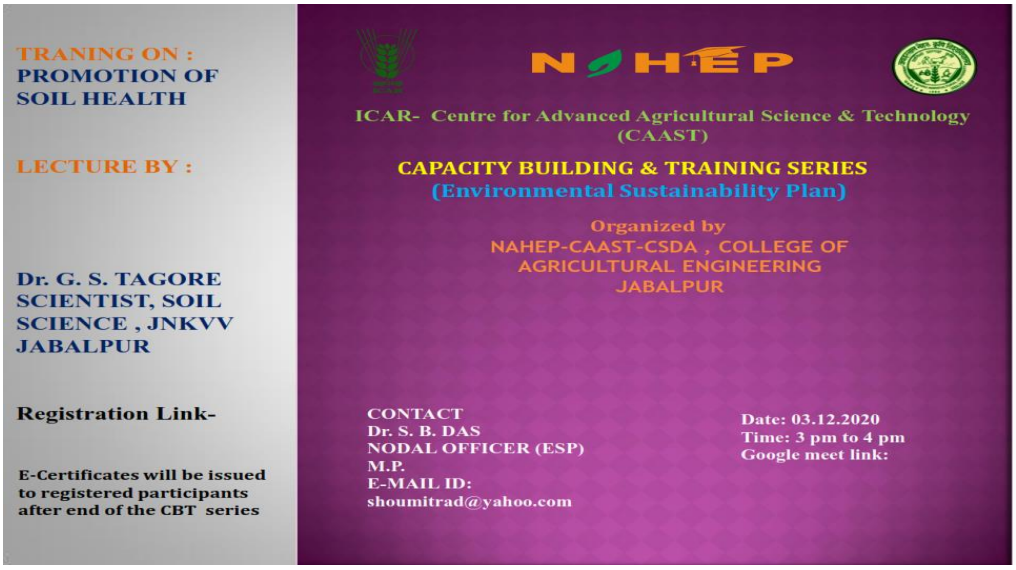
11.2 Awareness Programs under ESP:

11.2.1 Green technology - Plantation -Horticultural crops

Date	Coordinator	Theme / Topic	Participants attended			Impact
			Total	Female	Male	
29-08-2020	Rahul Dongre, Assistant Professor, Dept of Horticulture	Green technology theme- Plantation / Green taken up- Horticultural crops	30	17	13	Enhanced awareness among students towards green technologies. Acquainted about new/ advanced scenario of environmental sustainability. It creates interest among Students/ research scholars to perform research in the field of green technology and carbon sequestration

Category wise distribution:

Number of Participation						Percentage of participation of Category			
Gender	UR	SC	ST	OBC	Total	UR	SC	ST	OBC
Male	5	5	3	4	17	29.4	29.4	17.6	23.5
Female	7	2	3	1	13	53.8	15.4	23.1	7.7
Total	12	7	6	5	30	40.0	23.3	20.0	16.7



11.2.2 Process of Registration of FASSAI license

Date	Speaker (Designation & Organization)	Theme / Topic	Participants attended			Impact
			Total	Female	Male	
26.12.2020	Dr. S.S. Shukla Professor &Head, Food Science & Technology, JNKVV, Jabalpur	Process of Registration of FASSAI License	**16**	**05**	**11**	Students got information regarding "How to get registration and the complete process of FASSAI license. Students were advised to start their own startup and register their products as per the procedure explained

Category wise distribution:

Number of Participation						Percentage of participation of Category			
Gender	UR	SC	ST	OBC	Total	UR	SC	ST	OBC
Male	6	1	0	4	11	54.5	9.1	0.0	36.4
Female	3	0	0	2	5	60.0	0.0	0.0	40.0
Total	9	1	0	6	16	56.3	6.3	0.0	37.5

11.3 Awareness advisory

11.3.1 Green technology Plantation -Horticultural crops

Dr. S.K.Pandey, Professor & Head, Dept. Of Horticulture, CoA, JNKVV, Jabalpur

ADVISORY:

1. The importance of trees cannot be overlooked. One cannot imagine the existence of life on Earth without trees. Hence plant the seedlings/ saplings as much as possible.
2. Dieticians say that plant-based diets are healthful, nutritionally adequate, and provide health benefits in the prevention and treatment of certain diseases. Vegetarians also have lower rates of health problems. Go for the healthy plant-based diet.

3. In salt problematic soil grow salt tolerance crops *i.e.* Date palm, Aonla, Guava, Coconut, *Khirni etc.*
4. In acid problematic soil grow acid tolerance crops *i.e.* Strawberry, Raspberry, Fig, Bael, Plum etc.
5. Go towards green technology. New renewable sources (small hydro, modern biomass, wind, solar, geothermal, and biofuel) must be encouraged.
6. Follow the principles of Green building concepts to save energy.
7. Improving indoor air quality through plants (air purifiers) *i.e.* Aloe Vera, Peace lily, Golden Pothos, Weeping fig, Bamboo palm, Dracaena, money plant, Azalea etc.
8. Must be encouraged landscaped greening city concept
9. Carbon emission emitted through human activities or by natural reasons must be discouraged.
10. Establish more project to earn Carbon Credit.
11. Many key ecosystem services provided by biodiversity, such as nutrient cycling, carbon sequestration, pest regulation and pollination, sustain agricultural productivity must be encouraged.
12. Invest more in Eco tourism.

11.3.2 Awareness advisory on construction & renovation work

Er.S.S.Gour, Executive Engineer & Dr.S.B.Das, JNKVV, Jabalpur

Fall protection- Protect equipment's such as safety belt, rope *etc.* Net, falling firm unsecured height

Eye, Face and Head protections:

Eye &Face: Mask

Head: Helmets

Head gear

Different color to identify

Markers and other personnel's

Information system:

Day to day work information overhead or undergrounds pits *etc.*

1. Electrical safety, Cables and other equipment's proper insulations, Auto circuit boards
2. Prohibit outsides entry to work field directly by fencing around the workplace
3. Cover the place by side up to a height of 12 ft so that noise and other pollution may restrict work place only
4. Provided appropriate place for lunch and other short breaks
5. Adequate water supply
6. Fire extinguisher
7. Trained person for operating equipment's
8. Preamble Head load @ adult men 55 kg, women 30 kg
9. Labor hut site office, canteen, Recreation firm for residential labors
10. Lighting arrangement at night
11. Drainage facility to drain water during rainy season

12. First aid boxes placed at various location
13. Crèche for feeding and enroll number of children
14. Harmful chemical stores, Fuel store should be with proper safety features
15. Separate place for prolong Heavy machine
16. Concrete plants
17. Grounds
18. Maintain visitor's entry registers
19. Avoid hard language to talk with workers
20. Fix shift wise working hours as per requirement of work
21. Strict rules

Fall protection

Falls are one of the biggest causes of injuries and deaths in the workplace, especially in industries such as **construction,** the **trades**, **mining**, and **electrical utility** repair. A fall from any distance, even a short one, can result in long-term debilitating or fatal injuries. Employers are responsible for assessing the risk in their workplaces and implementing measures to protect workers from falls.

Guideline for fall protection

- Providing working conditions that are free from known dangers.
- Keeping work areas clean and sanitary so workers can see where they are going and won't suffer from trips that may lead to a serious fall.
- Guarding any hole in the floor by erecting a railing around it and providing a floor hole cover.
- Erecting a toe board and guardrail around any floor, platform, or runway that is open-sided and 4 feet or higher off the ground (or 4 feet from the next level).
- Providing fall protection equipment such as a safety harness, personal fall arrest system, safety nets, and railings.

Understanding Risk Assessments in the Workplace

Risk assessments are the process of identifying, analyzing, and evaluating risks within the workplace. Understanding the role risk assessments shows a lot of work for the employer, stakeholders, and employees alike.

The Principles of Risk Management

- **Integrated:** Risk management is a base for all activities within the organization.
- **Structured and comprehensive:** This type of approach aims to accomplish consistent and comparable results.
- **Customized:** A risk management framework and process should be completely proportionate to the company's external and internal context put forth by its objectives.
- **Inclusive:** An improved awareness and informed risk management system must involve stakeholders and their knowledge, views, and perceptions.

- **Dynamic:** as the organization's internal and external context changes with time, the risk management program must anticipate, detect, acknowledge, and respond to those changes as soon as they can.
- **Best available information:** Future expectations and data from the past and present must be taken into account when reviewing limitations and uncertainties (risks) within a process. Information should also be available for any and all stakeholders involved with the organization.
- **Human and cultural factors:** These factors influence most of all aspects, stages, and levels related to risk management.
- **Continual improvement:** Through the process of learning and gaining more experience, the management tool will be improved upon continuously.

PREAMBLE

The Constitution of India provide detailed provisions for the rights of the citizens and also lays down the Directive Principles of State Policy which set an aim to which the activities of the state are to be guided.

Directive Principles provide

a) For securing the health and strength of employees, men and women

b) The tender age of children is not abused

c) Citizens are not forced by economic necessity to enter avocations unsuited to their age or Strength

d) Humane conditions of work and maternity relief are provided

e) Government shall take steps, by suitable legislation or in any other way, to secure the Participation of employee in the management of undertakings, establishments or other Organizations engaged in any industry.

- On the basis of these **Directive Principles** as well as international instruments, Government is committed to regulate all economic activities for management of safety and health risks at workplaces and to provide measures so as to ensure safe and healthy working conditions for every working **man** and **woman** in the nation.
- Government recognizes that safety and health of workers has a positive impact on **productivity** and **economic** and **social development**.
- **Prevention** is an integral part of economic activities as high safety and health standard at work is as important as good business performance for new as well as existing industries.
- Indiscriminate use of **agro-chemicals** including pesticides, agricultural machineries and equipment, industries with major accident risks; effects of computer controlled technologies and alarming influence of **stress at work** in many modern jobs pose serious safety, health and environmental risks.

OBJECTIVES

a. Continuous **reduction** in the incidence of work related injuries, fatalities, diseases, disasters and loss of national assets.

b. Improved coverage of work related injuries, fatalities and diseases and provide for a more comprehensive data base for facilitating **better performance** and **monitoring.**

c. Continuous enhancement of community awareness regarding **safety, health and environment** at workplace related areas.

d. Continually increasing **community expectation** of workplace health and safety standards.

e. Improving safety, health and environment at workplace by creation of "**green jobs**" contributing to **sustainable enterprise development**.

Awareness

- Continuously evaluating the impact of such awareness and information initiatives
  Maximizing gains from the substantial investment in awareness campaigns by sharing experience and learning
- Suitably incorporating teaching inputs on safety, health and environment at work place in schools, technical, medical, professional and vocational courses and distance education programme
- Securing good liaison arrangements with the International organizations.
- Providing medical criteria wherever necessary which will assure in so.
- far as practicable that no employee will suffer diminished health, functional capacity, or life expectancy as a result of his work place activities and that in the event of such occupational diseases having been contracted, is suitably compensated.

Conclusion

- There is a need to develop close involvement of social partners to meet the challenges ahead in the assessment and control of workplace risks by mobilizing local resources and extending protection to such working population and vulnerable groups where social protection is not adequate.
- Government stands committed to review the National Policy on Safety, Health and Environment at Workplace and legislations through tripartite consultation, improve enforcement, compilation and analysis of statistics; develop special programmes for hazardous operations and other focus sectors, set up training mechanisms, create nation-wide awareness, arrange for the mobilization of available resources and expertise.
- The National Policy and programme envisages total commitment and demonstration by all concerned stake holders such as Government and social partners. Our goals and objectives will be that through dedicated and concerted efforts consistent with the requirements of safety, health and environment at work place and thereby improving the quality of work and working life.

11.3.3 Awareness Advisory on safe use of Pesticides

Dr. S. B. Das, Professor, Dept. of Entomology, CoA, JNKVV, Jabalpur

ADVISORY:

Insecticides / Pesticides Registered under section 9(3) of the Insecticides Act, 1968 for use in the Country: (As on 30.06.2020)

S. No	**Name of the Pesticide**	S. No	**Name of the Pesticide**
1	2,4-D Amine salt	36	Bifenazate
2	2,4-Dichlorophenoxy Acetic Acid	37	Bifenthrin
3	Abamectin*	38	Bispyribac Sodium
4	Acephate	*39*	Bitertanol
5	Acetamiprid	40	Boscalid
6	Afidopyropen	41	Brodifacoum
7	Alachlor	42	Bromadiolone
8	Allethrin	43	Buprimate (FI-WRT)
9	Alphacypermethrin	44	Buprofezin
10	Alphanaphthyl Acetic Acid	45	Butachlor
11	Aluminium Phosphide	*46*	Captan
12	Ametroctradin	*47*	Carbendazim
13	Ametryn	*48*	Carbofuran
14	Amisulbrom (FI-WRT)	*49*	Carbosulfan
15	*Ampelomycesquisqualis*	*50*	Carboxin
16	Anilophos	*51*	Carfentrazone Ethyl
17	Atrazine	*52*	Carpropamid
18	Aureofungin	*53*	Cartap Hydrochloride
19	Azadirachtin (Neem Products)	*54*	Chlorantraniliprole
20	Azimsulfuron	*55*	Chlorfenopyr
21	Azoxystrobin	*56*	Chlorfluazuron
22	*Bacillus sphaericus*	*57*	Chlorimuron ethyl
23	*Bacillus subtillus*	*58*	Chlormequat Chloride (CCC)
24	*Bacillus thuringiensis*var. Galleriae	*59*	Chlorothalonil
25	*Bacillus thuringiensis*var. Israelensis	*60*	Chlorpropham (TI),TIM
26	*Bacillus thuringiensis*var. Kurstaki	*61*	Chlorpyriphos
27	Barium Carbonate	*62*	Chlorpyriphos Methyl
28	Beauveriabassiana	*63*	Chromafenozide
29	Benalaxyl (TIM)	*64*	Cinmethylene
30	Benalaxyl M	*65*	Clethodim (FI-WRT)
31	Bendiocarb	*66*	Clodinafop-propargyl
32	Benfuracarb	*67*	Clomazone
33	Bensulfuron Methyl	*68*	Clothianidin
34	Bentazone TI	*69*	Copper Hydroxide
35	Beta Cyfluthrin	*70*	Copper Oxychloride

71	Copper Sulphate	*108*	Epoxyconazole
72	Coumachlor	*109*	Ethephon
73	Coumatetralyl	*110*	Ethion
74	Cuprous Oxide	*111*	Ethiprole
75	Cyantraniliprole	*112*	Ethofenprox (Etofenprox)
76	Cyazofamid	*113*	Ethoxysulfuron
77	Cyenopyrafen (FI-WRT)	*114*	Ethylene Dichloride and Carbon Tetrachloride mixture
78	Cyflufenamide (FI-WRT)	*115*	Etoxazole (FI)
79	Coumatetralyl	*116*	Famoxadone
80	Cyflumetofen	*117*	Fenamidone
81	Cyfluthrin	*118*	Fenazaquin
82	Cyhalofop-butyl	*119*	Fenitrothion
83	Cymoxanil	*120*	Fenobucarb (BPMC)
84	Cypermethrin	*121*	Fenoxaprop-p-ethyl
85	Cyphenothrin	*122*	Fenpropathrin
86	Cyproconazole (TI)	*123*	Fenpyroximate
87	Dazomet	*124*	Fenvalerate
88	Deltamethrin (Decamethrin)	*125*	Fipronil
89	Diafenthiuron	*126*	Flonicamid
90	DichloroDiphenylTrichloroethane (DDT)	*127*	Fluazifop-p-butyl
91	Dichloropropene and Dichloropropane mixture	*128*	Flubendiamide
92	Dichlorvos	*129*	Flucetosulfuron
93	Diclofop-Methyl	*130*	Fluchloralin
94	Diclosulam	*131*	Fluensulfone 47% TC (MUP) (FI)
95	Dicofol	*132*	Flufenacet
96	Difenoconazole	*133*	Flufenoxuron
97	Diflubenzuron	*134*	Flufenzine
98	Dimethoate	*135*	**Flumioxazin**
99	Dimethomorph	*136*	Fluopicolide
100	Dinocap	*137*	Fluopyram and its metabolite
101	Dinotefuron	*138*	Flusilazole (TI)
102	Dithianon	139	Fluthiacet methyl (TIM)
103	Diuron	140	Fluvalinate
104	Dodine	141	Fluxapyroxad
105	D-trans Allethrin	142	Fomesafen
106	Edifenphos	143	Forchlorfenuron
107	Emamectin Benzoate	144	Fosetyl-Al

145	Gibberellic Acid	*182*	Metamifop TI
146	Gossyplure (PB-RopeL)	*183*	Metamitron (TIM)
147	Glufosinate Ammonium	*184*	Metarhiziumanisopliae
148	Glyphosate	*185*	Methabenzthiazuron
149	Haloxyfop-R-methyl	*186*	Methomyl
150	Helosulfuron methyl	*187*	Methoxyfenazide (FI- WRT)
151	Hexaconazole	*188*	Methyl Bromide
152	Hexazinone	*189*	Methyl Chlorophenoxy Acetic Acid (MCPA)
153	Hexythiazox	*190*	1-MethylCyclopropene 3.3% V.P
154	Hydrogen Cyanamide	*191*	Metiram
155	Imazamox	*192*	Metofluthrin
156	Imazethapyr	*193*	Metolachlor
157	Imidacloprid	*194*	Metrafenone
158	Imiprothrin	*195*	Metribuzin
159	Indaziflam	*196*	Metsulfuron Methyl
160	Indoxacarb	*197*	Milbemectin
161	Iprobenfos (Kitazin)	*198*	Monocrotophos
162	Iprodione	*199*	Myclobutanil
163	Iprovalicarb	*200*	Novaluron
164	Isoprothiolane	*201*	Nuclear polyhyderosis virus of *Helicoverpaarmigera*
165	Isoproturon	*202*	Nuclear polyhyderosis virus of *Spodopteralitura*
166	Kasugamycin	*203*	Oxadiargyl
167	Kresoxim Methyl	*204*	Oxadiazon
168	Lambdacyhalothrin	*205*	Oxathiapipron
169	Lime Sulphur	*206*	Orthosulfamuron
170	Lufenuron	*207*	Oxycarboxin
171	Magnesium Phosphide Plates	208	Mancozeb
172	Malathion	209	Oxyfluorfen
173	Mancozeb	210	Paclobutrazol
174	Mandipropamid	211	Paraquat dichloride
175	Mepiquate Chloride	212	Penconazole
176	Meptyldiinocop	213	Pencycuron
177	Mesosulfuron Methyl	214	Pendimethalin
178	Metaflumizone	215	Penflufen*
179	Metalaxyl	216	Penoxsulam
180	Metalaxyl-M	217	Permethrin
181	Metaldehyde	218	Phenthoate

219	Phorate	*258*	Streptomycin + Tetracycline
220	Phosalone	*259*	Sulfentrazone(TIM)
221	Phosphamidon	*260*	Sulfosulfuron
222	Picoxystrobin'TIM	*261*	Sulfoxaflor
223	Pinoxaden	*262*	sulphur
224	Prallethrin	*263*	Tebuconazole
225	Pretilachlor	*264*	Tembotrione
226	Primiphos-methyl	*265*	Temephos
227	Prochloraz TI	*266*	Tetraconazole (FI)
228	Profenophos	*267*	Thiacloprid
229	Prohexadione Calcium	*268*	Thifluzamide
230	Propamocarb hydrochloride	*269*	Thiobencarb (Benthiocarb)
231	Propanil	*270*	Thiocyclam Hydrogen oxalate
232	Propaquizafop	*271*	Thiodicarb
233	Propergite	*272*	Thiomethoxam
234	Propetamphos	*273*	Thiophanate-Methyl
235	Propiconazole	*274*	Thiram
236	Propineb	*275*	Tolfenpyrad (TIM)
237	Propoxur	*276*	Topramezone
238	*Pseudomonas fluorescens*	*277*	Transfluthrin
239	Pymetrozin (FI), TIM	278	Pyridaben (FI- WRT)
240	Pyraclostrobin	279	Triadimefon
241	Pyrazosulfuron ethyl	280	Triafamone
242	Pyrethrin	281	Triallate
243	Oxydemeton-Methyl	282	Triasulfuron
244	Pyridalyl	283	Triazophos
245	Pyriproxyfen (TI)	284	Trichlorfon
246	Pyrithiobac sodium	285	*Trichodermaharzianum*
247	Pyroxasulfon (FI- WRT)	286	*Trichodermaviride*
248	Quinalphos	287	Tricyclazole
249	Quizalofop ethyl	288	Trifloxistrobin
250	Quizalofop-P-tefuryl	289	Triflumezopyrim (TIM)
251	S-bioallethrin	290	Trifluralin
252	Sodium acifluorfen	291	Validamycin
253	Sodium paranitrophinolate	292	*Verticilliumlecanii*
254	Spinetoram	293	Zinc Phosphide
255	Spinosad	294	Zineb
256	Spiromesifen	295	Ziram
257	Spirotetramat		

List of pesticides which are banned, refused registration and restricted in use:(As on 30.06.2020)

I. PESTICIDES / FORMULATIONS BANNED ININDIA

Pesticides Banned for manufacture, import and use.	
1.	Aldicarb (vide S.O. 682 (E) dated 17th July2001)
2.	Aldrin
3.	Benzene Hexachloride
4.	Benomyl (vide S.O 3951(E) dated 8th August, 2018)
5.	Calcium Cyanide
6.	Carbaryl (vide S.O 3951(E) dated 8th August, 2018)
7.	Chlorbenzilate (vide S.O. 682 (E) dated 17th July 2001)
8.	Chlordane
9.	Chlorofenvinphos
10.	Copper Acetoarsenite
11.	Diazinon (vide S.O 3951(E) dated 8th August, 2018)
12.	Dibromochloropropane (DBCP) (vide S.O. 569 (E) dated 25th July1989)
13.	Dieldrin (vide S.O. 682 (E) dated 17th July 2001)
14.	Endosulfron (vide ad-Interim order of the Supreme Court of India in the Writ Petition (Civil) No. 213 of 2011 dated 13th May, 2011 and finally disposed of dated 10th January, 2017)
15.	Endrin
16.	Ethyl Mercury Chloride
17.	Ethyl Parathion
18.	Ethylene Dibromide (EDB) (vide S.O. 682 (E) dated 17th July 2001)
19.	Fenarimol (vide S.O 3951(E) dated 8th August, 2018)
20.	Fenthion (vide S.O 3951(E) dated 8th August, 2018)
21.	Heptachlor
22.	Lindane (Gamma-HCH)
23.	Linuron (vide S.O 3951(E) dated 8th August, 2018)
24.	Maleic Hydrazide (vide S.O. 682 (E) dated 17th July 2001)
25.	Menazon
26.	Methoxy Ethyl Mercury Chloride (vide S.O 3951(E) dated 8th August, 2018)
27.	Methyl Parathion (vide S.O 3951(E) dated 8th August, 2018)
28.	Metoxuron
29.	Nitrofen
30.	Paraquat Dimethyl Sulphate
31.	Pentachloro Nitrobenzene (PCNB) (vide S.O. 569 (E) dated 25th July 1989)
32.	Pentachlorophenol
33.	Phenyl Mercury Acetate
34.	Sodium Cyanide (banned for Insecticidal purpose only vide S.O 3951(E) dated 8th August, 2018) *

35.	Sodium Methane Arsonate
36.	Tetradifon
37	Thiometon (vide S.O 3951(E) dated 8th August, 2018)
38.	Toxaphene (Camphechlor) (vide S.O. 569 (E) dated 25th July 1989)
39.	Tridemorph (vide S.O 3951(E) dated 8th August, 2018)
40.	Trichloro acetic acid (TCA) (vide S.O. 682 (E) dated 17th July 2001)
Pesticide formulations banned for import, manufacture and use	
1.	Carbofuron 50% SP (vide S.O. 678 (E) dated 17th July 2001)
2.	Methomyl 12.5% L
3.	Methomyl 24% formulation
4.	Phosphamidon 85% SL
Pesticide / Pesticide formulations banned for use but continued to manufacture for export	
1.	Captafol 80% Powder (vide S.O. 679 (E) dated 17th July 2001)
2.	Nicotin Sulfate
Pesticides Withdrawn (Withdrawal may become inoperative as soon as required complete data as per the Guidelines are generated and submitted by the Pesticides Industry to the Government and accepted by the Registration Committee. (S.O 915(E)dated 15thJun,2006)	
1.	Dalapon
2.	Ferbam
3.	Formothion
4.	Nickel Chloride
5.	Paradichlorobenzene (PDCB)
6.	Simazine
7.	Sirmate (S.O. 2485 (E) dated 24th September 2014)
8.	Warfarin (vide S.O. 915 (E) dated 15th June 2006)

* Regulation to be continued in the extant manner for non-insecticidal uses.

II. Pesticides restricted for use in the country

S.No.	Name of Pesticides	Details of Restrictions
1.	Aluminum Phosphide	The Pest Control Operations with Aluminum Phosphide may be undertaken only by Govt./Govt. undertakings / Govt. Organizations / pest control operators under the strict supervision of Govt. Experts or experts whose expertise is approved by the Plant Protection Advisor to Govt. of India except [1]Aluminium Phosphide 15 % 12 g tablet and [2]Aluminum Phosphide 6 % tablet. [RC decision circular F No. 14-11(2)-CIR-II (Vol. II) dated 21-09-1984 and G.S.R. 371(E) dated20th may 1999]. [1]Decision of 282nd RC held on 02-11-2007and,

		[2]Decision of 326th RC held on 15-02-2012. The production, marketing and use of Aluminum Phosphide tube packs with a capacity of 10 and 20 tablets of 3 g each of Aluminum Phosphide are banned completely. (S.O.677 (E) dated 17thJuly, 2001)
2.	Captafol	The use of Captafol as foliar spray is banned. Captafol shall be used only as seed dresser. (S.O.569 (E) dated 25thJuly, 1989) The manufacture of Captafol 80 % powder for dry seed treatment (DS) is banned for use in the country except manufacture for export. (S.O.679 (E) dated 17thJuly, 2001)
3.	Cypermethrin	Cypermethrin 3 % Smoke Generator is to be used only through Pest Control Operators and not allowed to be used by the General Public. [Order of Hon'ble High Court of Delhi in WP(C) 10052 of 2009 dated 1407- 2009 and LPA-429/2009 dated 08-09-2009]
4.	Dazomet	The use of Dazomet is not permitted on Tea. (S.O.3006 (E) dated 31st Dec, 2008)
5.	DichloroDiphenylTrichloroethane (DDT)	The use of DDT for the domestic Public Health Programme is restricted up to 10,000 Metric Tonnes per annum, except in case of any major outbreak of epidemic. M/s Hindustan Insecticides Ltd., the sole manufacturer of DDT in the country may manufacture DDT for export to other countries for use in vector control for public health purpose. The export of DDT to Parties and State non- Parties shall be strictly in accordance with the paragraph 2(b) article 3 of the Stockholm Convention on Persistent Organic Pollutants (POPs). (S.O.295 (E) dated 8th March, 2006)
		Use of DDT in Agriculture is withdrawn. In very special circumstances warranting the use of DDT for plant protection work, the state or central Govt. may purchase it directly from M/s Hindustan Insecticides Ltd. to be used under expert Governmental supervision. (S.O.378 (E) dated 26thMay, 1989)
6.	Fenitrothion	The use of Fenitrothion is banned in Agriculture except for locust control in scheduled desert area and public health. (S.O.706 (E) dated 03rdMay, 2007)
7.	Methyl Bromide	Methyl Bromide may be used only by Govt./Govt. undertakings/Govt. Organizations / Pest control operators under the strict supervision of Govt. Experts or Experts whose expertise is approved by the Plant Protection Advisor to Govt. of India. [G.S.R.371 (E) dated 20thMay, 1999 and earlier RC decision]
8.	Monocrotophos	Monocrotophos is banned for use on vegetables. (S.O.1482 (E) dated 10thOct, 2005)
9.	Trifluralin	(vide S.O 3951(E) dated 8th August, 2018)

		• The Registration, import, manufacture, formulation, transport, sell and its all uses except use in wheat shall be prohibited and completely banned from date of publication of this Order. • A cautionary statement has to be incorporated in the label and leaflet that it is toxic to aquatic organism, hence should not be used near water bodies, aquaculture or pisciculture area.

Pesticide which shall be phased out vide gazette notification no. S.o. 3951(e)

S. No.	Name of the pesticide	Insecticides to be phase out by 31st December, 2020
1	**Alachlor**	• No new certificate of registration to manufacture shall be issued after publication of this Order. • No person shall import, manufacture or formulate Alachlor with effect from the 1st January,2019. • The use of Alachlor shall be completely banned with effect from the 31st December,2020. • It is toxic to aquatic organism; hence a cautionary statement should be incorporated on label and leaflets "toxic to aquatic organism hence should not be used near water bodies, aquaculture or pisciculture area.
2	**Dichlorovos**	• No new certificate of registration to manufacture shall be issued after publication of this order. • No person shall import, manufacture or formulate dichlorvos with effect from the January,2019. • The use of dichlorvos shall be completely banned with effect from the 31st December,2020. • It is very toxic to aquatic organism; hence a cautionary statement should be incorporated on label and leaflets that it is toxic to aquatic organism, hence should not be used near water bodies, aquaculture or pisciculture area. • A warning may be incorporated in the label and leaflet stating that this product is toxic to honey bees so do not spray during active honey bees foraging period of the day.
3	**Phorate**	• No new certificate of registration to manufacture shall be issued after publication of this order. • No person shall import, manufacture or formulate Phorate with effect from the 1st January,2019. • The use of Phorate shall be completely banned with effect from the

		31st December,2020. • It is very toxic to aquatic organism; hence a cautionary statement should be incorporated on label and leaflets that it is toxic to aquatic organism, hence should not be used near water bodies, aquaculture or pisciculture area. • A warning may be incorporated in the label and leaflet stating that this product is toxic to honey bees so do not spray during active honey bees foraging period of the day. • A cautionary statement should incorporate in label and leaflet that this product is toxic to birds.
4	**Phosphamidon**	• No new certificate of registration to manufacture shall be issued after publication of this Order. • No person shall import, manufacture or formulate Phosphamidonwitheffectfromthe1stJanuary,2019. • The use of Phosphamidon shall be completely banned with effect from the 31st December,2020.
		• It is very toxic to aquatic organism; hence a cautionary statement should be incorporated on label and leaflets that it is toxic to aquatic organism, hence should not be used near water bodies, aquaculture or pisciculture area. • A warning may be incorporated in the label and leaflet stating that this product is toxic to honey bees so do not spray during active honey bees foraging period of the day. • A cautionary statement should incorporate in label and leaflet that this product is toxic to birds.
5	**Triazophos**	• No new certificate of registration to manufacture shall be issued after publication of this order. • No person shall import, manufacture or formulate Triazophos with effect from the 1st January,2019. • The use of Triazophos shall be completely banned with effect from the 31st December,2020. • It is very toxic to aquatic organism; hence a cautionary statement should be incorporated on label and leaflets that it is toxic to aquatic organism, hence should not be used near water bodies, aquaculture or pisciculture area. • A warning may be incorporated in the label and leaflet stating that this product is toxic to honey bees so do not spray during active honeybees for aging period of the day • A cautionary statement should incorporate in label and leaflet that this product is toxic to birds.

11.4 Awareness Program under Equity Action Plan (EAP)

11.4.1 Awareness on Grievance Redressal Mechanism (GRM):

11.4.2

Online awareness program entitled "Grievance Redressal Mechanism (GRM)" was held on 5th Feb 2021, under the guidance of Dr. Deepak Rathi, Nodal Officer EAP. The lecture was delivered by Dr. Abhishek Shukla, Nodal officer GRM cell. They discussed the terminology Grievance Redressal Mechanism, why this committee formed, what can be the possible grievances and how grievances be redressed by committee. How the person can approach, what are the point raised in front of redressal forum and how they mechanized. All these points were discussed in awareness program.

Programe Schedule

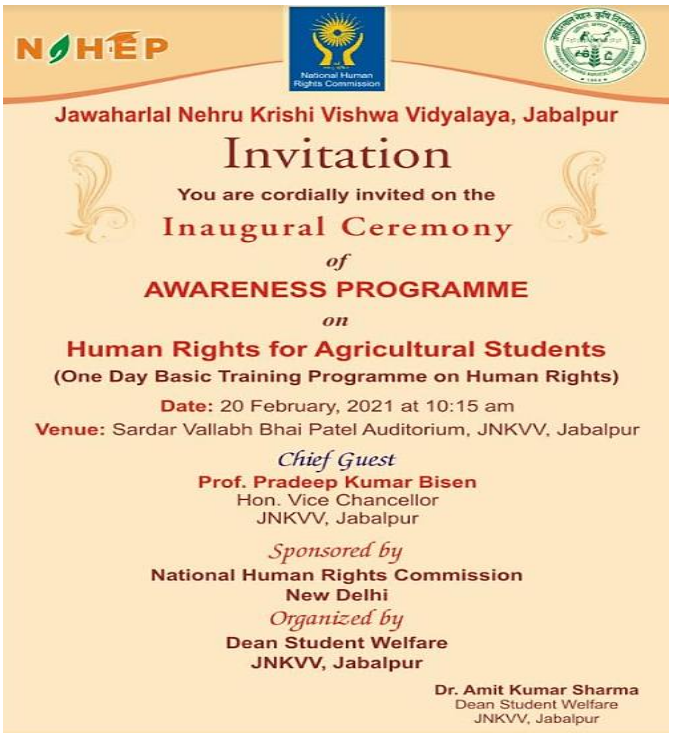
Sr. No.	Title of Training	Coordinator	Venue	Participants	Date	Online/ Offline
1	Grievance Redressal Mechanism (GRM)	Dr. Deepak Rathi Nodal officer EAP	*College of Agriculture Engineering JNKVV, Jabalpur*	PG, Ph.D. Students and Faculties	5.02.2021	Online

Statistical Distribution of Participants-

Table: Awareness Program on Grievance Redressal Mechanism (GRM)									
	Number of Participants					% of participants in diff. category			
Gender	**UR**	**SC**	**ST**	**OBC**	**Total**	**UR**	**SC**	**ST**	**OBC**
Male	53	16	11	60	140	37.9	11.4	7.9	42.9
Female	40	8	10	13	71	56.3	11.3	14.1	18.3
Total	93	24	21	73	211	44.1	11.4	10.0	34.6

11.4.3 Awareness on Human Rights for Agricultural Students:

One day Basic Awareness Program entitled "Human Rights for Agricultural Students" was conducted by NAHEP on 20 Feb 2021. The programme was sponsored by National Human Rights Commission, New Delhi and organized by Dean Student Welfare, JNKVV, Jabalpur. Mr. Praveen Dubey former Deputy Advocate General, M. P. High Court, Jabalpur, Advocate Aishwarya Singh, Mr. Siddharth Seth and Mr. Parag Chaturvedi presented their views on various aspects of human rights. Total 96 student registered & participated in this one-day training programme. Out of which 61.5% were male and 38.5% were female. They belong to OBC (44.7%), UR (34.4%), SC (12.5%) and ST (11.5%) categories. Participants get benefitted with information on human rights and its aspects.



Program Schedule

Sr. No.	Title of Training	Coordinator	Venue	Participants	Date	Online/ Offline
1	Human Rights for Agricultural Students	Dr. Amit Kumar Sharma, DSW, JNKVV Jabalpur	Sardar Vallabh Bhai Patel Auditorium, JNKVV Jabalpur	PG &Ph.D. Students and Faculty of university	20.02.2021	Offline and online both

Statistical Distribution of participants

Table: Awareness program on Human Rights for Agricultural Students									
	Number of Participants					% of participants in diff. category			
Gender	UR	SC	ST	OBC	Total	UR	SC	ST	OBC
Male	11	7	7	34	59	19	12	12	57
Female	22	5	4	6	37	60	13	11	16
Total	33	12	11	40	96	34	12	12	42

11.4.4 Thesis Writing and online Thesis Evaluation

One Day Basic Awareness Program on "Thesis Writing and online Thesis Evaluation" was organized by College of Agricultural Engineering, on 3rd March, 2021 at 10.00 am at Sardar Vallabh Bhai Patel Auditorium, JNKVV, Jabalpur.

In Inaugural session Dr. Anupama Varma, Assistant Professor, CoA, JNKVV, Jabalpur proposed welcome to Former Dean of the College of Agriculture, Dr. M. N. Khare. It was quoted by him that a good dissertation is also a good criticism. Research is the search for something that guides future generations. The Chairman of the program, Dean Faculty of Agriculture, Dr. Dhirendra Khare, indicated the Common Errors in Thesis writing. Director of Instruction, Dr. Abhishek Shukla presented salient points in synopsis preparation and thesis writing, Dr. S. B. Das explained Lab & Field Planning for Thesis Research. Dr. R. K. Nema, explained Curricular Research in Agricultural Engineering. Er. Sharad Jain explained Online Evaluation of Thesis useful for faculty. Dr. Yogita Gharde explained Statistical software available for analysis of agricultural data.

A total of 492 students of the university registered &participated in the one-day training programme. Out of which 58% were male and 42% were female. They belong to UR (41%), OBC (36%), SC (14%) and ST (10%) categories.

The students and faculties from almost all the stream and degree program registered for this event. Out of 492 registered participants M.Sc. Ag were found to be 52% followed by Ph. D. Ag. (24%), Ph. D. Agril.Engg. (6%) M.Sc. Horti.(4%), Ph. D. Horti.(3%) M. Tech. Agril. Engg.(2%), M.Tech. (2%), Ph. D. Forestry (2%) M.Sc. Forestry (1%), Ph. D. (2%) and Others (4%). Students were educated about the common mistakes and guidelines to follow regarding thesis writing.

Program Schedule

Day	Speaker	Topics
03rd March 2021	Dr. S. B. Das	Lab and field planning for thesis research
03rd March 2021	Dr. AbhishekShukla	Silent points in synopsis preparation and thesis writing
03rd March 2021	Dr. H. L. Sharma	Common statistical tools in agricultural research
03rd March 2021	Dr. YogitaGharde	Statistical software available for analysis of agricultural data
03rd March 2021	Er. Sharad Jain	Online Thesis Evaluation
03rd March 2021	Dr. R. K. Nema	Curricular research in Agricultural Engineering
03rd March 2021	Dr. Dhirendra Khare	Common Error in Thesis Writing and Concluding Remarks

Statistical distribution of participants

Awareness Program on Thesis Writing and online Thesis Evaluation									
Number of Participation						Percentage of participation of Category			
Gender	UR	SC	ST	OBC	Total	UR	SC	ST	OBC
Male	109	36	26	116	287	38	13	9	40
Female	93	31	22	59	205	45	15	11	29
Total	2	67	48	175	492	41	14	10	36

11.4.5 Improving Language Competency through Capacity Building in Spoken English:

Capacity-building programm in spoken English was organized to develop student oral competency to various speaking activities based on workplace case scenario and to enhance student level of confidence as they are engaged in different type of communication events. Online capacity building program was organized from Nov 23rd to Dec 2nd 2020. Microsoft- team was used for registering students interested in the program, 463 students registered for the program out of which 65% were male and 35% were female. They belong to UR (32.61%), OBC (39.3%), SC (13.6%) and ST (14.5%) categories.

The students from almost all the streams and degree program registered for this module. Out of 463 registered participants 47.1% from B.Sc. agriculture followed by M.Sc. Ag. (16.6%), B. Tech (14%) and Ph.D. (10%) program. Students were evaluated through a test prior to program through multiple choice question. Total 90 question were framed to evaluate candidates. Test was also conducted on the last day of the training to judge the performance in terms of improvements. 70 participants appeared in test1 prior to the program out of which 38 participants obtained more than 50% marks while 20 obtained 50 to 60%, 17 obtained 61 to 70% marks. In post program test II, 58 candidates participated out of which 45 obtained more than 50% marks, 16 obtained 50 to 60%, 19 obtained 61 to 70% and 9 obtained more than 71% marks.

The participants have shown significant improvement in mass as well as individually. In both the test 19 participants were common and 14 participants out of them have shown10 to 20% increase in marks and remaining are within 10%. On the day one out of 463, registered candidate only 175 attended the training and later on it was reduced to almost half (97). This trend was continued and on the last day of training only 27 candidates attended the course. This is major cause of concern. In spite of this, the improvements in regular participants have shown an enthusiasm for further continuation of

such program. As for as feedback is concern out of 56 responses were recorded majority ofthem reported that the content of the module was Good (62.5%) and Excellent (33.9%). This module was useful for their professional development (78%).

Program Schedule

S. N	Day	Speaker	Topics
1	23rdNov	Dr. Manisha Dwivedi	Introduction of sentence construction, Division of sentences, List of 100 words used commonly, List of 100 comment English sentence used frequently.
2	24th Nov	Dr. Manisha Dwivedi	Orders of (Sentences) words, means to enrich daily English vocabulary, Correct usage of verbs in a sentence.
3	25th Nov	Dr. Archana Sharma	Introduction to Reading.
4	26th Nov	Dr. Archana Sharma	Selective reading material from standard authors of English and exercises related to them.
5	27th Nov	Dr. Gajanan Malviya	Common Errors, Topics of General Discussion.
6	28th Nov	Dr. Anupama Verma	Story telling (sentences formation), Common Phrases and sentences, Short videos for conversation practice
7	29th Nov	Dr. Somanath Sarvade	Improving Speaking Skill through Group Discussion.
8	30th Nov	Dr. UmeshVarma	Translation, 'Wh' – words and Phraseology and Sentence on "How to ask Price", One words substitution and Daily conversational sentences. Verb phrases and how to say 'NO'
9	01st Dec	Dr. Somanath Sarvade	Improving Speaking Skill through Group Discussion
10	01st Dec	Dr. GajananMalviya	General Discussion, Topics related to Daily Life (Spoken Practice), Common Errors with the help of general Topics.
11	02nd Dec	Dr. Anupama Verma	Short videos for conversation practice, Conversation on real life situation.
12	02nd Dec	Dr. Umesh Varma	Complex sentences and similes, Compound and sentences of daily conversation Component sentences and conversational sentences.

Statistical distribution of participants

Table: Capacity building in Spoken English									
Number of Participants						% of participants in diff. category			
Gender	UR	SC	ST	OBC	Total	UR	SC	ST	OBC
Male	82	46	43	128	299	27.4	15.4	14.4	42.8
Female	69	17	24	54	164	42.1	10.4	14.6	32.9
Total	151	63	67	182	463	32.6	13.6	14.5	39.3

11.4.6 Improving Language Competency through Capacity Building in Writing Skill

Capacity building in writing skills was organized to introduce learners to various strategies of formal written communication and to enhance learner's confidence and ability to communicate effectively in writing in a variety of situations. The online communicative module on writing skill was organized from Dec 07th to 18th 2020. Total 149 candidates were registered for the program out of which 65.10 % were male and 34.9 % were female. The candidates belong to unreserved (32.88%), other backward caste (32.21%), schedule caste (14.76%) and schedule tribe (20.13%) categories.

The five groups of registered candidates were made on WhatsApp to conduct the classes on Google meet platform. Each group contains on an average 30 participants to make the class more interactive and convenient. The group of five were involved in delivering lectures com tutorials. The topics covered were, using correct punctuation, capitalization, commonly used abbreviations, symbols for effective writing, introduction to connectors, summary writing, paragraph writing, effective formal letters, resume, connectors, time contrast sequence and words often confused. Out of total registered candidates the attendance was found to be varied between 14 to 46 per day.

The tests were conducted to know the status and performance of writing skills of participating students. 32 participants appeared in pre- program test 1 and 27 in post-program test 2. In test 1 out of 32 participants 28 scored less than 50% marks while four scored between 50 to 60%. In second test 27 participants appeared out of which 17 scored less than 50% marks 10 scored more than 50% marks 4 scored 50 to 60%, 4 scored 61 to 70% and 2 scored more than 71% marks. The evaluation test has shown a betterment in participants. Individually the improvement was significant. 16 participants were common, and improved between 10 to 20% in marks. The module was helpful in improving writing skill of the participants.

Program Schedule

Day	Speaker	Topics
07th Dec	Dr. Somanath Sarvade	Summary writing, Letter writing: formal and informal letter. Job application writing.
08th Dec	Dr. Somanath Sarvade	Words often confused: Homonyms, Homophones, Homographs (three "H"), Words often confused and Summary writing, Precise writing.
09th Dec	Dr. Gajanan Malviya	Introduction to connectors in English. Connectors – time, contrast and sequence And, moreover, also, in addition to, further more etc. Connectors – opinion, order of importance, result etc. Sentence connectors- cause/effect-since/for/so that/because/as etc. Replacement of connectors.

Day	Speaker	Topics
10th Dec	Dr. Gajanan Malviya	Common Errors with the help of general Topics. How to use the simple present tense in day to day life. Students were motivated to frame simple sentences and ask questions to other students, Students took part in activity based on finding a connector in a sentence. General discussion.
11th Dec	Dr. Umesh Varma	Paragraph writing, Paragraph writing methods. Daily conversation words of sentences, Vocabulary, Complex & compound sentences, Complex & compound sentences story telling.
12th Dec	Dr. Anupama Verma	Using correct punctuation and capitalization, and commonly used abbreviations and symbols for effective writing. Picture description in writing, Sentence construction and paragraph writing, Writing effective formal letter and resume.
13th Dec	Dr. Anupama Verma	Words and phrases that one uses regularly in one's speech and writing, Writing task on various topics, Common errors in sentences, Hindi to English translation, Tense Exercises.
14th Dec	Dr. Umesh Varma	Similes & comparisons, Similes & comparisons idioms proverbs, Translation, use of "let, get, too… to and so". Debates and daily conversation sentences use of "the" Manias & phobias conditions & ailments of body.
15th Dec	Dr. Manisha Dwivedi	Framing of easy sentences, Common error in framing sentences, Division of words in framing sentence with exercises, Order of words while framing sentences with examples, Types of sentences with exercise, Correct the sentences with exercise.
16th Dec	Dr. Manisha Dwivedi	Importance of sentences in improving writing skill, Common error while writing letters, Customary form letter used in colleges, Commonly used letter with examples.
17th Dec	Dr. Archana Sharma	Writing in general and how to write effectively for different purposes, Practice of writing on selected topics and vocabulary drill.
18th Dec	Dr. Archana Sharma	Precise writing and how to write good précis. Practice to make a précis of the given passage.

Statistical distribution of participants

Table: Capacity building in Writing skill

	Number of Participants					% of participants in diff. category			
Gender	UR	SC	ST	OBC	Total	UR	SC	ST	OBC
Male	27	15	19	36	97	27.8	15.5	19.6	37.1
Female	22	7	11	12	52	42.3	13.5	21.2	23.1
Total	49	22	30	48	149	32.9	14.8	20.1	32.2

11.5 Faculty Development Program

11.5.1 Faculty Development "Teaching Tools to Knockdown the Lockdown":

The training was organized by Dept. of Plant Breeding & Genetics, JNKVV, Jabalpur, entitled "Teaching Tools to Knockdown the Lockdown". It was held on 16th to 20th May 2020. Dr. Shivramakrishnan participated in this programme.

College of Agriculture, Balaghat

Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur

FACULTY DEVELOPMENT PROGRAMME (ONLINE SHORT TERM)

"Teaching Tools to Knockdown the Lockdown"

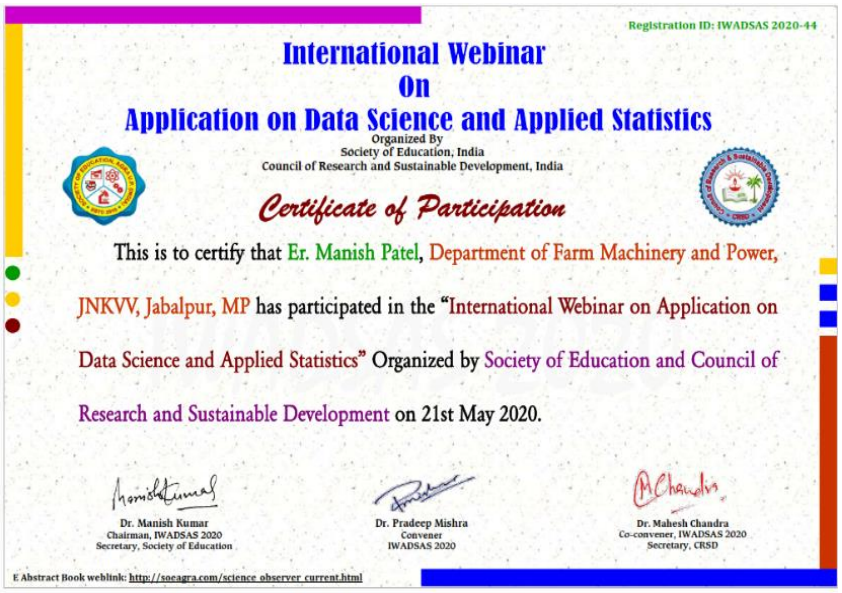
Certificate

This is to certify that Ms/Mr/Dr. R. Shiv Ramakrishnan of Department of Plant Breeding & Genetics, J.N.K.V.V. Jabalpur (MP), has participated in Five Days Faculty Development Programme (Online Short Term) on "Teaching Tools to Knockdown the Lockdown" organized by College of Agriculture, Balaghat, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur during May 16th-20th, 2020.

A.S. Lodhi, Co-Coordinator | Vivek Badhe, Coordinator | G. K. Koutu, Dean | Dhirendra Khare, Dean, Faculty of Agriculture

11.5.2 International webinar on Application on Data Science and Applied Statistics:

The training was organized by Society of Education India, Council of Research & Sustainable Development of India entitled "Application on Data Science and Applied Statistics". It was held on 21st May 2020. Er. Manish Patel participated in this webinar.



Registration ID: IWADSAS 2020-44

International Webinar

On

Application on Data Science and Applied Statistics

Organized By

Society of Education, India

Council of Research and Sustainable Development, India

Certificate of Participation

This is to certify that Er. Manish Patel, Department of Farm Machinery and Power, JNKVV, Jabalpur, MP has participated in the "International Webinar on Application on Data Science and Applied Statistics" Organized by Society of Education and Council of Research and Sustainable Development on 21st May 2020.

Dr. Manish Kumar, Chairman, IWADSAS 2020, Secretary, Society of Education

Dr. Pradeep Mishra, Convener, IWADSAS 2020

Dr. Mahesh Chandra, Co-convener, IWADSAS 2020, Secretary, CRSD

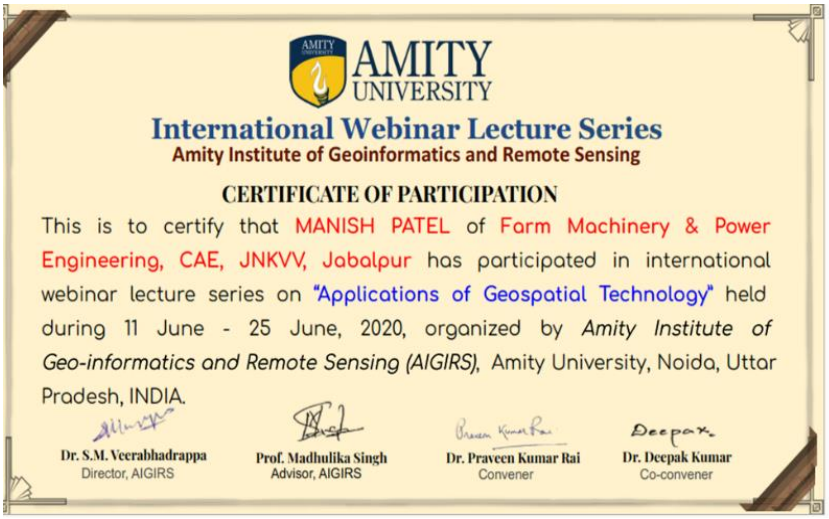
E Abstract Book weblink: http://soeagra.com/science_observer_current.html

11.5.3 Application of Remote sensing & GIS in Digital Agriculture:

The training was organized by NAHEP-CAAST for Center of Excellence for Digital Farming Solutions for Enhancing Productivity by Robot, Drones & AGVS Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, (MS), entitled "Application of Remote sensing & GIS in Digital Agriculture". It was held on 04th to 08th June 2020. Er. Manish Patel participated in this training.

11.5.4 Application of Geospatial Technology:

The training was organized by Amity Institute of Geo- Informatics and Remote Sensing, Amity University, Noida, (UP), entitled "Application of Geospatial Technology". It was held on 11th to 25th June 2020. Er. Manish Patel participated in this training.



11.5.5 Faculty Development Program:

Faculty development programe is organized by Govt. Narmada College Hosangabad was held on 20th to31st July 2020. This training was attended by Er. Manish Patel.

11.5.6 Drone Remote Sensing in Agriculture:

The training was organized by Indian Society of Agrophysics, ICAR-Indian Agricultural Research Institute, New Delhi, entitled "Drone Remote Sensing in Agriculture". It was held on 9th Sept, 2020. Dr. Y. K. Tiwari participated in this training.


Indian Society of Agrophysics

Division of Agricultural Physics
ICAR-Indian Agricultural Research Institute
New Delhi

Certificate of Participation

This is to certify that Yogesh Kishore Tiwari of JNKVV, Jabalpur participated in one day webinar on "Drone Remote Sensing in Agriculture" on September 09, 2020 organized by Indian Society of Agrophysics in association with Division of Agricultural Physics, ICAR - Indian Agricultural Research Institute, New Delhi.

Rabi N. Sahoo
Course Director

P. Krishnan
Head of the Division

S. K. Chaudhari
President, ISAP

11.5.7 Intellectual Property Rights in Agricultural Research and Education in India:

The training was organized by ICAR-NAHEP-Intellectual Property & Technology Management (IRTM Unit) New Delhi entitled "Intellectual Property Rights in Agricultural Research and Education in India". It was held on 12th to 28th Sept 2020. Dr A. K. Rai, Director Instrumentation attended that training.


NAHEP भारतीय कृषि अनुसंधान परिषद
INDIAN COUNCIL OF AGRICULTURAL RESEARCH
कृषि अनुसन्धान भवन-I & II, पूसा, नई दिल्ली-110012
Krishi Anusandhan Bhawan-I & II, Pusa, New Delhi-110012

This is to certify that

A. K. Rai, JNKVV, Jabalpur

has participated in Virtual Workshop cum Training Programme on "Intellectual Property Rights in Agricultural Research & Education in India" during September, 12-28, 2020 jointly organized by National Agricultural Higher Education Project (NAHEP) and Intellectual Property & Technology Management (IP&TM) Unit of ICAR Headquarters, Pusa, New Delhi

(R.C. Agarwal)
ND (NAHEP) & Course Director

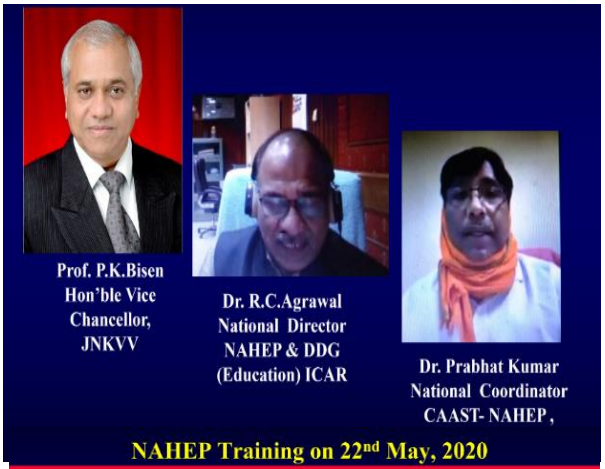
(Sanjeev Saxena)
ADG (IP&TM) & Course Director

11.6 Workshops

11.6.1 Launching Workshop:

Launching Workshop of NAHEP- CAAST at JNKVV was organized online on 22.07.2020. In the launching workshop 248 participants included dignitaries of concerned Departments i.e. Hon'ble Vice Chancellor, JNKVV, DDG (Education), National Director- NAHEP, National Coordinator- CAAST, Dean Faculty of Agriculture, Director Research Services, Director Extension Services, Director Instructions, Deans of colleges of JNKVV and its Heads of different departments, Scientists of various capacities, Officers of allied departments and students of Ph.D. & PG. Expert lectures were delivered on

i. RS and GIS Applications for NRM in Agriculture by Dr. S.P. Agrawal, Head-WR, IIRS, Dehradun
ii. RS Applications in Agriculture by Dr.



Vinay Sehgal, Head- Physics, IARI, New Delhi.

iii Drone Applications and Geo-informatics for Agriculture by Dr. Manjul Hazarika, AIT, Bangkok.

Program Schedule

NAHEP

Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (MP)

Warmest Invitation

Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur

Cordially invites you for the

LAUNCHING WORKSHOP

of the

ICAR-Centre of Advanced Agricultural Science and Technology (CAAST)

on

Skill Development to Use Spatial Data for Natural Resource Management In Agriculture

Under the World Bank funded

National Agricultural Higher Education Project (NAHEP)

at

Department of Soil and Water Engineering
College of Agricultural Engineering
Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (MP)

on

Friday, 22nd May, 2020 at 12.0 noon
Online platform (Google Meet)

Your kind presence would grace the occasion and show the path to fulfil the objectives of NAHEP

With Regards
R.K. Nema
PI and Dean
College of Agricultural Engineering, Jabalpur

Goggle meet platform link - **https://meet.google.com/zfw-xzif-nzt**

PROGRAM
Launching Workshop: Friday, 22nd May 2020

Dr. P.K. Bisen
Hon'ble Vice Chancellor
JNKVV, Jabalpur
has kindly agreed to chair the function

Dr. R.C. Agrawal
National Director, NAHEP and DDG (Education)
ICAR, New Delhi
will address on the occasion as Chief Guest and

Dr. Prabhat Kumar
National Coordinator, NAHEP,
CAAST ICAR, New Delhi
will grace the function as Special Guest

in gracious presence of the

Hon'ble Members, Board of Management, JNKVV

Dr. Nandlal Idnani
Shri Kedarnath Shukla
Sh. Ashwini Singh Chouhan
Dr. Bakul Lad
Sh. Om Thakur
Dr. R.S. Tripathi
Sh. Tamlal Raghuji Sahare
Smt. Asha Arun Yadav
Dr. G. Venkateshwarlu
Dr. Brijesh Dutt Arjaria

Authorities of the University

Dr P.K. Mishra, Director Research
Ag. Dr. Om Gupta, Director Extension
Instructions Sh. Ashok K. Ingle, Registrar
Sh. Mahesh K. Kori, Comptroller
Dr. Dhirendra Khare, Dean Faculty of
Dr. Abhisek Shukla, Director
Dr. D.K. Pahalwan, Director Farms

Inaugural Session

12.00	About the project	PI, CAAST
12.10	Introduction of CAAST	NC, CAAST
12.25	Overview NAHEP	ND, NAHEP
12.40	launching at JNKVV	VC, JNKVV
12.55	Vote of Thanks	Dr. M.K. Hardaha

Technical Session

13.00	RS and GIS applications for NRM in Agriculture	Dr. S.P. Aggarwal, IIRS
13.30	RS Applications in Agriculture	Dr. Vinay Sehgal, IARI
14.00	Drone applications and Geo-informatics for Agriculture	Dr. Manzul Hazarika, AIT, Bankok
14.30	Interaction with audience	All experts
15.00	Thanks	Dr. M.K. Awasthi

11.6.2 First Annual Workshop:

The 1st Annual workshop was held on 12th February 2021 at Kotilya Hall, Agri-Business Management & Development, JNKVV, Jabalpur, under the chairmanship of Hon'ble Vice Chancellor, other dignitaries of JNKVV i.e. Dean Faculty, Director Research Services, Director Extension Services and Director ATARI also gave their immense presence in the workshop. Welcome address and introduction of the project was presented by Dr. R. K. Nema, PI, ICAR-NAHEP-JNKVV. All the Co-PI's and Nodal Officer's presented their progress and status of the project. Remarks were made by Nodal Officer of Monitoring & Evaluation Cell Dr. Dhirendra Khare, Dean Faculty of Agriculture, JNKVV. Dr. P. K. Bisen, Hon'ble Vice Chancellor, Chairman Monitoring & Evaluation Cell concluded the session with his kind remarks.

First Annual Workshop of NAHEP-CAAST at JNKVV Jabalpur.

Proceeding of 1st Annual Workshop held on 12th February 2021

Workshop started with university song and lighting of lamp before Goddess Swaraswati by Hon'ble Vice Chancellor and Dean Faculty, Director Research Services, Director Extension and Director ATARI.

- Welcome address and introduction of the project was presented by Dr. R. K. Nema, Principal Investigator, ICAR-NAHEP-CAAST-JNKVV, Jabalpur.
- Dr. Y. K. Tiwari, Co-PI Procurement & Finance, Dr. M. K. Awasthi, Co-PI Skill Development National, Dr. M. K. Hardaha, Co-PI Skill Development International, Dr. S. K. Sharma, Co-PI Research, Dr. A. K. Rai, Co-PI, Product Development presented the progress.
- Dr. S. B. Das, Nodal Officer, Environmental Sustainability Plan, Dr. Deepak Rathi, Nodal Officer, Equity Action Plan, Dr. A. K. Khare, Nodal Officer, procurement presented their progress and status.
- Remarks were made by members of Monitoring & Evaluation Cell- Dr P. K. Mishra, DRS, JNKVV, Agriculture Technology Expert, Dr. Om Gupta, DES, JNKVV, Extension expert, Dr. Amit Sharma, Dean Student Welfare and Impact Assessment Expert, Dr. A. K. Rai, Director Instrumentation, JNKVV, Documentation Expert, Er. S. K. Jain, Computer and IT Specialist and In charge IT Cell, JNKVV, IT Expert.

- Remarks were made by Nodal officer Monitoring and Evaluation cell- Dr.Dhirendra Khare, Dean Faculty of Agriculture, JNKVV
- Dr. P. K. Bisen, Hon'ble Vice- Chancellor, Chairman Monitoring & Evaluation Cell concluded with his kind remarks
- Vote of thanks was presented by Dr. M. K. Hardaha.

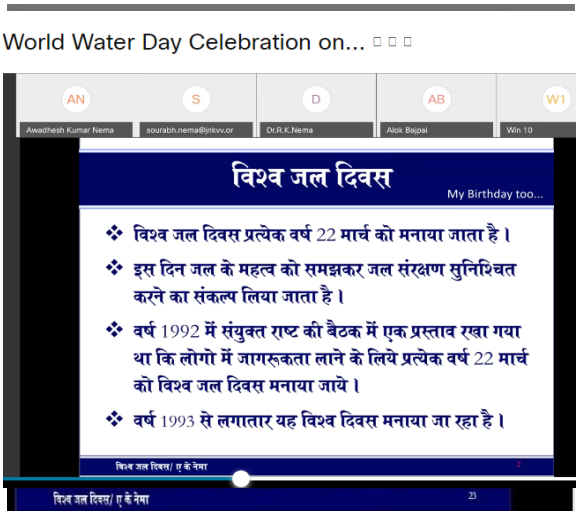
Salient points emerged out of the discussion during workshop are: -

- A person from library or consulting head of department should be included for purchase of books (SKP)
- Specification should be formatted critically and covering the requirement and availability in market. Short notification for suppliers may be given in local Newspaper and website (YKT)
- DSW suggested to include out campuses in VV for awareness programme and schools outside Jabalpur (MKA)
- PG teaching at Tikamgarh and Rewa be also included. Also teaching faculty at other campuses may be involved in international activities (MKH)
- Identify Veg Pea- Chickpea in field through Remote Sensing and GIS (SKS)
- Dr. Sanjeev Kumar has proposed that a digital solution lab must be prepared at VV level with support of NAHEP (SKJ)
- Linguistic Lab should be developed as proposed by DSW & DFA (DSW).
- Efforts should be made to construct new administrative block as green building. (AKR, SSG)
- Solar systems in VV campus should be increased to enhance solar power availability to move toward "Atma Nirbhar JNKVV" for power. (AKR)
- Advisory for chemical hazards through pesticides and lab discharges insecticide should be a part of Rawe also (SBD)
- CSDA should generate a land use planning of Jabalpur Campus of JNKVV and crop planning using satellite data.
- Since the NAHEP project is for higher education and CAAST is for PG specially, DSW/DI/ Dean's should be integrated part of the execution. They also should be notified as associated members of this team. (DSW)
- Hands on training, awareness program and skill development trainings for capacity building should be listed in different tables. (DR. D.Rathi)
- Members of team for execution of project may be included as per attitude of work and need of situation as well as activity nature.
- The meeting should be conducted every month to expedite the progress and relevance in work.

Program Schedule

11:00 AM	University Song
11:05 AM	Lightning of Lamp
11:10 AM	Welcome and Introduction by Dr. R.K. Nema, Principal Investigator
11:20 AM	Presentation by Co-PIs, Dr. Y.K. Tiwari, Dr. M.K. Awasthi, Dr. M.K. Hardaha, Dr. S.K. Sharma, Dr. A.K. Rai
11:35 AM	Presentation by Nodal Officers Dr. S.B. Das, Dr. Deepak Rathi, Dr. A.K. Khare
11:50 AM	Suggestive Guiding Remarks by Nodal Officer GRM – Dr. Abhishek Shukla
11:55 AM	Remarks by members of Monitoring & Evaluation Cell Dr. P.K.Mishra, Dr. Om Gupta, Dr. D.K. Pahalwan, Dr. S.B. Nahatkar, Dr. A.K. Rai, Er. S.K. Jain
12:20 PM	Remarks by Nodal Officer Monitoring & Evaluation Cell – Dr. Dhirendra Khare
12:30 PM	Address by Dr. P.K. Bisen, Hon'ble Vice-Chancellor, Chairman Monitoring & Evaluation Cell
12:50 PM	Vote of thanks – Dr. M.K. Hardaha

11.6.3 World water day celebration:



World water day was celebrated online with students, faculties, and KVK Scientists on 22nd March 2021. Hon'ble Vice-Chancellor Dr. P. K. Bisen enlightened about the continuous decreasing water availability. He also elaborated the future road-map of water management that should include supply as well as demand-side management. Dr. Dhirendra Khare, Dean faculty of Agriculture told about the importance of water and the Continuous decrease in groundwater level every year. He described the relevance of the water budget preparation. Er. Awadhesh Nema, Deputy Director Farmer Welfare & Agriculture Development Department presented the statistics of different sources of water and also detailed the various scientific methods and advanced techniques of water management in agriculture. i.e. Contour Farming, Mixed Farming, etc. Keynote speaker of the Program, Mr. Vivek Dave Deputy Commissioner, Watershed Management Department of Agriculture M.P. Introduced the River Rejuvenation Program and the steps taken by State Government. Miss. Ayushi Trivedi, Ph.D. Scholar presented details of Research Work on river rivival. The program was graced by the presence of Dr. P.K. Mishra Director Research Services, Dr. Abhishek Shukla Director Instruction, Director Extension Services Dr. Om Gupta, Dean University Student welfare Dr. Amit Sharma, Registrar Mr. Reva Singh Sisodia Comptroller Mr. V.N.Bajpai and HODs of different Departments.

An online Essay Writing Competition on "Importance of water in Human life and Agriculture" was organized. Three hundred ten participants registered out of them one hundred Seventy-two students attended the program.

Statistical Distribution of Participants-

Table: World Water Day Celebration									
Number of Participation						Percentage of participation of Category			
Gender	UR	SC	ST	OBC	Total	UR	SC	ST	OBC
Male	98	27	7	90	**222**	44	12	3	41
Female	42	12	9	25	**88**	48	14	10	28
Total	140	39	16	115	**310**	45	13	5	37

11.7 Awareness program for faculty at out campus of JNKVV

11.7.1 Awareness Program in COA Powarkheda

In order to introduce NAHEP and Remote Sensing at College of Agriculture Powarkheda which is a constituent college of JNKVV, an awareness program was organized by the center on 23/02/2021. Two scientists namely Dr. M.K. Awasthi and Dr. M.L. Sahu were deputed by the center to perform the task.

27 scientists participated in awareness program. Activities of Nahep JNKVV were introduced to them and scope for teachers were explained. They were also acquainted for RS & GIS application in agriculture.

11.7.2 Awareness Program in COA Balaghat

An awareness program was organized in order to introduce NAHEP and Remote Sensing at College of Agriculture Balaghat which is a constituent college of JNKVV on 15/03/2021. Three scientists namely Dr. M.K. Hardaha, Er. C.M. Abroal and Dr.R.K. Nema were deputed by the centre to perform the task.

17 scientists participated in awareness program. Activities of NAHEP JNKVV were introduced to them and scope for teachers were explained. They were also acquainted for RS & GIS application in agriculture. Team along with the scientists also visited the museum created by the college and working sites of water harvesting tank. The venues for college building, college library and a commercial unit established by the college where also visited and discussions were made in order to improve digitalization.



11.7.3 Awareness Program in COA Rewa

In order to introduce NAHEP and Remote Sensing at College of Agriculture Rewa which is a constituent college of JNKVV, an awareness program was organized by the centre on 26/03/2021. Two scientists namely Dr. P. B. Sharma and Dr. R. N. Shrivastava were deputed by the centre to perform the task. They contacted PG students and Faculty members individually to create their interest in remote sensing.

Later a lecture and interaction session were arranged for the faculty of the college and scientists of KVK and PG students under the chairman ship of Dr. S.K. Pandey Dean COA Rewa. The scientists delivered lectures on Application of R.S. and GIS in Agriculture and objectives and scope of CSD, NAHEP Jabalpur. Quarries in this regard were answered and students and faculty were encouraged to apply remote sensing in their disciplines.


12. Appendix B

12.1 Theme based maps:

Land use land cover maps were prepared at district level, by supervised and unsupervised classification techniques.

12.1.1 Land use land cover classification using vector machine classifier using software.

Accurate and up-to-date land-use and land-cover (LULC) maps are important inputs to biophysical and environmental assessment models required for decision-making and resource planning. High-resolution satellite images are increasingly becoming freely available for several applications (agriculture, urban planning, natural resource management, etc.) at local and national scales.

The study aims at investigating the potential of spectral derived indices to accurately differentiating the land use land cover classes using Sentinel2 satellite data. The non-parametric supervised classification was carried out by support vector machine in R environment. The study was conducted in Mandala district located in the east part of Madhya Pradesh within the coordinates 22°30' N – 23°15'N and 79°45' E – 80°30' E. The district lies almost entirely in the catchment of the river Narmada & its tributaries. The district has an area of 8771 km², and a population of 779,414.

The image processed in this study was obtained from the ESA's Sentinels data hub (https://scihub.copernicus.eu/dhus/#/home) dated 02/02/2021. The downloaded Sentinel2 L1C level image (Top of Atmosphere Reflectance) of Mandala district is converted into Sentinel 2A level image (Bottom of Atmosphere Reflectance) using "Sen2r" package in R environment. It is the atmospheric correction applied to TOA Level-1C orthoimage products. The 13 bands of atmospherically corrected image were resampled at 10 m spatial resolution to facilitate the computation of spectral indices.

Four spectral indices BSI, MNDWI, NDTI and NDVIre were derived using "overlay" function in R environment. The index values were computed using reflectance values in short wave infrared, Red, blue and Green wave bands. These indices were used for differentiating the agriculture land, bare land, water and settlement class. These indices were combined with spectral bands of Sentinel2A for classification schemes. The details of indices is given in Table 12.1.

Table 12.1: Spectral Indices derived using Sentinel 2 data

Index	Formula	Application
Bare soil index (BSI)	{(SWIR1+RED)-(NIR+BLUE)}/{(SWIR1+RED)+(NIR+BLUE)}	Enhancing bare soil, fallow land
Modified Normalized Difference Water Index (MNDWI)	(GREEN-SWIR1)/(GREEN+SWIR1)	Discrimination of water body
Normalized Difference Tillage Index (NDTI)	(SWIR1-SWIR2)/(SWIR1+SWIR2)	Highlight the built-up areas and separate them from bare land
Red-Edge Normalized Difference Vegetative Index (NDVIre)	(REDedge1-RED)/(REDedge1+RED)	Enhancing Agricultural land

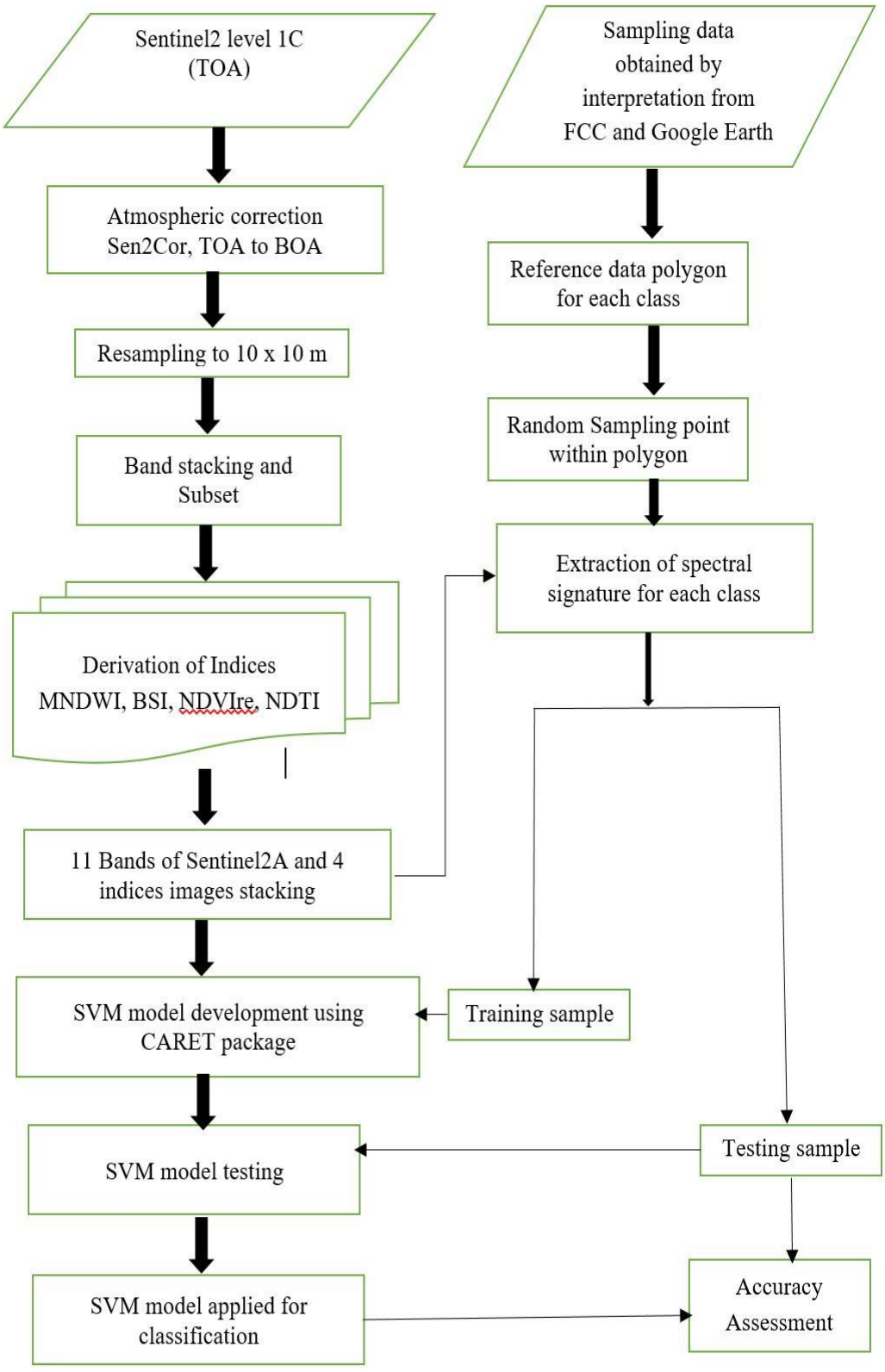


Figure 12.1 Overview of methodological approach

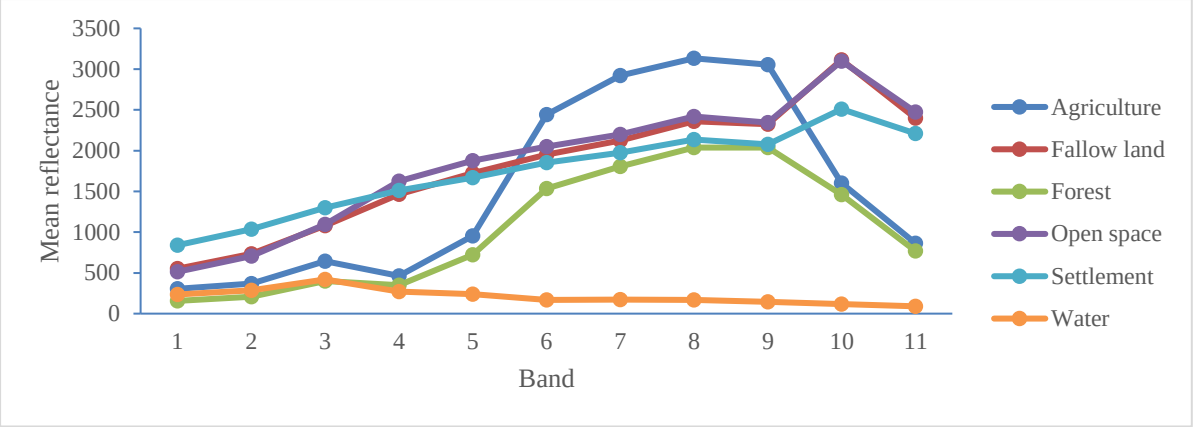


Figure 12.2. Spectral profile for Sentinel-2 bands.

The training and testing data samples for the classification were obtained by manual interpretation of FCC image of Sentinel2 data and high-resolution imagery available from Google Earth. To collect training sample data, the polygon shape file tool in QGIS was used to create polygon for each class. For facilitating the accurate assessment of classification, random points were extracted from each polygon using "extract" function of "raster" package in R software. Total 26,359 training samples (pixels) were used for training and testing the support vector machine classifier. SVM was used to classify the Mandla district into 6 classes namely AG (Agriculture), WT (water body), OS (open space), FR (forest land), FL (fallow land) and ST (settlement or Built up). Figure 1 gives an overview of the methodological approach adopted for this study. The "caret" (Classification and Regression training) package in the R statistical and programming environment was used to implement the classification algorithm.

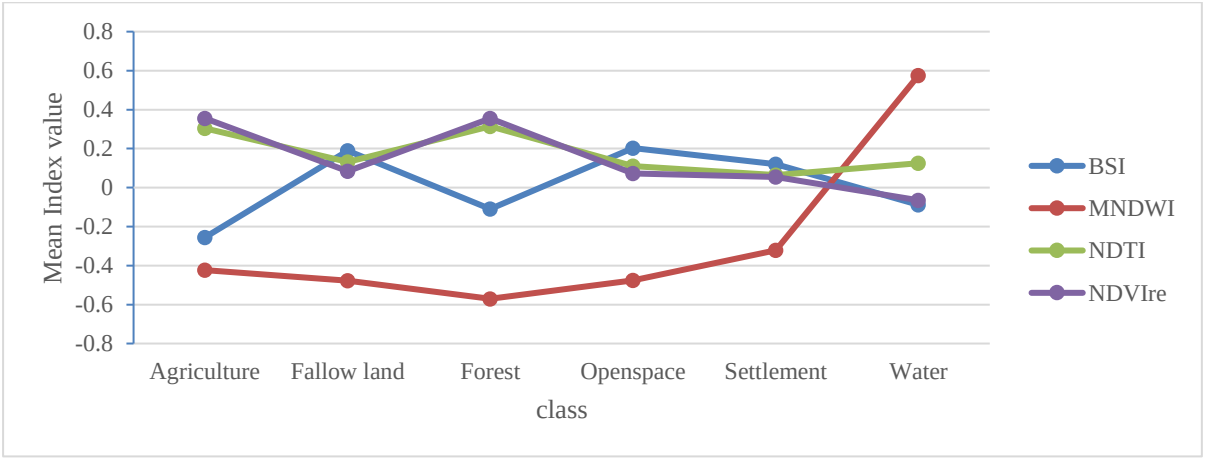


Figure.12.3 Mean index values for each class

The package reduces the complexity associated with model tuning by first iterating over a range of values of model parameters and then selecting the parameter combination that gives the best performance for building a final model. In implementing the classification algorithms, training samples (reflectance values from bands and indices values from indices layers) were derived by overlaying the training data (point shape file) on the image data (11 bands and four indices layers) and extracting the underlying values. The extracted values of image data were used to study the spectral profile for Sentinel2 data (Figure. 2) and mean indices values for each class (Figure. 12.3).

In this study, by analyzing the spectral profiles of the six typical land cover types in Mandla, it was found that a regular pattern exits for mean reflectance. The mean reflectance of open land and fallow land have similar reflectance pattern at each band. The spectral indices NDTI and BSI discriminate the bare soil, fallow land and settlement effectively due to differences between their indices values for respective classes (Figure 12.3).

The extracted sampling points were split into a 20–80% training and testing samples using a stratified random split (via the "create data partition" function of the caret package). In building a model, optimal tuning parameters were first determined based on multiple resampling of the training data and an evaluation of the effect of different parameter sets on model performance using cross-validation. Here, 5 random partitions of the training data with 5 repetitions (i.e., via the train control function of caret) were used to automatically determine the optimal tuning parameters for the SVM algorithms. The optimal parameter set was then used to generate the final model which was subsequently validated using the 80% testing samples. Validation of model results with the testing samples produced accuracy assessment statistics such as overall accuracy, kappa statistic, sensitivity, and specificity. The 5,274 training samples were used for training. The predictors are the 11 bands and four indices, while the six-land use/cover classes represent the response (target) variable. The tuning parameters of SVM classifier after training obtained as follow:

Table 12.2. Resampling results across tuning parameters:

C	Accuracy	Kappa
0.25	0.9447860	0.9311698
0.50	0.9477060	0.9347814
1.00	0.9518397	0.9398882
Tuning parameter 'sigma' was held constant at a value of 0.2872611		
Accuracy was used to select the optimal model using the largest value.		
The final values used for the model were sigma – 0.2872611 and C = 1.		

After developing SVM the model, it was tested/validated over the testing data sample for assessing the accuracy of model in terms of Kappa statistics and confusion matrix. The validation results of SVM model as follow:

Output of testing the model on independent data

Table 12.3 Confusion Matrix and Statistics

Prediction	Agriculture	Fallow	Forest	Open Space	Settlement	Waterbody
Agriculture	**3188**	0	11	0	1	0
Fallow land	6	**3702**	4	319	9	0
Forest Land	6	0	**6453**	0	0	0
Open Space	0	606	0	**2166**	11	0
Settlement	0	0	8	19	**1376**	0
Waterbody	0	0	0	0	0	**3200**
Overall Statistics: Accuracy: 0.9526						
95% CI : (0.9496, 0.9554)						
No Information Rate: 0.3071						
P – Value [Acc> NIR] : < 202e-16 Kappa : 0.9408						

The confusion matrix shows confusion between the open space and fallow land class. This indicates that the radial basis SVM classifier has difficulty for separating fallow land and open space as compared to other classes. However, the result of SVM classifier is acceptable for classifying the LULC classes of Mandla district. The overall accuracy is about 94%. The producer's accuracy (sensitivity and specificity) and the user's accuracy (positive predicted values and negative predicted values) are relatively better for all land use/cover classes. In terms of the producer's accuracy, sensitivity is lower than specificity for open space and fallow land classes.

Table 12.4: Evaluation Parameters of classification in Mandla district.

Class	Agriculture	Fallow	Forest	Open Space	Settlement	Waterbody
Sensitivity	0.9962	0.8593	0.9964	0.8650	0.98497	1.0000
Specificity	0.9993	0.9799	0.9996	0.9668	0.99863	1.0000
Pos Pred Value	0.9963	0.9163	0.9991	0.7783	0.98076	1.0000
Neg Pred Value	0.9993	0.9644	0.9984	0.9815	0.99893	1.0000
Prevalence	0.1518	0.2043	0.3071	0.1188	0.06626	0.1518
Detection	0.1512	0. 1756	0.3060	0.1027	0.06526	0.1518
Detection Prevalence	0.1518	0.1916	0.3063	0.1320	0.06654	0.1518
Balanced Accuracy	0.9978	0.9196	0.9980	0.9159	0.99180	1.0000

12.2 Land use land Cover mapping using Sentinel-2 data by unsupervised classification

Land Use Land Cover Classification of the Balaghat and Jabalpur District, Madhya Pradesh, India was carried out employing the unsupervised Classification technique. Sentinel-2 imagery was taken and individual bands of 10 m spatial resolution from NIR, Red, Green and Blue bands were stacked together to create a multispectral image cube. Once the stacked image is generated, a single pixel contains a 4-dimensional vector containing spectral values corresponding the considered bands. Reference dataset has been taken with the help of high-resolution Google earth images. The Flow chart of methodology is shown in Fig. 12.4. Sentinel-2 data set was used for LULC classification. Data set were pre-processed to create corrected reflectance images.

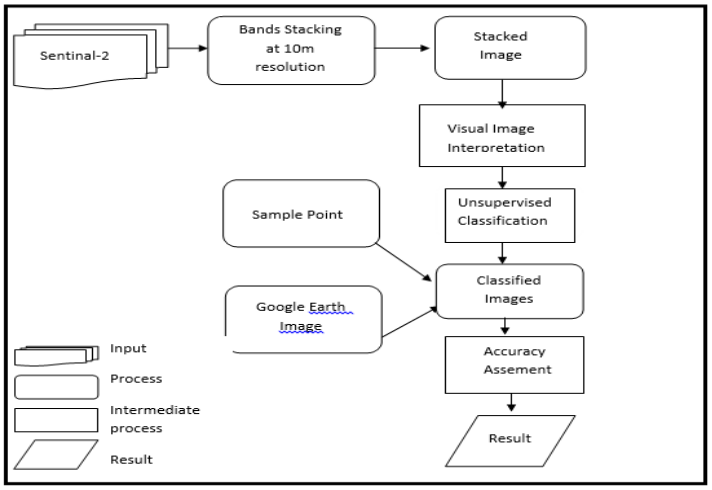


Figure: 12.4Methodology for unsurprised classification

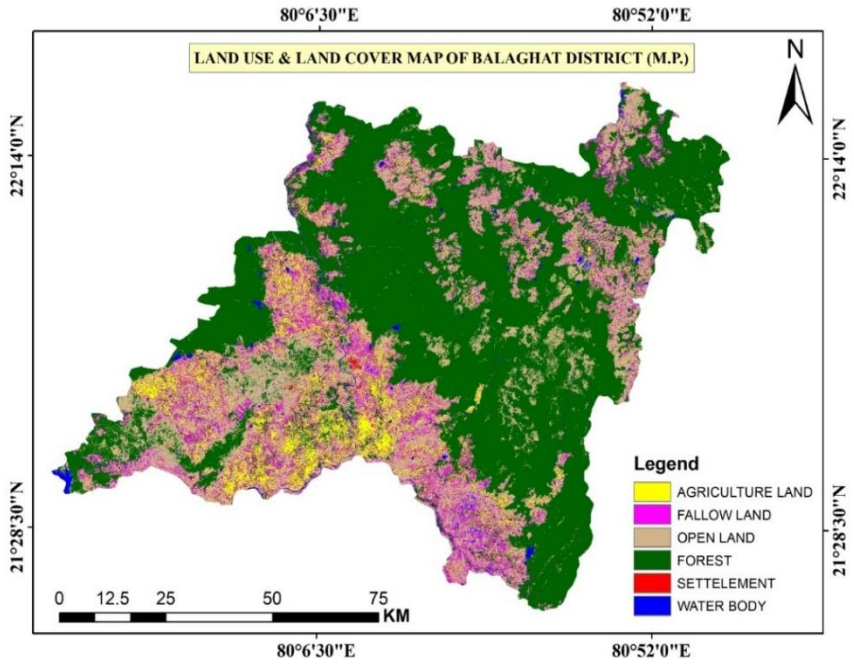


Figure: 12.5 Land Use Land Cover Map of Balaghat District

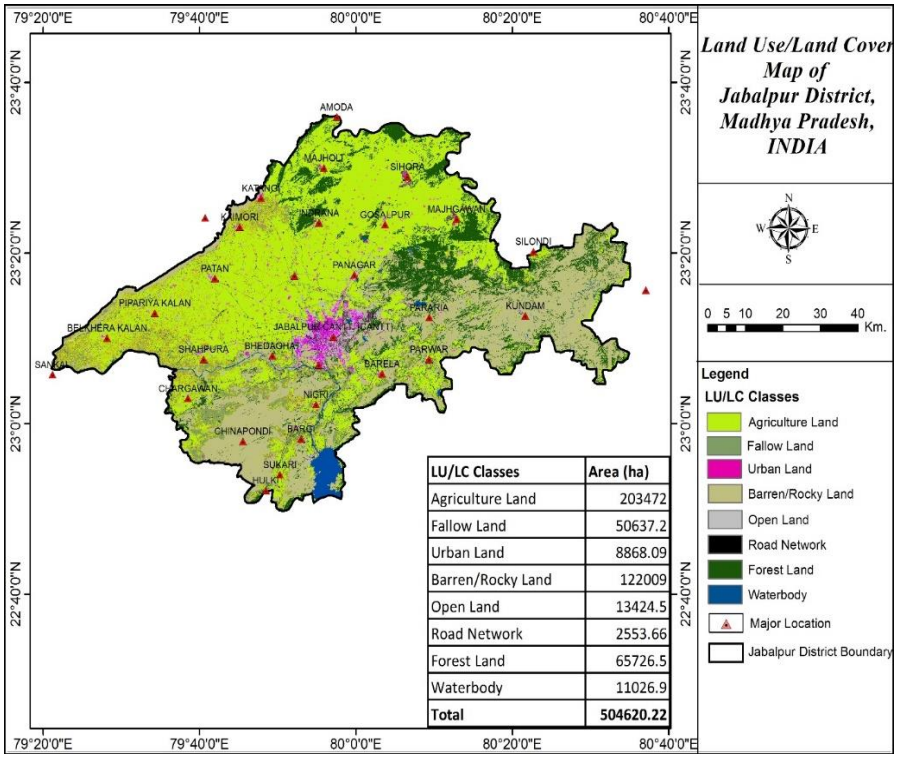


Figure: 12.6 Land Use Land Cover Map of Jabalpur District

The atmospherically corrected images are used for unsupervised classification using K- mean clustering techniques and Iterative self-organizing analysis (ISODATA). The classified map of Balaghat and Jabalpur district is shown in Fig. 12.5 and 12.6 respectively. It was found that overall accuracy of Balaghat district is 65 %. In which most accurate classes are Forest, Agriculture land and Settlement. Overall accuracy of Balaghat district is low due to mixing two classes such as fallow and open land. The LULC data was also validated with data obtained through the Crop production statistic information system of India (CPSIS).

Table: 12.5 Area covered under different Classes

Class	Area (ha)	CPSIS Data (ha)	Area in %
Forest	536134.0	505078.0	94
Water body	14918.8	14470.0	NA
Fallow land	88210.0	54000.0	61
Agriculture land	68209.0	57621.0	84
Open land	220270.0	141502.0	64
Settlement	1715.3	1509.2	88

Total area of Balaghat district is 922900 ha classified into six land use land cover classes. Those classes are agriculture land, forest, fallow land, open land, settlement and water body. The Table shows that the maximum accuracy was found in forest which is 94 percent followed by settlement (88%) and Agriculture (84%).

In case of the Jabalpur district, land area mainly comprised Agriculture land i.e. 48.91%, settlement land 1.75 %, and water bodies 2.18% and remaining area comes under fallow land, forest land and others.

12.3 Crop Classification maps:

The crop classification maps were prepared at district level using multidate satellite imagery, for the major crops in Narsinghpur and Jabalpur district Madhya Pradesh India, by applying the unsupervised classification technique. A time series data of sentinel -2 data was used for the generation of classified maps using K- mean clustering techniques and Iterative self-organizing analysis (ISODATA). Overall accuracy of classification for Narsinghpur district is 83.57%.

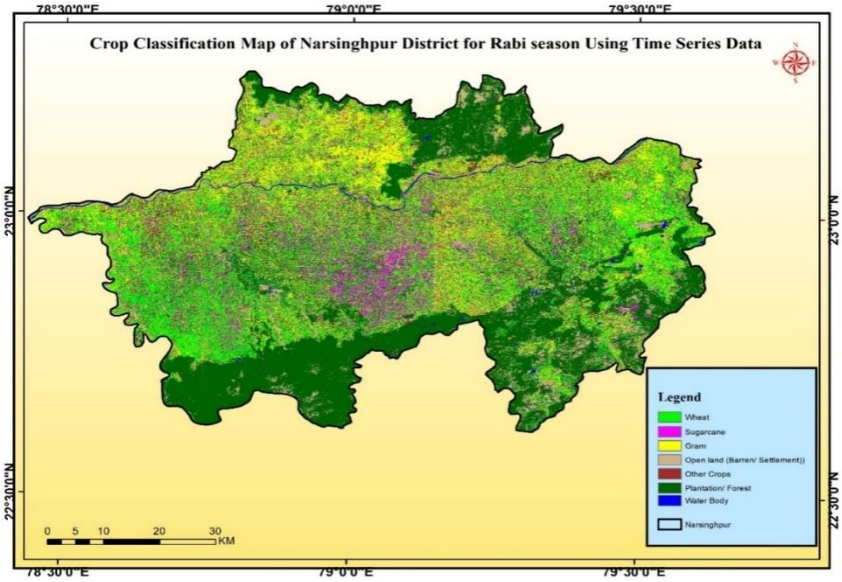


Figure 12.7 Crop Classification Map of Narsinghpur District

Table: 12.6 Classification statistics for crop and land uses in Narsinghpur District (M.P)

Particular	Area (ha)	CPSIS Area (ha)	Area in %
Wheat	111634	120227	92
Gram	87077	82424	94
Sugarcane	53546.9	62985	85
Other Crops	34420.1	20000	58
Fallow Land	13568.8	10728	79
Forest	152849	1316184	90
Open land (Barren/ Settlement)	54485.4	62000	87
Water Body	4994.05	NA	NA
Total	512575.25		83.57

Total Area of Narsinghpur district is 512575.25 ha. Which has been divided into eight classes. Those classes are wheat, gram, sugarcane, forest, other crops, fallow land, open land and water body. The Table 12.6 shows that the maximum accuracy will be found in gram and wheat, which is 94 and 92 percent.

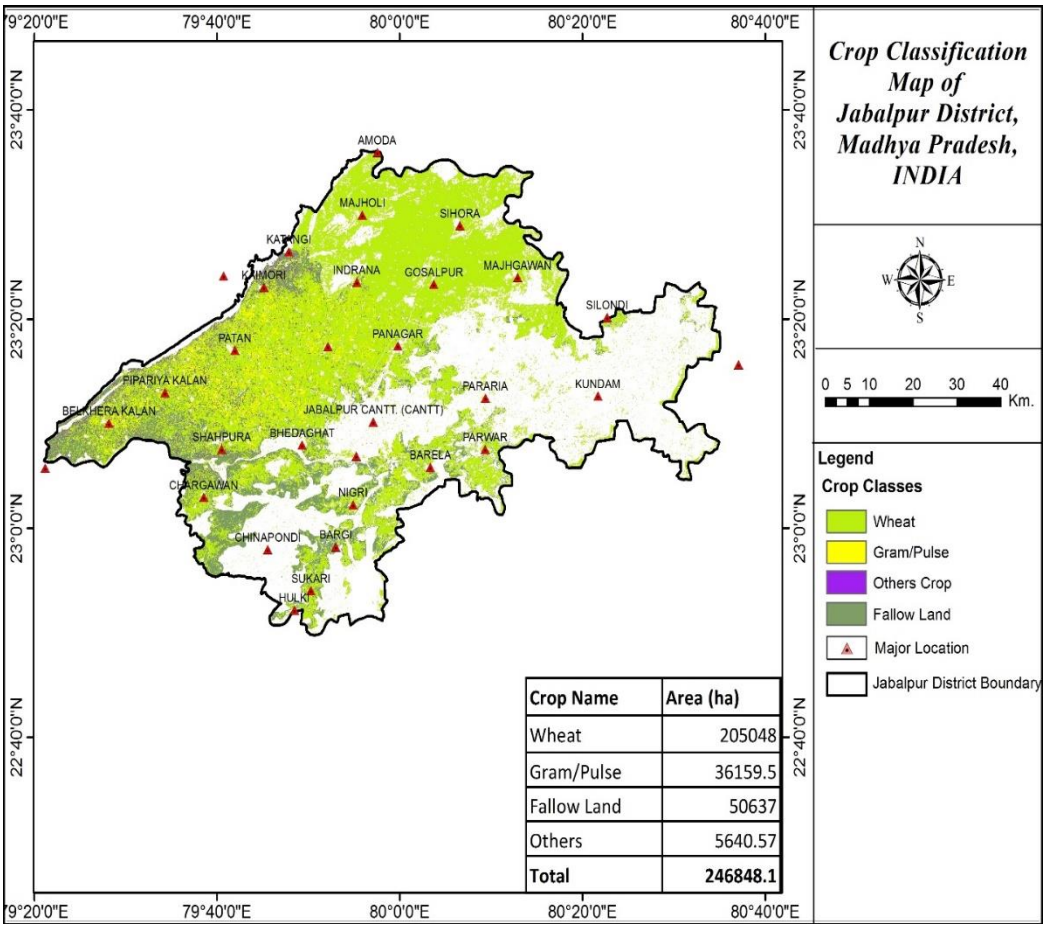


Figure 12.8: Crop classification of Jabalpur district

For February 2019 classified maps shows that, agricultural land of Jabalpur district having wheat crop 83.07 %, Gram/ Pulses 14.64 % and other crop (2.28%).

12.4 Spatio-temporal rainfall variability analysis over the Madhya Pradesh

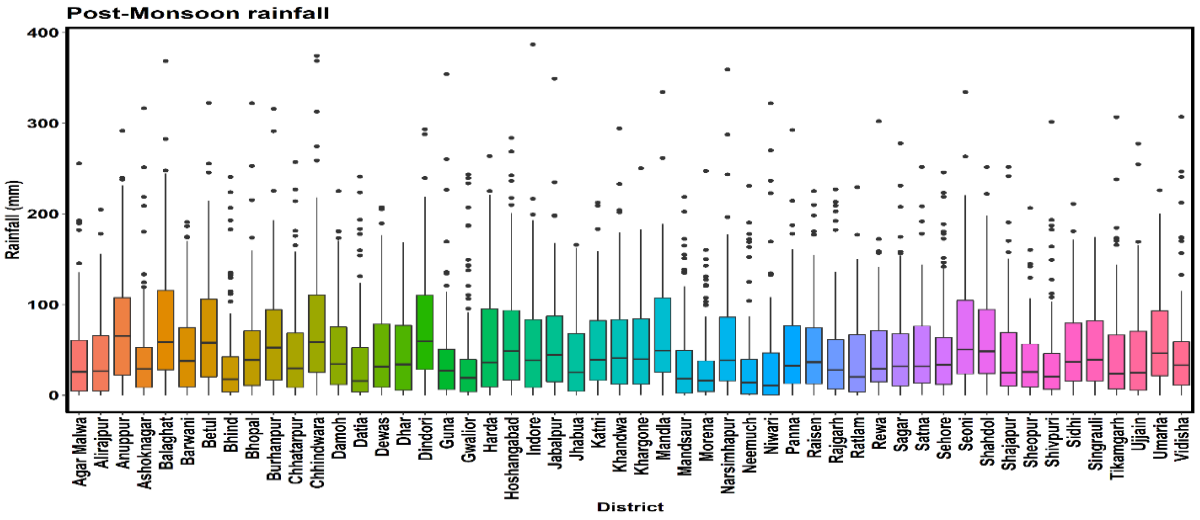
This study was carried out to investigate the spatial and temporal variability of rainfall at 52 districts of the Madhya Pradesh (MP), India. Data for the period of 119 years (1901–2019) on annual and seasonal basis was used. The daily gridded rainfall data (0.25 ^{0} x 0.25 ^{0}) for the period of 1901-2019 was obtained from Indian Meteorological Department. The information was extracted as the gridded daily rainfall for Madhya Pradesh state. The daily rainfall for each district was obtained by averaging the gridded rainfall over the district boundary. The daily rainfall was then converted into the monthly, seasonal and annual rainfall data for each district. According to the IMD, four meteorological seasons are winter season: January–February, summer season: March–May, monsoon season: June–September, and post-monsoon season: October–December.

Annual and seasonal rainy days were also computed for analysis purpose. A day with precipitation amounts greater than the 2.5 mm is defined as a wet day, otherwise it is defined as a dry day. Box plots were applied to reveal variations of the annual and seasonal rainfall at each district (Fig. 12.9).

There were considerable differences observed in seasonal and annual rainfall at 52 districts for the 119 years of rainfall record. Fig.12.9 also depicting the presence of considerable outliers in seasonal and annual rainfall time series. The presence of the most number of outliers were observed for the post-monsoon, winter and summer rainfall as compared to the annual and monsoon rainfall. This implies that, extreme rainfall events occurred during the period 1901-2019.

It is also noticed that most of the middle lines of box are adjacent to the bottom horizontal lines in the boxes and the length of upper and lower whiskers are unequal for the post-monsoon, winter and summer rainfall. It inferred that, the post-monsoon, winter and summer rainfall do not follow normal distribution. In general, there is more variability of rainfall at each station during the post-monsoon, winter and summer season as compared to the monsoon rainfall. The maximum rainfall is contributed by the monsoon season at each station.

The maximum monsoon rainfall was observed for district Balaghat (2214.84 mm in the year 1961) and minimum monsoon rainfall for district Niwari (31.28 mm in the year 1976). The post-monsoon rainfall was varied from 0 to 386.84 mm, winter rainfall varied from 0 to 257.98 mm and summer rainfall varied from 0 to 293.18 mm at district level during the period 1901-2019. Similarly, annual rainfall at district level ranges between 33.46 mm (Niwari) and 2354.65 mm (Balaghat) during the period 1901-2019.


Post-Monsoon rainfall
Rainfall (mm)
0
100
200
300
400
Agar Malwa
Alirajpur
Anuppur
Ashoknagar
Balaghat
Barwani
Betul
Bhind
Bhopal
Burhanpur
Chhatarpur
Chhindwara
Damoh
Datia
Dewas
Dhar
Dindori
Guna
Gwalior
Harda
Hoshangabad
Indore
Jabalpur
Jhabua
Katni
Khandwa
Khargone
Mandla
Mandsaur
Morena
Narsimhapur
Neemuch
Niwari
Panna
Raisen
Rajgarh
Ratlam
Rewa
Sagar
Satna
Sehore
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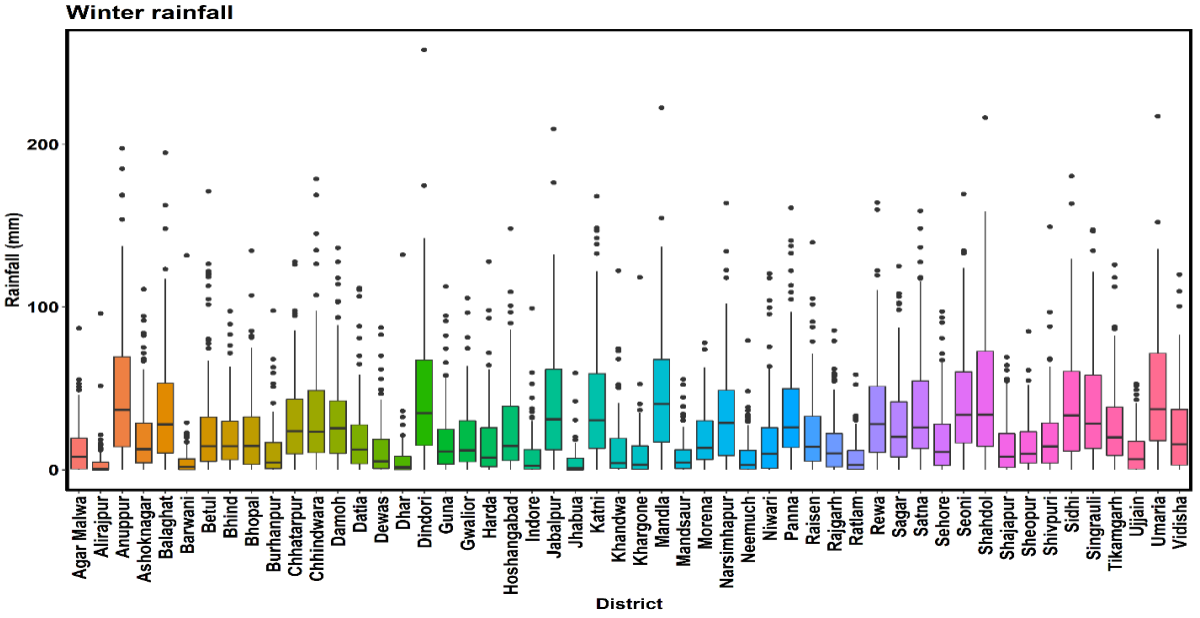
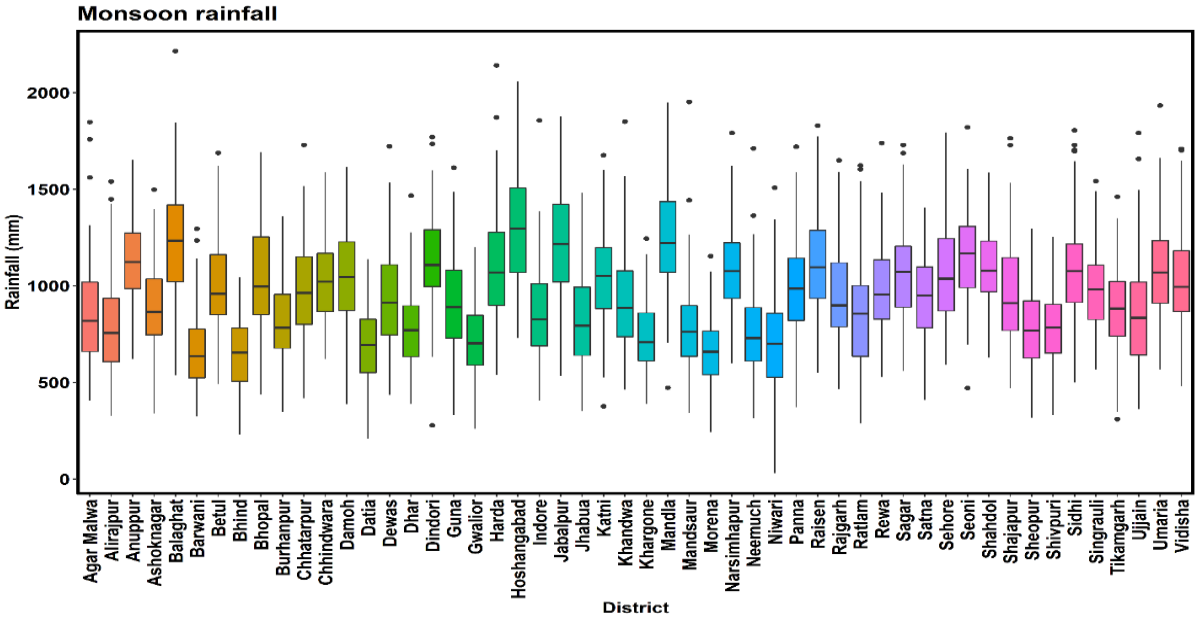

Winter rainfall
Rainfall (mm)
0
100
200
Agar Malwa
Alirajpur
Anuppur
Ashoknagar
Balaghat
Barwani
Betul
Bhind
Bhopal
Burhanpur
Chhatarpur
Chhindwara
Damoh
Datia
Dewas
Dhar
Dindori
Guna
Gwalior
Harda
Hoshangabad
Indore
Jabalpur
Jhabua
Katni
Khandwa
Khargone
Mandla
Mandsaur
Morena
Narsimhapur
Neemuch
Niwari
Panna
Raisen
Rajgarh
Ratlam
Rewa
Sagar
Satna
Sehore
Seoni
Shahdol
Shajapur
Sheopur
Shivpuri
Sidhi
Singrauli
Tikamgarh
Ujjain
Umaria
Vidisha
District


Monsoon rainfall
Rainfall (mm)
0
500
1000
1500
2000
Agar Malwa
Alirajpur
Anuppur
Ashoknagar
Balaghat
Barwani
Betul
Bhind
Bhopal
Burhanpur
Chhatarpur
Chhindwara
Damoh
Datia
Dewas
Dhar
Dindori
Guna
Gwalior
Harda
Hoshangabad
Indore
Jabalpur
Jhabua
Katni
Khandwa
Khargone
Mandla
Mandsaur
Morena
Narsimhapur
Neemuch
Niwari
Panna
Raisen
Rajgarh
Ratlam
Rewa
Sagar
Satna
Sehore
Seoni
Shahdol
Shajapur
Sheopur
Shivpuri
Sidhi
Singrauli
Tikamgarh
Ujjain
Umaria
Vidisha
District

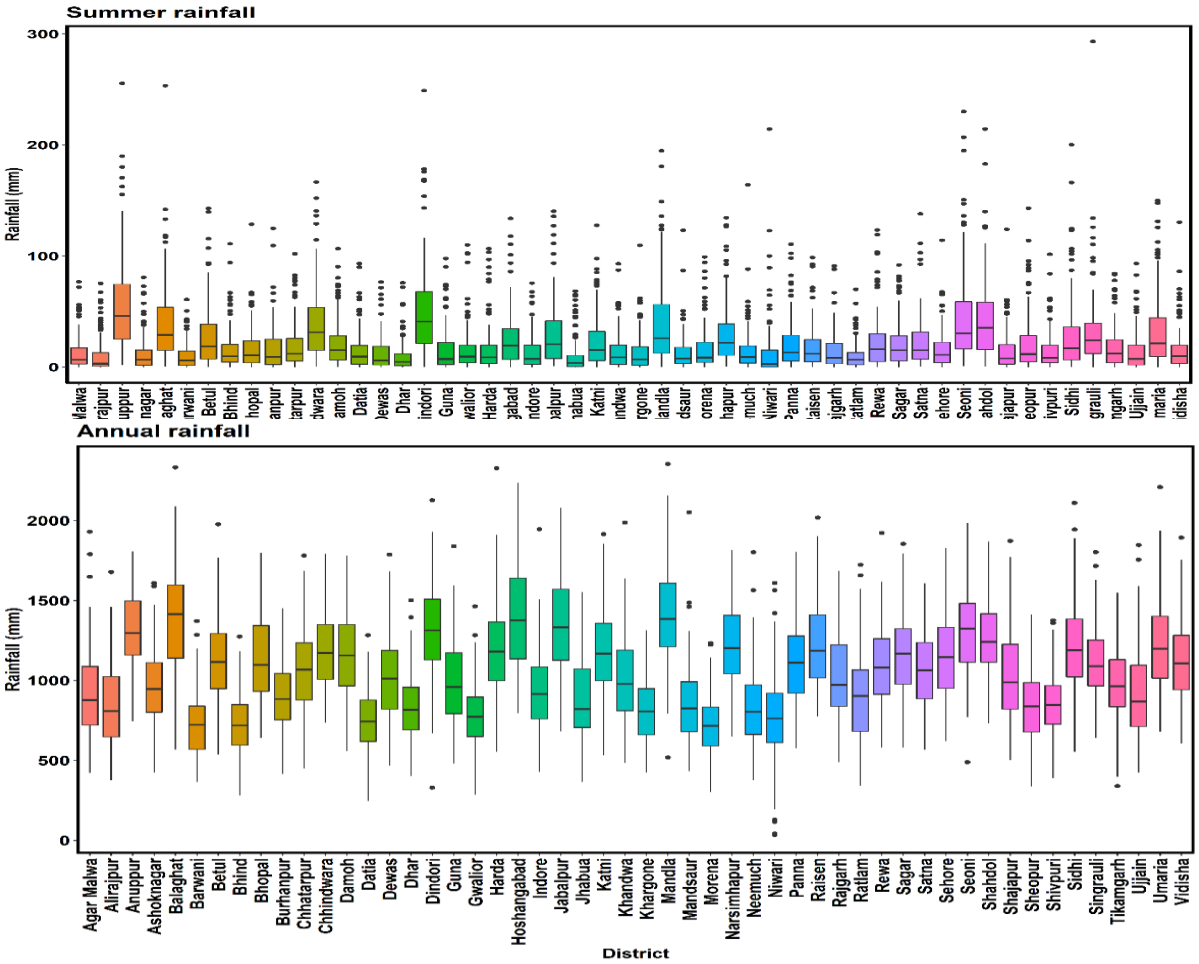
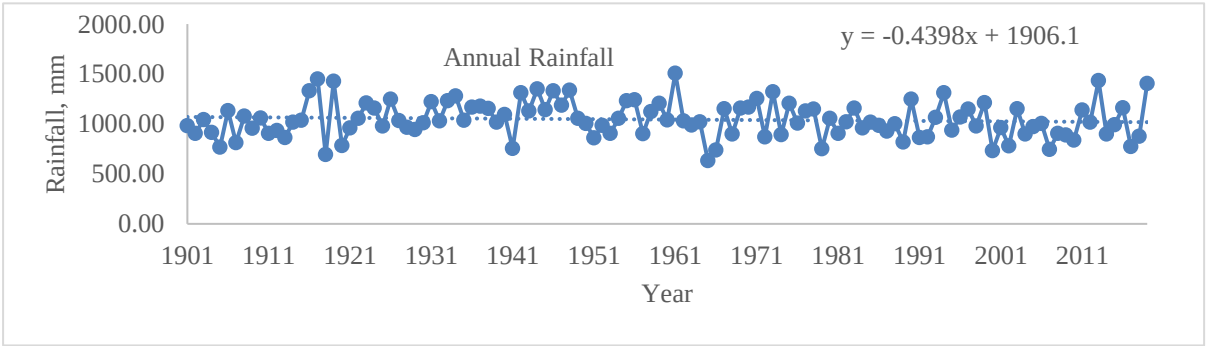
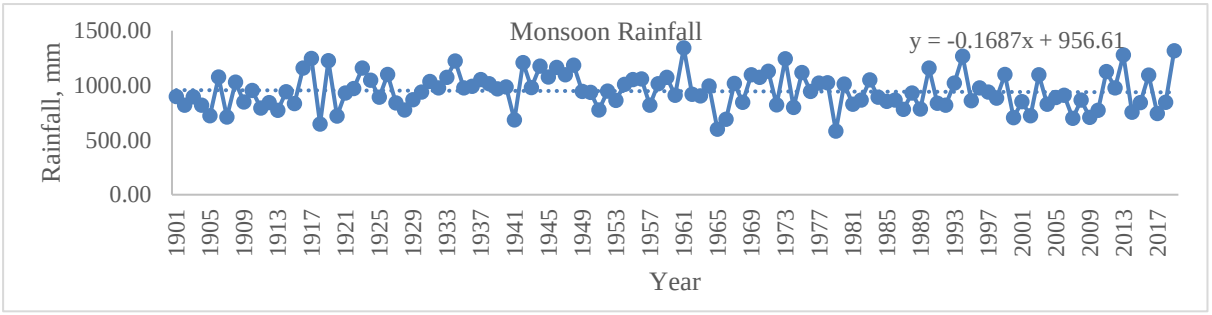
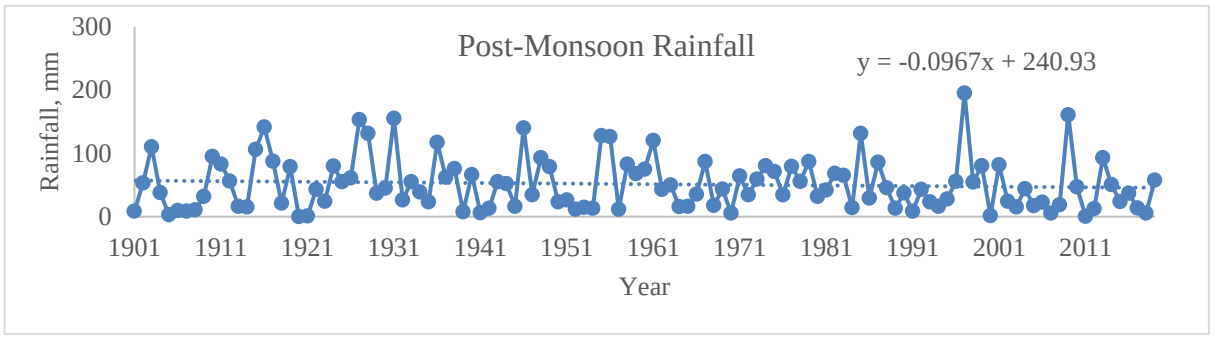


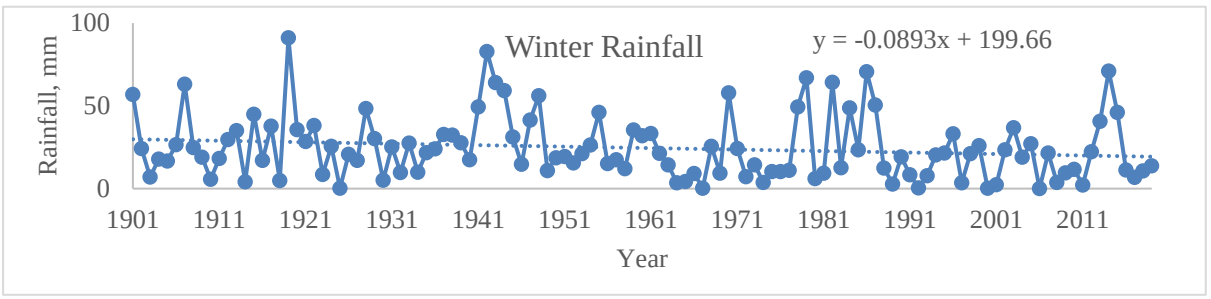
Figure 12.9 Rainfall variability at each district of Madhya Pradesh

The annual and seasonal rainfall variations of the state are depicted in Fig. 12.10 The mean annual rainfall of the state is 1044.12 mm with standard deviation of 178.82 mm, out of which 90.64% (946.49 mm), 4.91% (51.33 mm), 2.35% (24.55 mm), and 2.08 % (21.75 mm) were received in monsoon, post-monsoon, winter, and summer season, respectively. The coefficient of variation of monsoon, post-monsoon, winter and summer rainfall of the state is 17.04%, 80.18%, 78.37% and 79.60% respectively.









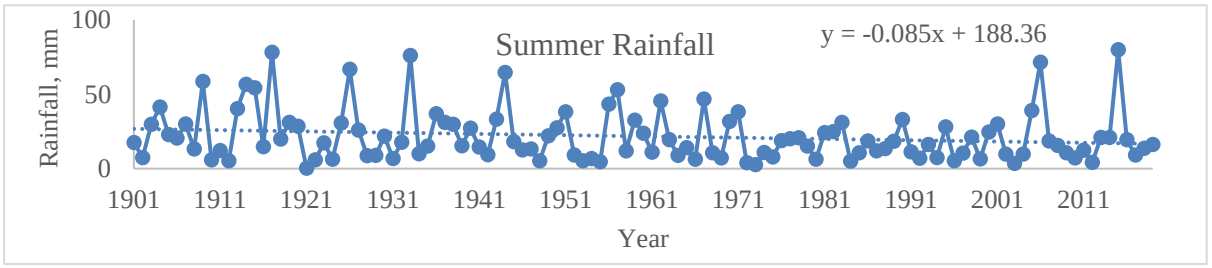


Figure 12.10 Temporal pattern of mean rainfall over the Madhya Pradesh

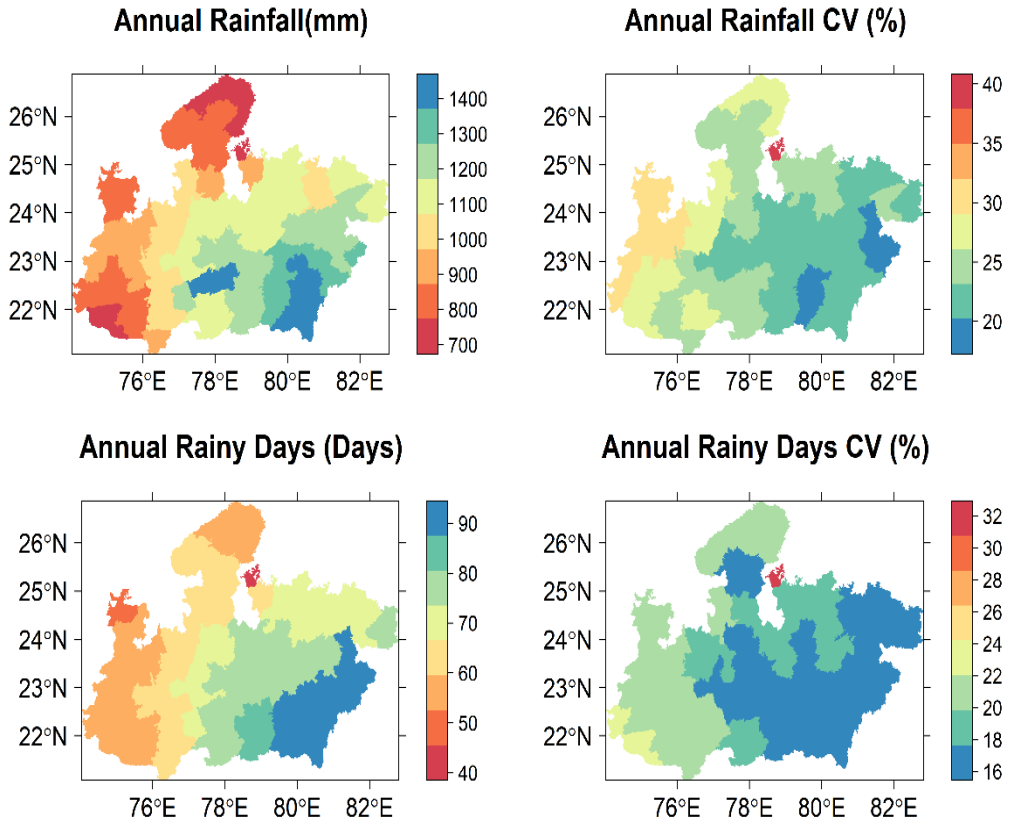
The spatial variability of annual and seasonal rainfall and rainy days over the Madhya Pradesh is depicted in Fig. 12.11. The average annual rainfall less than 750 mm were observed for the districts Barwani, Bhind and Morena. Out of 52 districts, 26 district received mean annual rainfall greater than 1044 mm (mean annual rainfall of the state). The maximum average annual rainfall was observed for the district Hoshangabad (1421.07 mm) followed by Mandla (1399.4 mm) and Balaghat (1384.98 mm). The coefficient of variation of mean annual rainfall was varied from 18.71% (Anuppur) to 39.38% (Niwari).

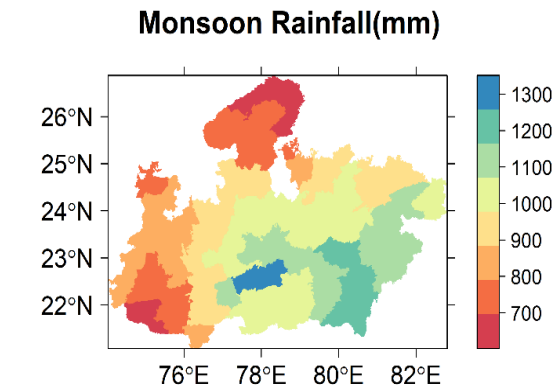
The average annual rainy days lies in the range of 41.87 days (Niwari) to 91.03 days (Seoni). The average annual rainy days of the state is 67.98 days with the coefficient of variation of 17.71%. During the entire period mean monsoon rainfall greater than 1044 mm was observed at Anuppur, Balaghat, Bhopal, Damoh, Dindori, Harda, Hoshangabad, Jabalpur, Katni, Mandla, Narsinhpur, Raisen, Sagar, Sehore, Seoni, Shahdol, Sidhi and Umaria districts. The mean monsoon rainfall less than 750 mm was observed at Barwani, Bhind, Datia, Gwalior, Morena, Khargone and Niwari districts. The coefficient of variation of mean monsoon rainfall varied between 18.61% (Anuppur) to 40.54% (Niwari).

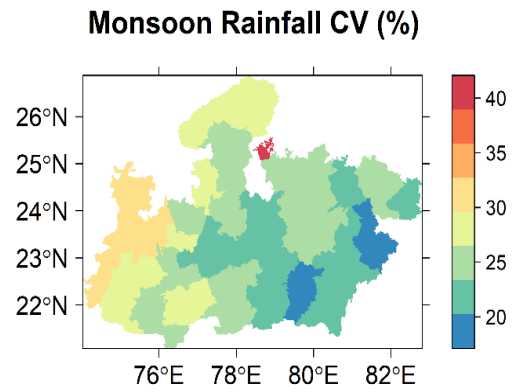
In case of mean monsoon rainy days, 26 district out of 52 having rainy days greater than 60 days. The highest number of mean monsoon rainy days was observed at Balaghat (76 rainy days) followed by Seoni (75 rainy days) and Mandla district (73.59 rainy days).

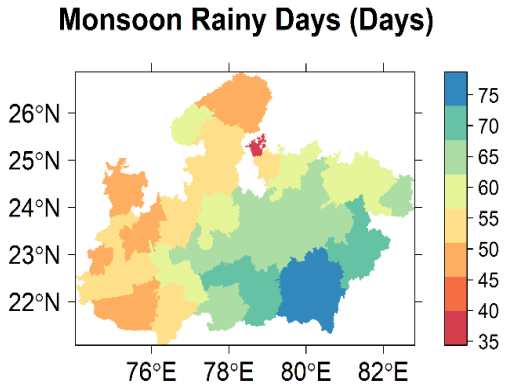
There is more spatial and temporal variability of post-monsoon, winter and summer rainfall and rainy days over the Madhya Pradesh during the entire period of rainfall record. Also, there is very less contribution of post-monsoon, winter and summer rainfall over the Madhya Pradesh.

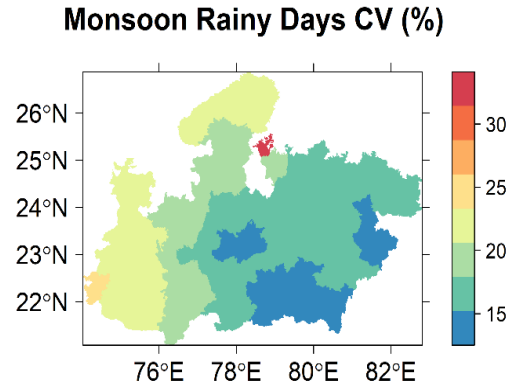
The seasonal and annual rainfall variability analysis along with the maps would be useful for effective planning and efficient use of water resources and also for district-level water management.

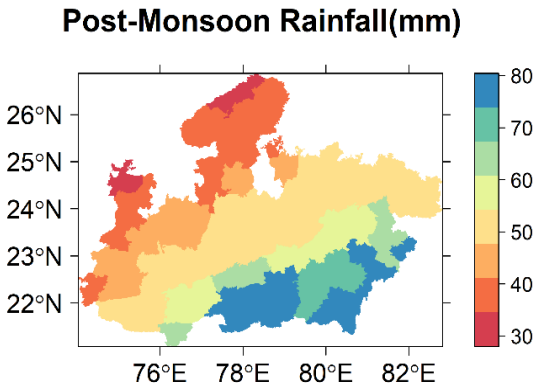


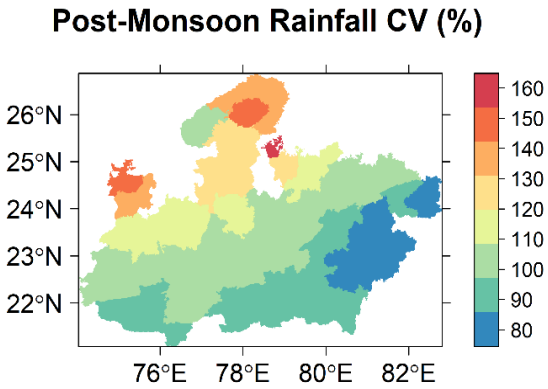

Monsoon Rainfall(mm)
26°N
25°N
24°N
23°N
22°N
76°E
78°E
80°E
82°E
1300
1200
1100
1000
900
800
700

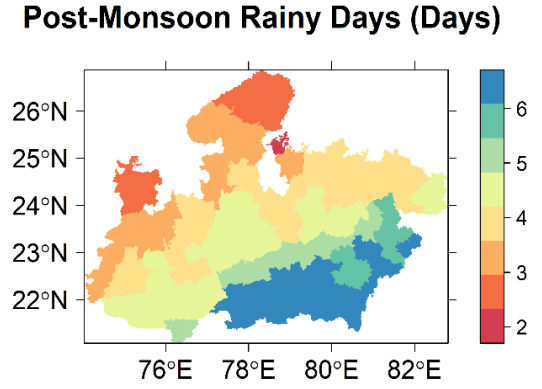

Monsoon Rainfall CV (%)
26°N
25°N
24°N
23°N
22°N
76°E
78°E
80°E
82°E
40
35
30
25
20

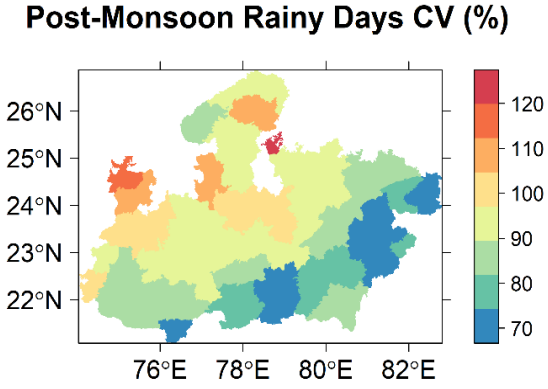

Monsoon Rainy Days (Days)
26°N
25°N
24°N
23°N
22°N
76°E
78°E
80°E
82°E
75
70
65
60
55
50
45
40
35


Monsoon Rainy Days CV (%)
26°N
25°N
24°N
23°N
22°N
76°E
78°E
80°E
82°E
30
25
20
15


Post-Monsoon Rainfall(mm)
26°N
25°N
24°N
23°N
22°N
76°E
78°E
80°E
82°E
80
70
60
50
40
30


Post-Monsoon Rainfall CV (%)
26°N
25°N
24°N
23°N
22°N
76°E
78°E
80°E
82°E
160
150
140
130
120
110
100
90
80


Post-Monsoon Rainy Days (Days)
26°N
25°N
24°N
23°N
22°N
76°E
78°E
80°E
82°E
6
5
4
3
2


Post-Monsoon Rainy Days CV (%)
26°N
25°N
24°N
23°N
22°N
76°E
78°E
80°E
82°E
120
110
100
90
80
70

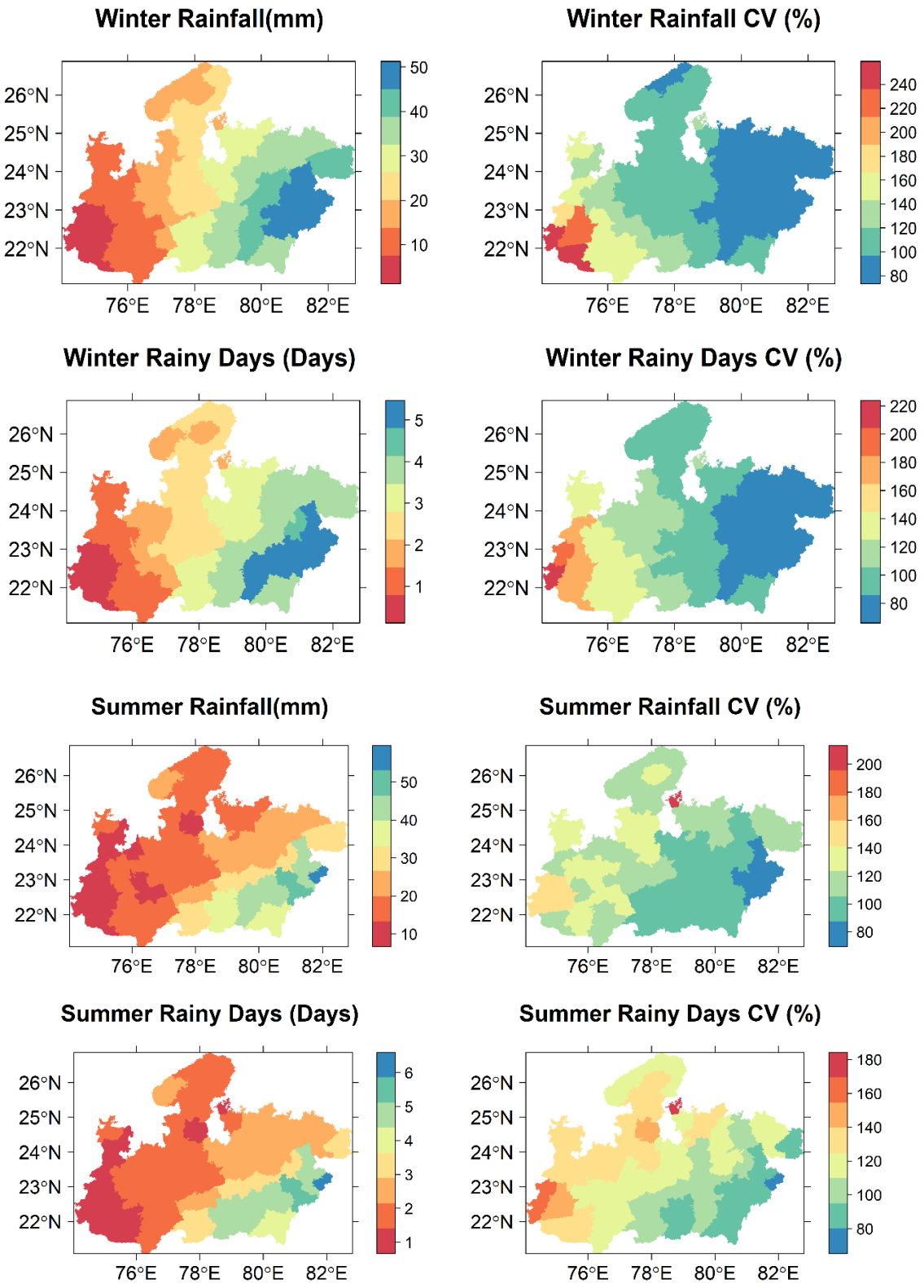


Figure 12.11 Spatial variability of mean rainfall and rainy days over the Madhya Pradesh

12.5 Long term trend analysis of rainfall for Sindh river basin

Regional spatiotemporal analysis of rainfall and drought has to gain much more attention under the climate change scenario worldwide. The study was under taken to analyze regional level long term trend analysis of rainfall, rainy days, and drought over the Sindh river basin. Sindh river is a tributary of Yamuna river, passes through two states of India namely Madhya Pradesh and Uttar Pradesh.

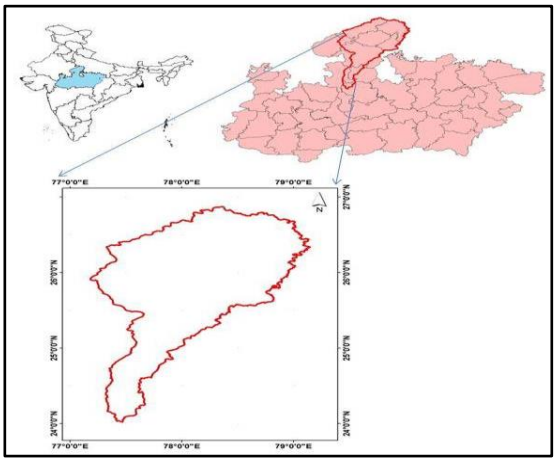


Figure 12.12 Location map of Sindh river basin

The river originates from the Vidisha District of Madhya Pradesh. In Madhya Pradesh, it flows through the districts of Guna, Shivpuri, Ashoknagar, Bhind, Gwalior, and Datia. After it joins the Yamuna river in the Jalaun district of Uttar Pradesh. The catchment area of the river covering 26,699 Km² area and 461 Km length in Madhya Pradesh. Major tributaries of Sindh are Pahuj, Mahuar, Kunwari, and Parbati. The areal extension of the Sindh river basin is from 21° 17′ N to 26° 36′ N and 74° 02′ E to 82° 26′ E encompassing eight districts as shown in Figure 12.12. Sindh basin is characterized by a subtropical climate and receives maximum rainfall from Jun to September. The cropping patterns are influenced by monsoon rainfall.

Daily rainfall for the period of 1901 to 2019 (119 years) prepared by the Indian Meteorological Department (IMD) at a spatial resolution of 0.25° × 0.25° grid was used for this study. According to IMD, in India rainfall are stated in four seasons viz. summer (March - May), winter (January - February), monsoon (Jun - September) and post-monsoon (October - December). Rainy days, monthly, seasonal, and annual rainfall series were prepared from daily rainfall data for thirty-eight grid points.

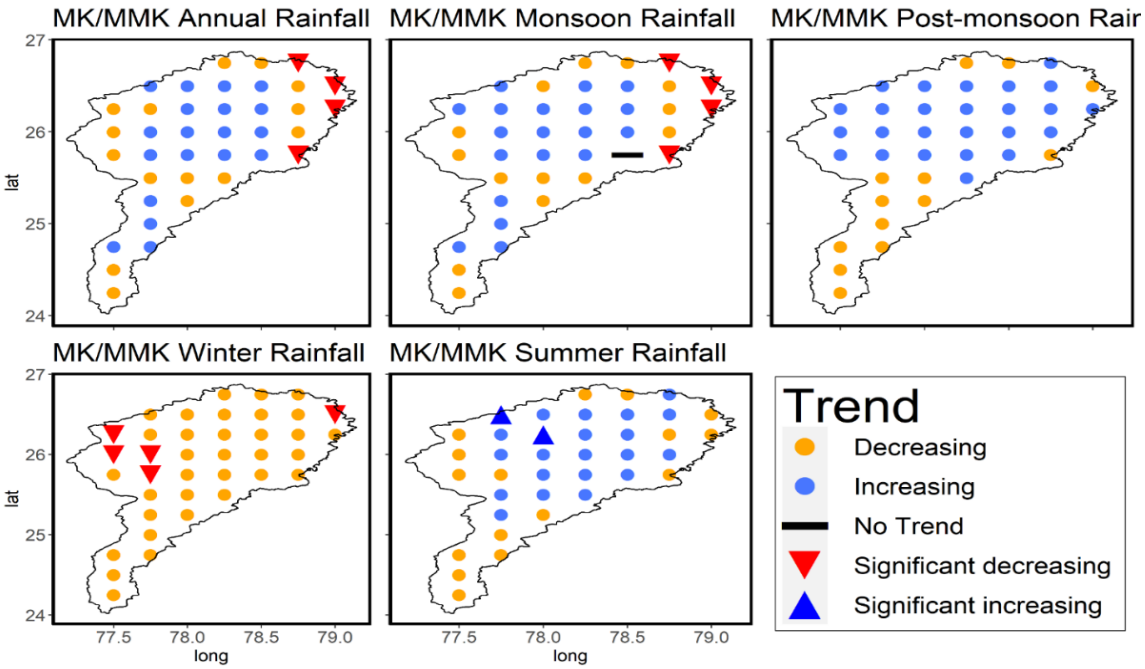


Fig 12.13: Grid wise trend for annual and seasonal rainfall analysis for the Sindh river basin

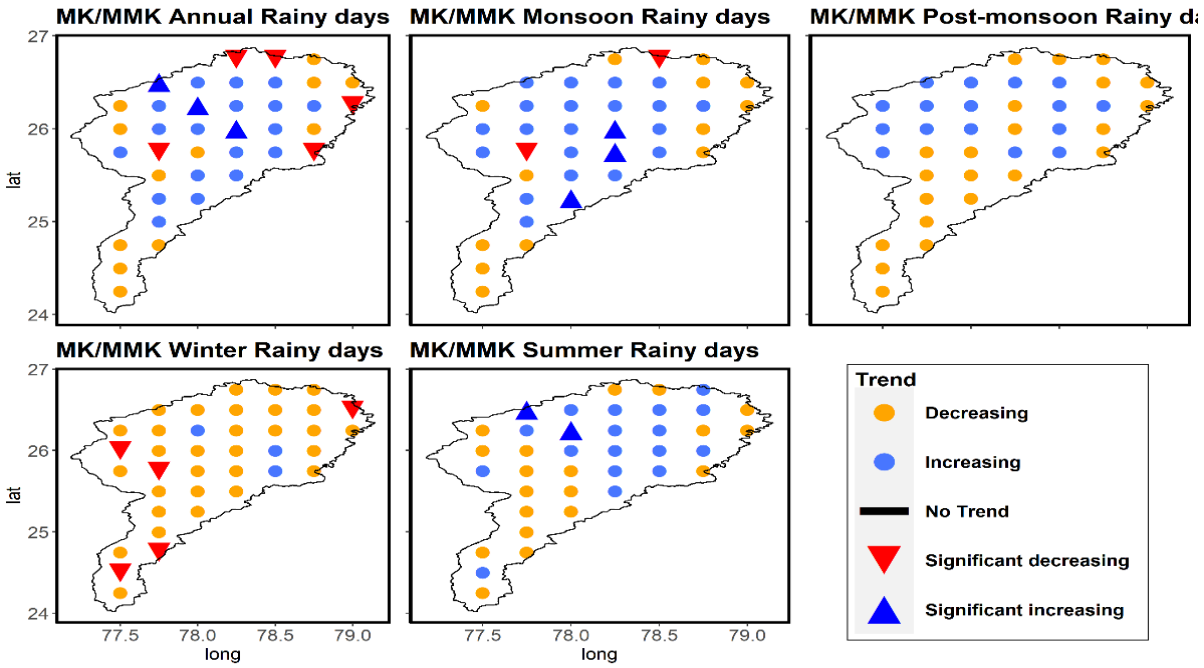


Figure 12.14: Grid wise trend for annual and seasonal rainy days analysis for the Sindh river basin

The nonparametric Mann-Kendall/modified Mann-Kendall test was used to analyze the trend of rainfall, rainy days, and SPI series of different timescales (1, 3, 6, 9, and 12-month SPI series) at a 95% confidence level. The modified Mann-Kendall test was performed only for the autocorrelated time series.

The trend analysis of rainfall and rainy days showed a significant decreasing trend for the north-eastern part of the basin (Fig. 12.13 and 12.14). A similar pattern of trends for rainfall, rainy days, and drought was observed over the basin. The results of the SPI trend analysis indicate that a large portion of the basin has a rising trend of drought. Almost all grid points of the basin showed decreasing trends for rainfall and rainy days during the winter season. The drought properties such as the number of drought months and its incidences along with its duration are presented in Table 12.7. The maximum number of drought incidence was found for the SPI-3 series, whereas the minimum number of drought incidence was found for the SPI-12 series. It is found that, the total number of drought months varying from 63 months (SPI-1 series) to 160 months (SPI-6 series) for the entire period over the basin.

Table 12.7: Drought properties of SPI series over the Sindh river basin

SPI series	Number of drought month (SPI< -1) (1901-2019)	Number of drought incidences	Duration of drought months		
			Minimum	Maximum	Average
SPI-1	63	53	1	3	1.18
SPI-3	144	85	1	6	1.69
SPI-6	160	71	1	7	2.25
SPI-9	151	59	1	10	2.55
SPI-12	143	34	1	13	3.32

The maximum duration of the drought was 13 months in the case of the SPI-12 series, followed by SPI-9, SPI-6, SPI-3, and SPI-1 with the duration of 10, 7, 6, and 3 months respectively. Similarly, the average drought duration for the SPI-12 series was 3.32 months followed by SPI-9, SPI-6, SPI-3, and SPI-1 with an average duration of 2.55, 2.25, 1.69, and 1.18 months respectively. The number of extreme droughts occurred over the basin during the different time scales of SPI for the entire period. SPI- 1 month showed 7 extreme drought events over the basin. Similarly, 3-month SPI showed 14 extreme drought events over the basin. Twenty-eight extreme drought events were observed for the SPI-6 month series. Likewise, thirty-two and thirty-five extreme drought events were noticed for SPI-9 and SPI-12 months over the basin respectively.

The spatial and temporal trend analysis of rainfall, rainy days, and drought can help policymakers to understand the behavior of rainfall and drought patterns over the Sindh river basin and accordingly to build planning and mechanism to deals with the drought effectively.

12.6 Hydrological Modelling of Banjar River Watershed using HEC-HMS

Soil and water are the two most important natural resources which are essential for agricultural production. In this study, Hydrologic Engineering Centre's Hydrologic Modeling System (HEC-HMS) is employed to simulate rainfall runoff process in Banjar river watershed, which is situated in between Mandla and Balaghat district of Madhya Pradesh, India (Fig. 12.15).

The overall methodology is represented in the Figure 12.16. The Carto DEM is processed using HEC-GeoHMS to generate sub-watersheds and channel characteristics. The curve number is generated using the LULC and the HSG provided by the Natural Resources Conservation Service (Fig.12.17). The loss method used is Soil Conservation Service Curve Number (SCS-CN), the transform method is Soil Conservation Service Unit Hydrograph, and channel routing method is Muskingum-Cunge.

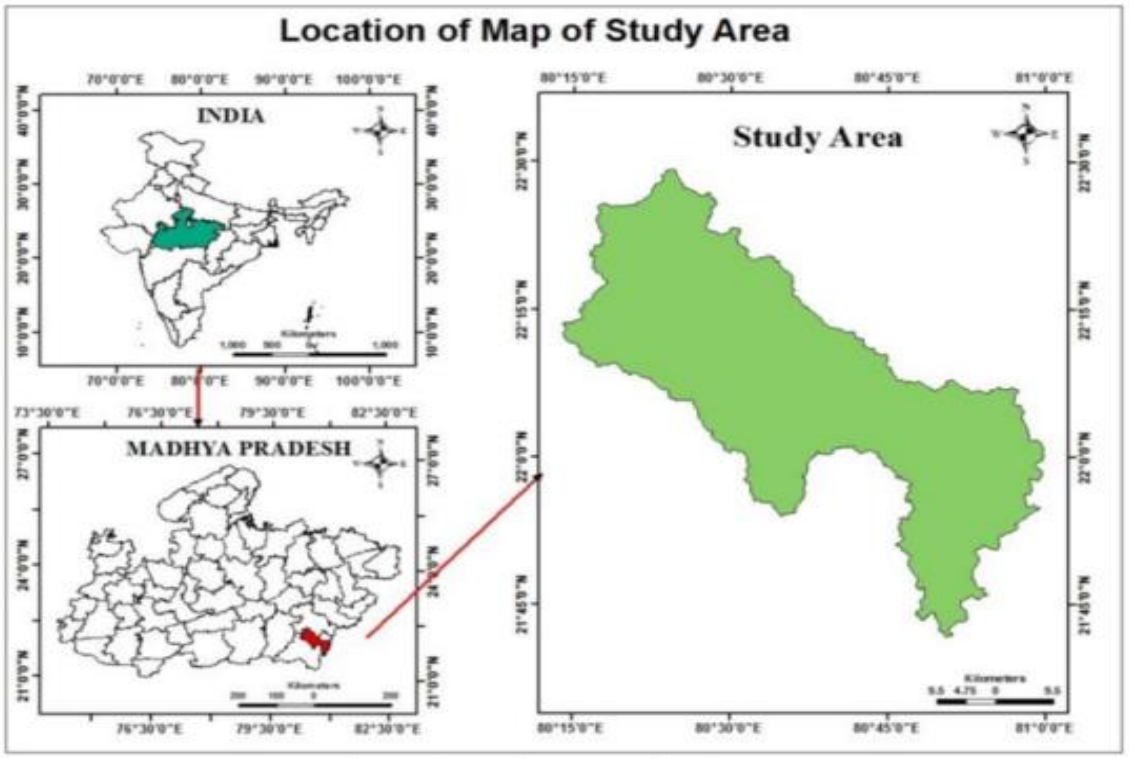


Figure. 12.15 Location map of study area.

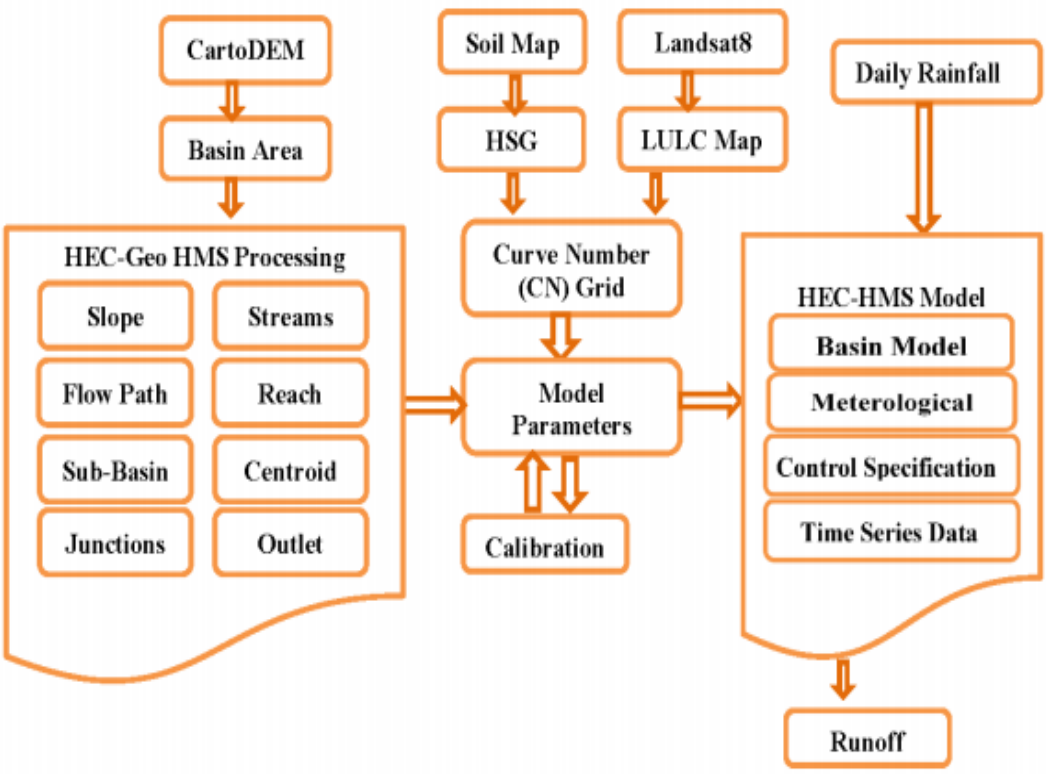


Figure 12.16 Flow Chart of Methodology

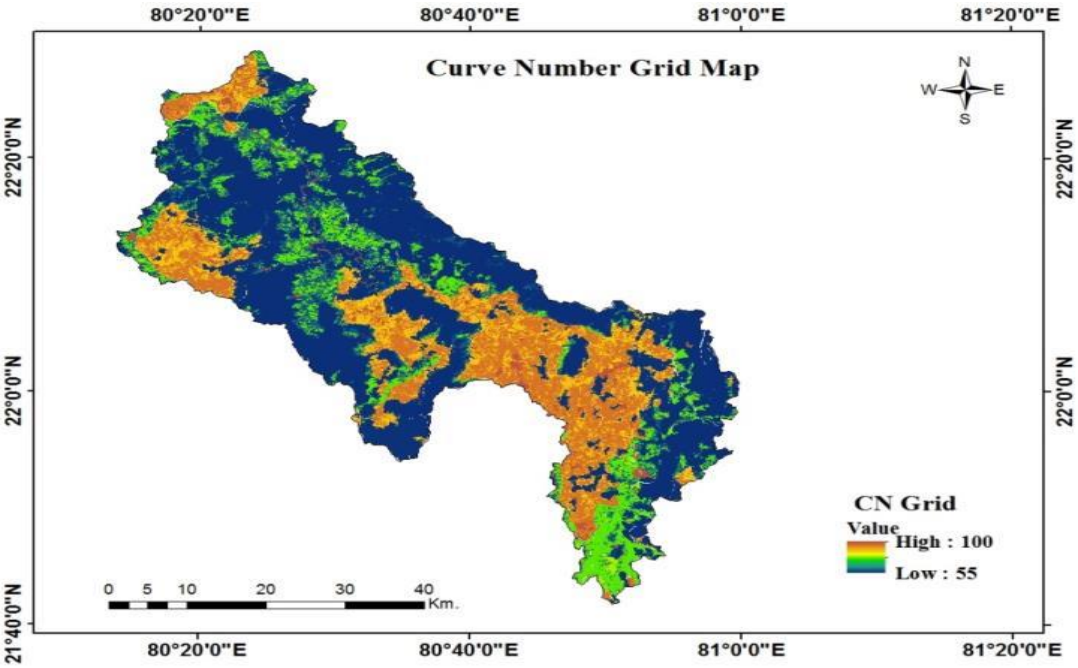


Figure 12.17 Curve number map

The performance of the model is assessed using performance evaluation indicators such as Nash-Sutcliffe efficiency (NSE), Percentage Error in Peak and Coefficient of Determination (R^2). The model is calibrated in order to determine the best fit between the model and observation. HEC-HMS has a trail optimization function that can be used to match the simulated flow with observed flow. The HEC-HMS model is calibrated and validated using two different events of 2005 (September) and 2014 (August) in the Banjar river watershed respectively, as shown in Figure 12.18 to Figure 12.21 .

During calibration the values of NSE, PEP and R^2 obtained are 0.792, 4.96% and 0.849, and 0.751, 10.51% and 0.809 for validation period, respectively. The results suggest that HEC-HMS can be utilized for the hydrological modelling of the basin that will be helpful to provide information to the decision makers for sustainable planning and management policies related to soil and water conservation measures and infrastructure development projects.

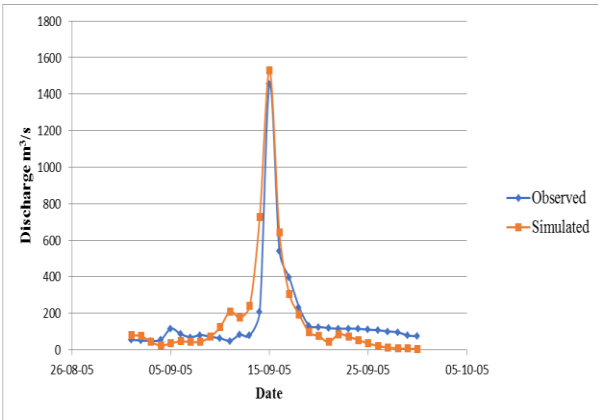


Figure 12.18 Observed and Simulated discharge for the calibration period

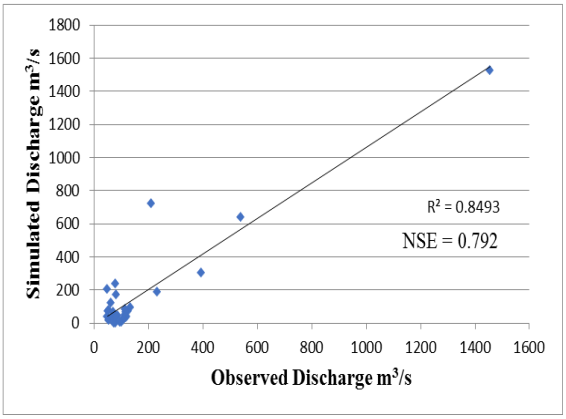


Figure 12.19 Scatter plots of observed discharge versus simulated discharge for the calibration period

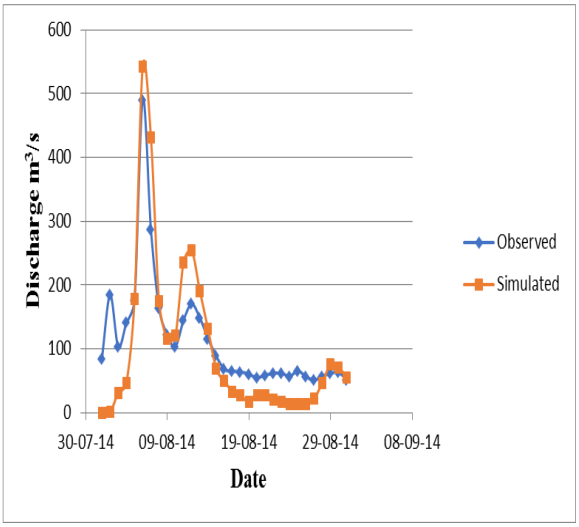


Figure 12.20 Observed and Simulated discharge for the validation period

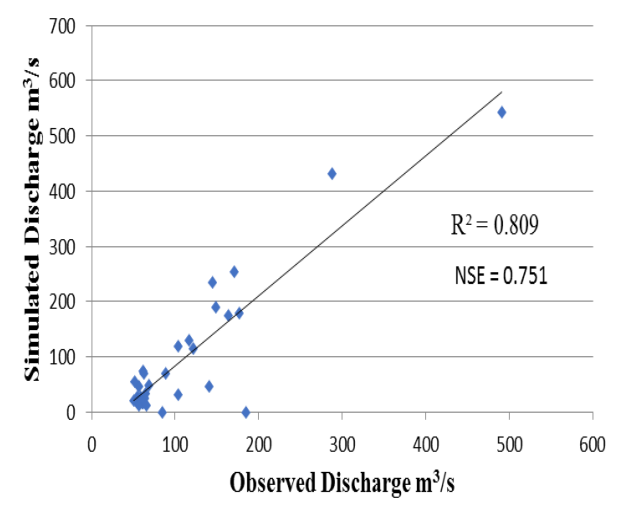


Figure 12.21 Scatter plots of observed discharge versus simulated discharge for the validation period.

12.7 Soil map:

The soil maps of scale of 1:500000 were procured from National Bureau of soil survey and land use planning, Nagpur. The soil map has been digitized at district levels and creates vector layer of soil type with the help of GIS Software. Soil characteristics information such as soil depth, drainage, texture, slope, erosion, soil series number etc., has been filled in its attribute table. The soil map is very important input parameter for the studies related to rainfall-runoff process, ground water hydrology, agriculture planning etc. Fig. 12.22 and 12.23 represents the soil map of Jabalpur and Nasinghpur district.

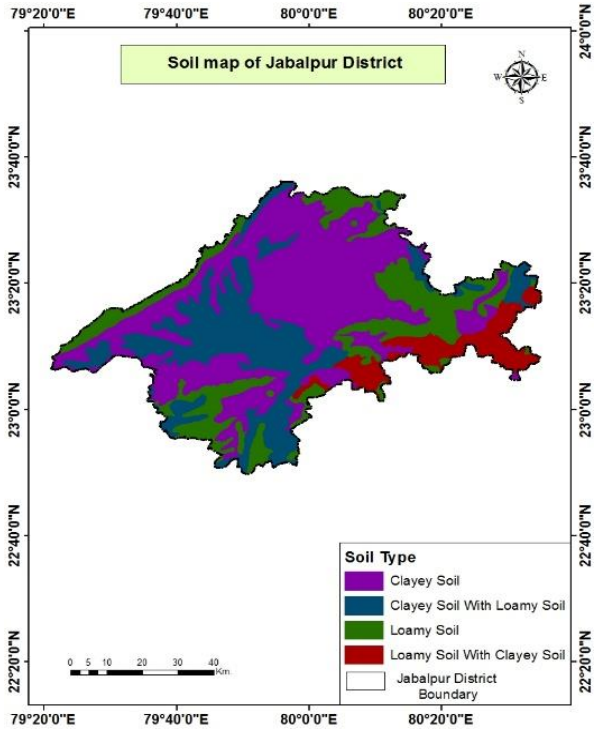


Figure 12.22 Soil map of Jabalpur district

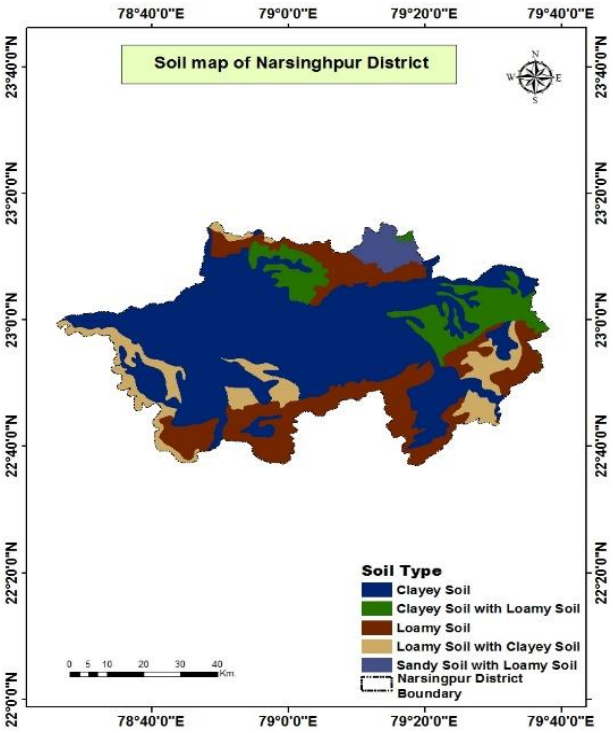


Figure 12.23 Soil map of Narsinghpur district

12.8 Geospatial Techniques for assessing recharge requirement regarding river revival

Groundwater is a ubiquitous geologic agent and its age and residence time determines its impact on geologic processes and also controls the feedbacks of these processes on groundwater flow and transport. River Science refers to the study of a variety of processes affecting river systems. This is a truly interdisciplinary science and requires the explicit joining of two or more areas of understanding into a single conceptual-empirical structure. in spite of the fact that large sums of money have been spent on river rehabilitation across the globe, the understanding of the science of restoration is fragmentary. A revival strategy should identify a long-term vision for the river basin, the desired outcome of the strategy over the planning horizon (goals), and specific, measurable targets to be achieved over the short to medium term (objectives). For this an accurate estimation of groundwater recharge is required to properly manage aquifers. Determination of the aquifer capacity is the most important step to know about the current situation of the aquifers so that the future planning can be done regarding installation of water harvesting structure and other conservation measures. The proposed area of interest is

- Application of Geospatial Techniques for assessing recharge requirement.
- Determination of aquifer capacity to accommodate recharge water.
- Estimation of quantum recharge in the watershed.

13. Appendix C

publication

S.No.	Research Articles	NAAS Rating
1.	Awasthi MK and Patle D. (2020). Reweigh Temperature as Estimator for Evaluation and Prediction. Current Journal of Applied Science and Technology. 39(43):66-71. DOI: 10.9734/CJAST/2020/v39i4331141	5.38
2.	Pawar PS, Rawat U, Yadav A, Rajput A, Vasht D. and Nema S. (2020) Long Term Trend Analysis of Rainfall, Rainy Days and Drought for Sindh River Basin, Madhya Pradesh, India. Int.J.Curr.Microbiol.App.Sci. 2020.9(12): 2738-2749	5.38
3.	Awasthi MK and Patle D. (2020). Trend Analysis of Ground Water Recharge in Tikamgarh district of Bundelkhand using Geospatial Technology. International Journal of Chemical Studies. Special Issue. 8(4):417-420. DOI: https://doi.org/10.22271/chemi.2020.v8.i4g.10181	5.31
4.	Trivedi A and Awasthi MK. A Review on River Revival (2020). International Journal of Environment and Climate Change 10(12): 202-210,; Article no.IJECC.61385. ISSN: 2581-8627.	5.13
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1.	Ayushi Trivedi and M.K Awasthi (2020). Groundwater Recharge Estimation using SWAT Model. National Web Conference on Sustainable Soil and Water Management for Bio-diversity Conservation, Food Security and Climate Resilience.	
2.	Ayushi Trivedi. River basin modeling using SWAT model (2020). International Web-Conference on Resource Management and Biodiversity Conservation to Achieve Sustainable Development Goals.	
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4.	Malay Singh, Y.K Tiwari, M.K Awasthi and Ayushi Trivedi. (2020). Analysis of geospatial causes for lowering discharge in kanari river. Conference on Global Approaches in Natural Resource Management for Climate Smart Agriculture. GNRSA-2020/787.	

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6.	Vinay Kumar Gautam, K.K Yadav, J.T Raju, Ayushi Trivedi (2020). Analysis of Groundwater Quality Parameters Using Gis Technique For Chittorgarh District, Rajasthan. conference on Global Approaches in Natural Resource Management for Climate Smart Agriculture.GNRSA-2020/787.
7.	Deepak Patle and MK Awasthi. (2021). Identification of Drought Presumable Zones Using Geographic Information System: A Case Study of Niwari District of Bundelkhand Region, Madhya Pradesh. International Conference on Soil and Water Resource Management (ICSWRM), Maharana Pratap University of Agriculture and Technology, Udaipur, (Rajasthan), India.
Poster Presentation	
1.	Ayushi Trivedi (2020). Determination of Quantum Recharge Requirement by Utilizing Spatial Data for Revival of Kanari River. National Web-Conference on Technological Approaches for Resource Conservation and Management for Environmental Sustainability by Academy of Natural Resource Conservation and Management (ANRCM) Lucknow (U.P)
2.	Ayushi Trivedi Has secured 1st Position in Poster Competition for Theme "Application of Geoinformatics" in Post Graduate / Research Scholar Category organized by M.Sc. Geoinformatics Department, ISTAR College, Vallabh Vidyanagar on 10th June 2020, 'River Revival : Assessing Spatial Features For Determination Of Quantum Recharge Requirement'
3.	Deepak Patle Has Participated in Poster Competition for Theme" Application of Geoinf ormatics" In Post Graduate / Research Scholar Category Organized by M.Sc. Geoinformatics Department, ISTAR College, Vallabh Vidyanagar on 10th June 2020
Book Chapter	
1	Ayushi Trivedi has published a Book chapter named "River rejuvenation: an innovative and logistic approach" in book titled "Recent Trends in Agricultural Sciences & Technology". Publisher of this book is weser Book Germany. This covers following topics River System, Major components of River System, Measures for river restoration, River Restoration Planning Process etc.
Review Article Published in Magazine	
1	Ayushi Trivedi and M. K Awasthi published 2 review articles named "Aquifer overexploitation: causes of river drying" and "Aquifer mapping and management for river revival" in monthly magazines such as "Agri-India Today" and "Agriculture & food: e newsletter" respectively.