

## Progress Report Quarter III (Oct - Dec 2020)

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**ICAR-NAHEP- Center for Advanced Agricultural Science and Technology**  
**COLLEGE OF AGRILCULTURAL ENGINEERING**  
**JNKVV, JABALPUR**  
**Progress Report Quarter III (Oct - Dec 2020)**

A center for Spatial Data Application in Agriculture (CSDA)

Title : "Skill Development to use spatial data for natural resources management in Agriculture"

**Objectives:**

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

**Activities**

1. Awareness program for students
  2. Introductory program for administrator
  3. Executive learning for executives
  4. Capacity building for Scientists, Teachers, officials, students and Young Professionals
- To identify appropriate techniques for integration of spatial and ground data to realize problems related to land, water and vegetation.

**Activities**

1. Problem identification in realizing process with satellite and ground data techniques available.
  2. Making the spatial data maps more precise and accurate using fine resolution data available with present satellite systems.
  3. Students undergoing master and doctoral degree program shall be involved to undertake research project on related aspects. They shall be provided research fellowship for the same.
- To develop user friendly spatial data products using identified technologies for policy makers, researchers, field workers and farmers.

**Activities**

1. Preparation of Theme based maps
2. Preparation of Integrated maps for decision making

## 1. Administrative Activities

### 1.1 Creation of Facilities-

#### Development of Computer Lab and Training Hall

Estimates of designed construction are received and a committee is formed for finalization of the estimate and design of the computer lab and training hall.

#### A) Equipment Plant & Machinery

The plan for procurement of equipment plant and machinery for eight items where uploaded in STEP, out of these seven equipments have been cleared in the STEP. Detailed specification for these items are being prepared for RFQ and further processing. L1 has been identified and purchase order for some of the items are also issued.

Item	Specification	Suppliers/Vendors	Purchase order issued	Contract signed
Spectro Radiometer	in process	-		-
Drone With multispectral sensor and application equipments.	in process	-		-
Thermal Imaging Camera	in process	-		-
Work Station	Prepared	Identified	Yes	yes
Server with software	Prepared	Identified		-
Network Attached Storage	in process			-
Stereo head phones, microphones, patch bay, head phone distribution amplifier, digital portable recorder etc	in process			

#### B) Office Equipments

Three items have been uploaded and cleared in the STEP. L1 has been identified and purchase order for some of the items are also issued.

Item	Specification	Suppliers/Vendors	Purchase order issued	Contract signed
Wall Mounted Smart LED TV	Prepared	Identified		-
Public Address System	in process	Identified		-
Multi function Photo Copier	in process	identified	yes	Yes

### C) Laboratory Equipments with accessories

Twenty items were uploaded in the STEP and have been cleared. L1 has been identified.

<b>Item</b>	<b>Specification</b>	<b>Suppliers/Vendors</b>	<b>Purchase order issued</b>	<b>Contract signed</b>
GEO Positioning System	in process	-		-
Hand held crop nitrogen sensor	in process	-		-
Large format Plotter A0 Size	in process	-		-
Drone Image Processing Software	in process	-		-
ArcGIS, ERDAS, MIKE SHE, Visual MODFLOW, MATLAB and Soil Water modelling Software.	in process	-		-
GEO server software for windows.	in process	-		-
High-power Computing System	in process	-		-
Digital Terminals	in process	-		-
A0 Scanner	Prepared	Identified		-
LAN/Wi-Fi networking equipments	in process	Identified		-
Interactive LED display with Digital podium.	in process	-		-
45 MP Cameras	in process	-		-
CCTV Camera with control Unit	in process	Identified		-
AIR Conditioner	in process	Identified		-
Cholorophyll SPAD meter	in process			-
Line quantum PAR sensor with logger	in process	Identified		-
Soil moisture meter with sensor	in process	-		-
Off line UPS	in process	-		-
Canopy Analyzer	in process	Identified		-
Digital Planimeter&Chartometer	in process			-

#### D) Furniture & Fixtures

Ten items were uploaded in the STEP and all of them are cleared. L1 has been identified.

Item	Specification	Suppliers/Vendors	Purchase order issued	Contract sign
Book Shelves	Prepared	Identified		-
Steel Rack	Prepared	Identified		-
Lab Stool	Prepared	Identified		-
Executive Table & Chairs	Prepared	Identified		-
Computer Table & chairs	Prepared	Identified		-
Steel Allmirah	Prepared	Identified		-
File Cabinet	Prepared	Identified		-
Compactor	Prepared	Identified		-
Side Table	Prepared	Identified		-
Furnishing Items	in process			-

#### E) Computers & Peripherals

Five Items were uploaded in the STEP and all of them are cleared. L1 has been identified and purchase order for some of the items are also issued.

Item	Specification	Suppliers/Vendors	Purchase order issued	Contract signed
Desktop Computer	Prepared	Identified	yes	Yes
Black & White, Color Printer	Prepared	Identified	yes	Yes
Portable HDD, Storage Devices, Equipment for Internet	in process	-		-
Photo Scanner	Prepared	-		-
Computer Peripherals		-		-

Quotation were received for the above items and comparative statement were prepared. Identification of suitable vendor for the supply of above equipment were finalize and uploaded in step.

#### 1.2 Preparation of Training Schedule

Detailed programs are being finalized in consultation with experts and our knowledge partner. As per training schedule online deliberations and training for students and faculty for various departments were conducted.

### 1.3 Selection of Participants:

Students pursuing M.Tech. M.Sc. (Agril) and Ph.D. Agriculture/Agricultural Engineering participated in above trainings and then department wise training lectures were arranged to find out interested students in the field of RS & GIS.

### 1.4 Recruitment of contractual staff

- Appointment letters has been issued for different contractual position. Joining details are given below

S. No	Name	Designation	Date of Joining
1	Pratima Pathak	YP-I (Office Assistant)	3/10/20
2	Mukesh kumar Vishwakarma	YP-I (Office Assistant)	3/10/20
3	Prakash kumar Mishra	YP-I (Accounts)	3/10/20
4	Krishna Singh	YP-II (Computer)	3/10/20
5	Rachit Nema	YP-II (Computer)	5/10/20
6	Anjali Patel	YP-II (Computer)	8/10/20
7	Dr. Devendra Vasht	RA	12/10/20
8	Dr. Sourabh Nema	RA	12/10/20
9	Pratiman Patel	SRF	12/10/20
10	Aniket Rajput	SRF	13/10/20
11	Dr. Minakshi Meshram	SRF	16/10/20
12	Dr. Umakant Rawat	RA	16/10/20
13	Dr. Popat. Shivaji pawar	RA	19/10/20
14	Ankit Yadav	RA	1/11/20
15	Om Prakash Prajapati	SRF	10/11/20
16	Sumit Hiranman Kakade	SRF	11/11/20

- Online application were invited for engagement of 1 RA (Big Data & App) and 1 RA (Drones & Sensors) vide advertisement No. PRO/DAE/2020/47 dated 9<sup>th</sup> Dec 2020. It was also notified for vide publicity.
- Interview conducted on 30<sup>th</sup> Dec 2020 and order has been passed for the appointment of 1 RA (Big Data Analyst.

## 2. Capacity building programs

**2.1 Awareness programs for Modern Agriculture:** An online awareness program entitled “Agriculture Education Day” was held on 3<sup>rd</sup> Dec 2020, under the guidance of Dr. R. N. Shrivastava, Dr. M. K. Awasthi and Dr. S. K. Sharma 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 had participated in online quiz competition in relevance to Mordern Agriculture and various Agriculture Mechanization Techniques. Also 97 students participated in essay writing and slogan competition titled "Contribution of Modern Agriculture in building the Self-Reliant India".

### Distribution of participants

Table 2.1 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



**Plate 1. Schools participated in Awareness program on Morden Agriculture.**

**2.2 Awareness program on use of RS & GIS:** An online awareness program entitled “Use of RS & GIS” was held on **27<sup>th</sup> and 28<sup>th</sup> Nov 2020**, under the guidance of **Dr. R. N. Shrivastava, Dr. M. K. Awasthi and Dr. S. K. Sharma**. Total **107 students** of 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. Saurabh Nema and Dr. Minakshi Meshram** had shared their presentation about Remote sensing process, GPS and GIS functionalities, Agriculture in India and the changes so far in techniques in farm mechanism etc. Students got the knowledge of RS & GIS Spectrum in Agriculture. Online certificates were issued to the participants.

Distribution of participants

Table 2.2. 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



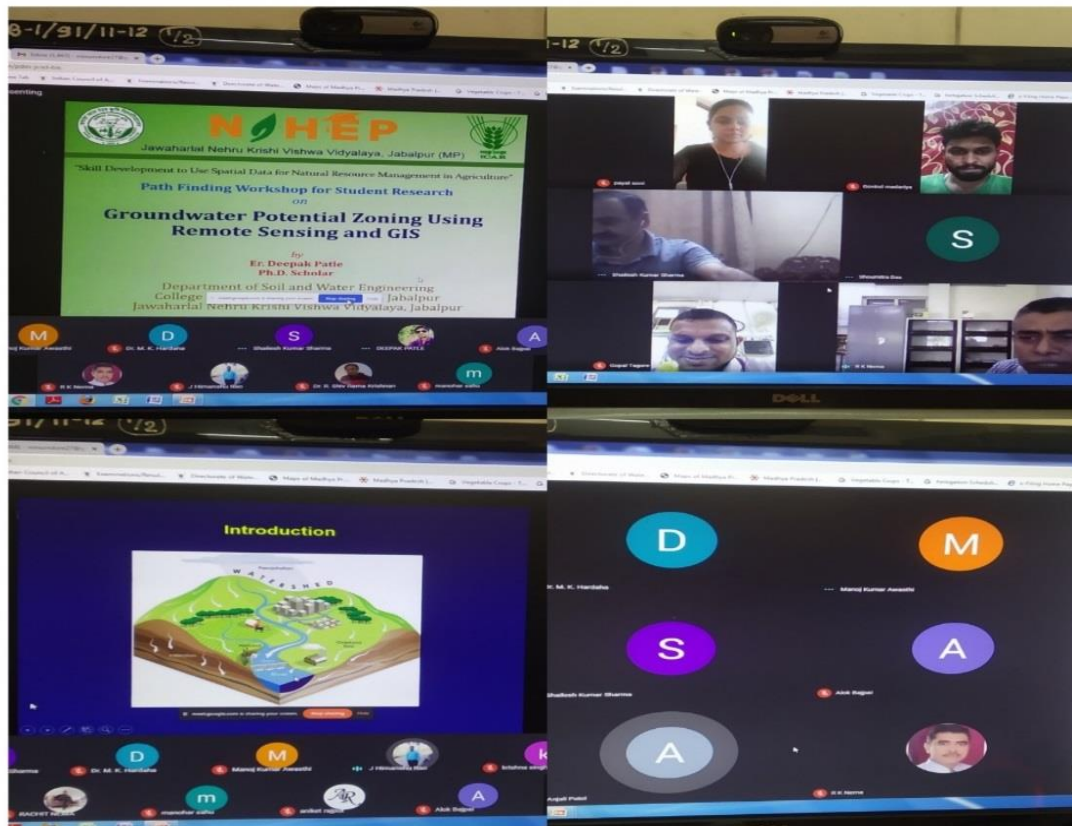
Plate 2: Schools participated in Introductory Program on Remote Sensing & GIS



**2.3 A Path Finding Workshop for Students Research:** A Path Finding Workshop for Students Research under NAHEP-CAAST-CSDA Project held on **28<sup>th</sup> Oct, 2020** from 11:00am to 01: 00 pm under the guidance of **Dr. M. K. Awasthi**. 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 students of PG and Ph.D. came to know the availability in the project, they also got the information of opportunities of training in India and abroad. They got a clear path about the topics they have selected for their research work.

Distribution of participants

Table 2.3 Path Finding programme									
Gender	Number of Participants					% of participants in diff. category			
	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

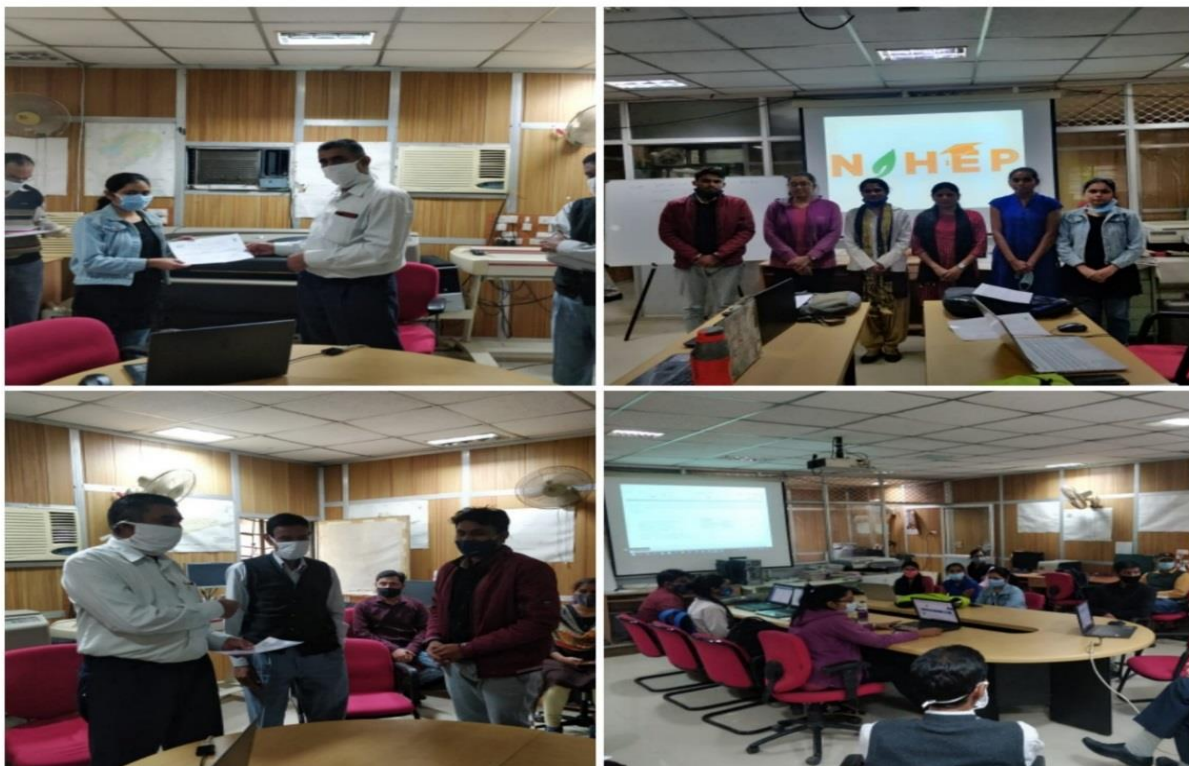


**Plate 3: students- Faculty interactive workshop for research possibilities**

**2.4 Training on Basics of Satellite Image Processing:** An offline training programme entitled Hands on –“Basics of Satellite Image Processing” was held from **5<sup>th</sup> Nov to 12<sup>th</sup> Nov 2020** under the guidance of **Dr. S. K. Sharma** 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 toposheet and 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.

Distribution of participants

Table 2.4 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



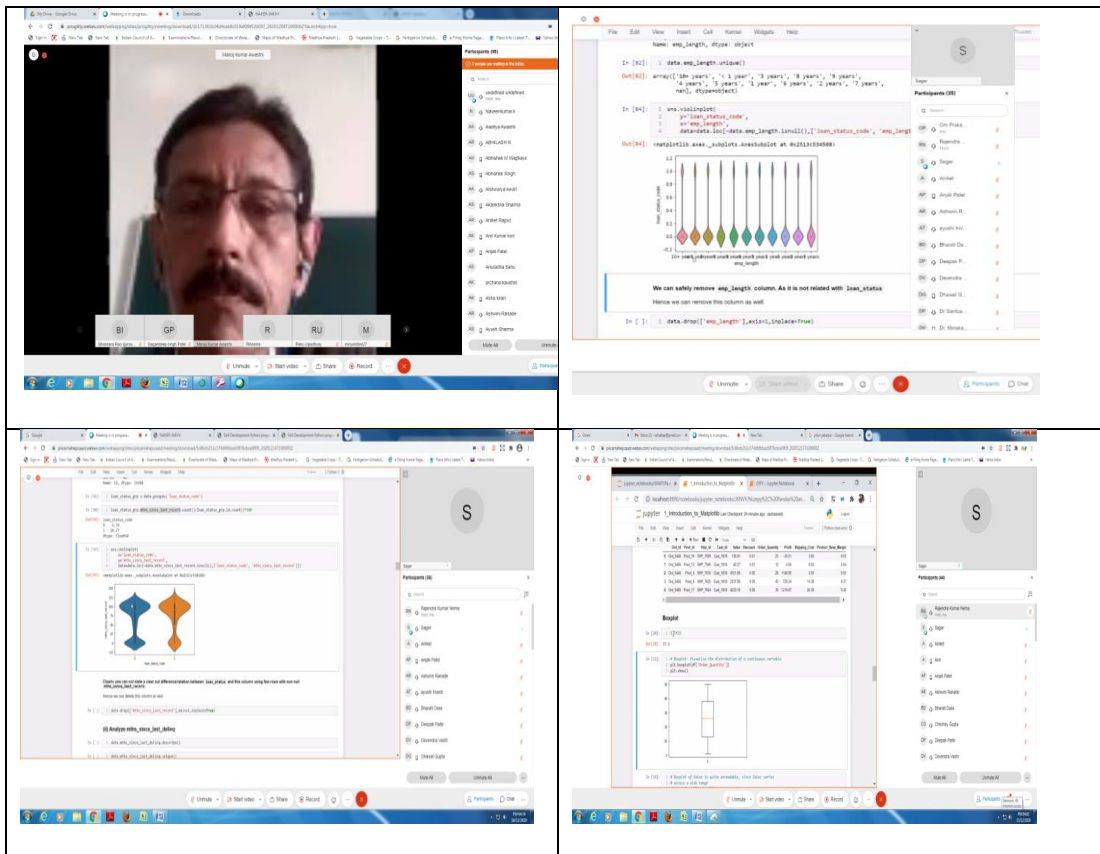
**Plate 4: Introducing Remote Sensing and GIS to post graduate students**

## 2.5 Training on Python programme:

Registration of 274 participants received and finally 124 were regularly attend the course and other activities. By learning python the participants became capable for advance training and now can use this language for short programming

Distribution of participants

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

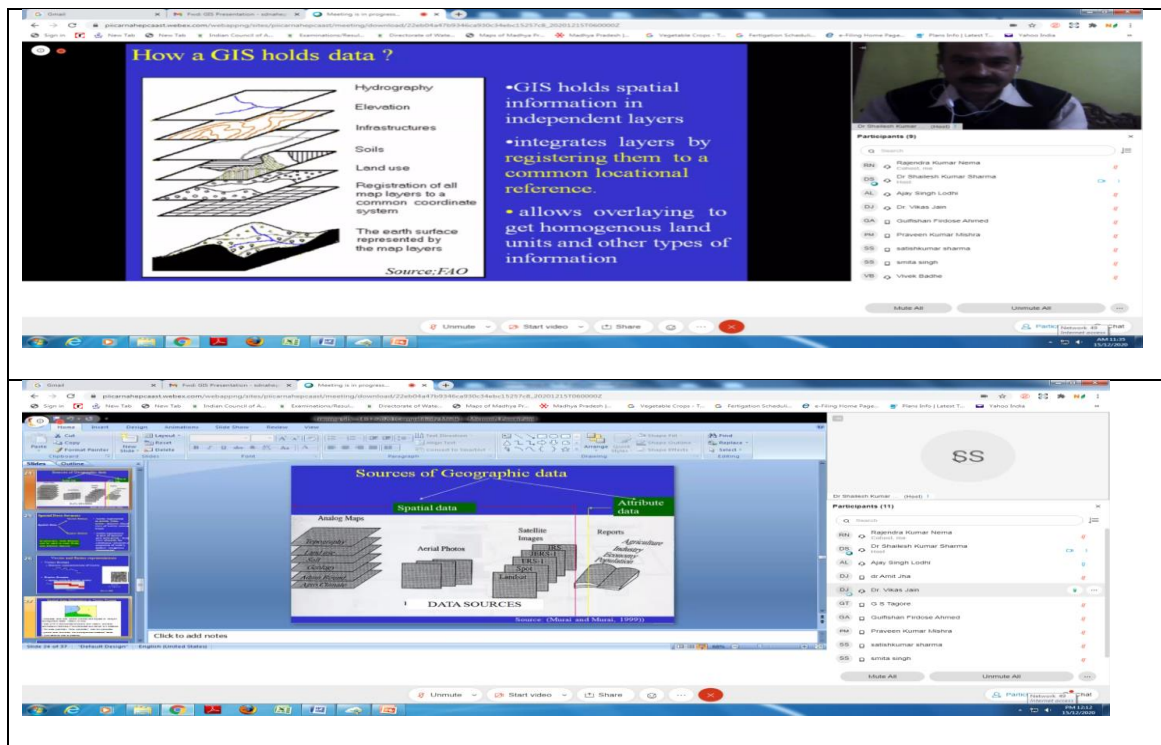


**Plate 5: Python training program to resource persons and students**

**2.6 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) from 14/12/2020 to 15/12/2020 under NAHEP-CAAST, at College of Agricultural Engineering, JNKVV, Jabalpur. During this training 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.

Distribution of participants

Table 2.6 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	



**Plate 6: Capacity building of faculty for courses on Geo informatics for agriculture Graduates**

**2.7 Hands on training on Geo-informatics:** Offline training entitled “Remote Sensing & Geographical Information System” for Faculty. It was held on 16<sup>th</sup> Dec to 18<sup>th</sup> Dec 2020, under the guidance of **Dr. S. K. Sharma**. 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. Training certificates were issued to the participants. Total 9 participants attend the meeting.

Distribution of participants

Table 2.7 Hands on training on Geo-informatics									
Gender	Number of Participants					% of participants in diff. category			
	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



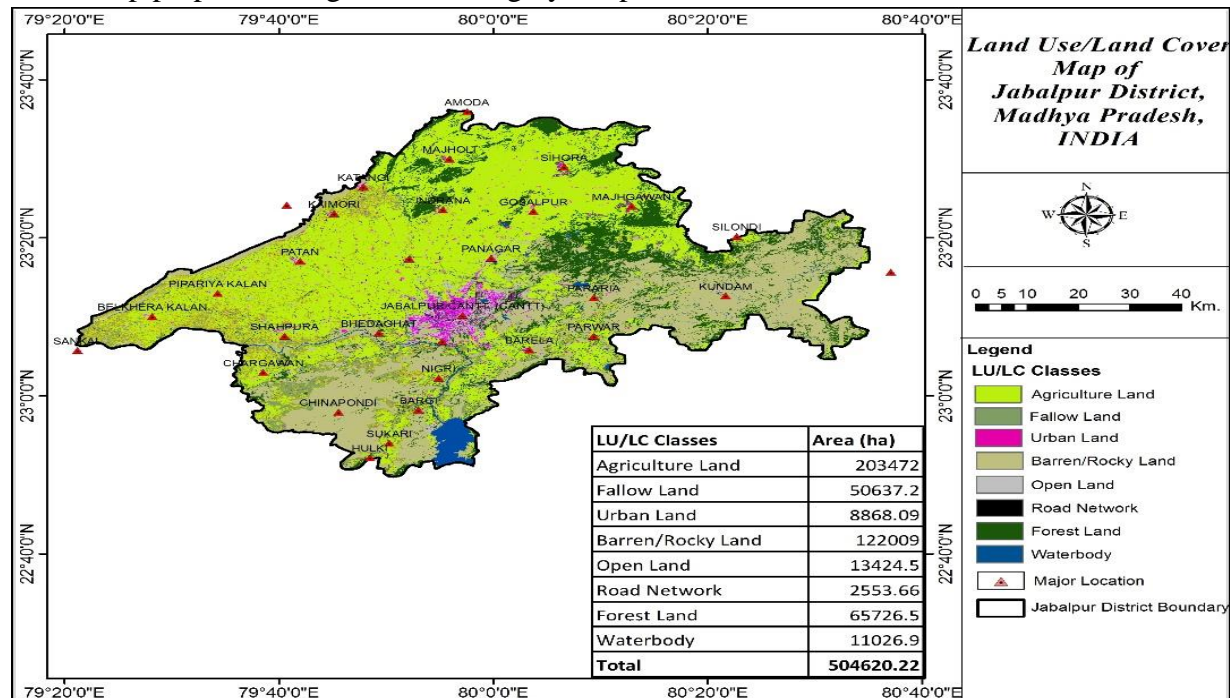
**Plate 7: Hand on training for Geo informatics**

### 3. Techniques for integration of spatial and ground data

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

- Watershed prioritization
- Fall Army Worm infestation in maize crop
- Assessment of soil quality index
- Brown plant hopper infestation in paddy
- Variation of spectral finger prints of major Rabi crops
- Ground Water potential zoning
- Carbon sequestration evaluation of Orchards
- Characterization of Orchards
- Groundwater estimation for river revival
- High temperature stress in Chickpea

**3.2 Precision and Accuracy of data maps:** The satellite data were procured for the preparation of thematic maps. The Land use/land cover map of Jabalpur district was prepared using fine resolution (10 m) Sentinel-2 imagery. This map will be compared with land use/land cover map prepared using Landsat imagery of spatial resolution of 30 m.



**Fig 1 : LU/LC classification of Jabalpur district**

**3.3 Students Research Projects:** The student undergoing master and doctoral degree program have been involved to undertake research project work on following topics. The details of research topic student involved, advisor for guidance, objectives and progress of work are presented below.

**Table 3.3.1 Involvement of students for post graduate research under NAHEP theme**

<b>S. No</b>	<b>Topics</b>	<b>Student</b>	<b>Department</b>	<b>Advisor</b>	<b>Course</b>
1	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	Department of Plant Physiology	Dr. R. Shiv Ramakrishnan	Ph. D.
2	Computation of carbon sequestration of orchards in Jabalpur district using Remote Sensing and GIS	Shreesty Pal	Fruit Science, Department of Horticulture	Dr. S. K. Pandey	Ph. D.
3	Characterization of orchards in Jabalpur district using GIS and remote sensing	Govind Madariya	Fruit Science, Department of Horticulture	Dr. S. K. Pandey	M.Sc.
4	Characterization of fall army worm (FAW) infestation in maize crop through ground based hyperspectral remote sensing under field conditions.	Kumari Pragya	. Department of Entomology,	Dr. S. B. Das, Principal	Ph. D.
5	Assessment of Spatial Recharge Quantum	Ayushi Trivedi	Department of Soil and	Dr. M. K. Awasthi	Ph. D.

	Requirement for Revival of Kanari River		Water Engineering		
6	Ground Water Potential Zoning in Ken River Basin using RS and GIS	Deepak Patle	Department of Soil and Water Engineering	Dr. M. K. Awasthi	Ph. D.
7	Assessment of Groundwater Potential Zones and planning for vulnerable zones by using RS and GIS	Neelam Bunkar	Department of Soil and Water Engineering	Dr. R. K. Nema	Ph.D
8	Spectral Characteristics of Wheat as Influenced by Differential Nitrogen Levels	Payal Soni	Department of Soil Science and Agricultural Chemistry	Dr. G.S. Tagore	M.Sc.(Agri.)
9	Assessment of Soil Carbon Footprints in Dominant Cropping System of Madhya Pradesh Using Hyper Spectral Remote Sensing and GIS	Rajneesh Khargharia	Department of Soil Science and Agricultural Chemistry	Dr. G.S. Tagore	M.Sc. (Agri.)



**Table 3.3.2 Progress work in Post Graduate Research**

<b>S. No</b>	<b>Title</b>	<b>Objective</b>	<b>Progress</b>
1	Plant growth regulators mediated amelioration of high temperature stress in chickpea by studying spectral reflectance pattern of canopy through hyperspectral sensors in chickpea	<ol style="list-style-type: none"> <li>1.To quantitatively assess the high temperature stress in chickpea plants using hyperspectral remote sensing</li> <li>2.To test the possibility of application of some bioregulators in improving growth, Leaf Area Index, biomass partitioning and yield under high temperature stress condition</li> <li>3.To analyze physio-biochemical alterations to gain insight into the mechanisms of bio-regulators induced high temperature stress tolerance.</li> <li>4.Characterization of efficiency of plant growth regulator for high temperature stress mitigation in chickpea through ground based hyperspectral remote sensing.</li> </ol>	<ul style="list-style-type: none"> <li>• Literature mining and research gap identification work is completed</li> <li>• Dose of salicylic acid and thiourea has been finalized</li> <li>• Experiment has been laid out in the field</li> <li>• Pre sowing observation on soil nutrient analysis and seed germination analysis has been done</li> <li>• Data of vegetative stage at 30 Days after sowing has been recorded.</li> </ul>
2	Computation of carbon sequestration of orchards in Jabalpur district using Remote Sensing and GIS	<ol style="list-style-type: none"> <li>1.Estimation of above-ground carbon sequestration of orchards using satellite data</li> <li>2.To find out the relationship between the amount of above ground carbon sequestration and vegetation indices from the data obtained through satellite</li> </ol>	Hands on training for digitization, pre- processing and classification of image using satellite data
3	Characterization of orchards in Jabalpur district using GIS and remote sensing	<ol style="list-style-type: none"> <li>1.To assess orchard area in Jabalpur district.</li> <li>2.Identification of different crops of orchards.</li> </ol>	Landsat data downloading, Training on “Basics of satellite image processing”, Digitization, Pre-processing and Classification of image

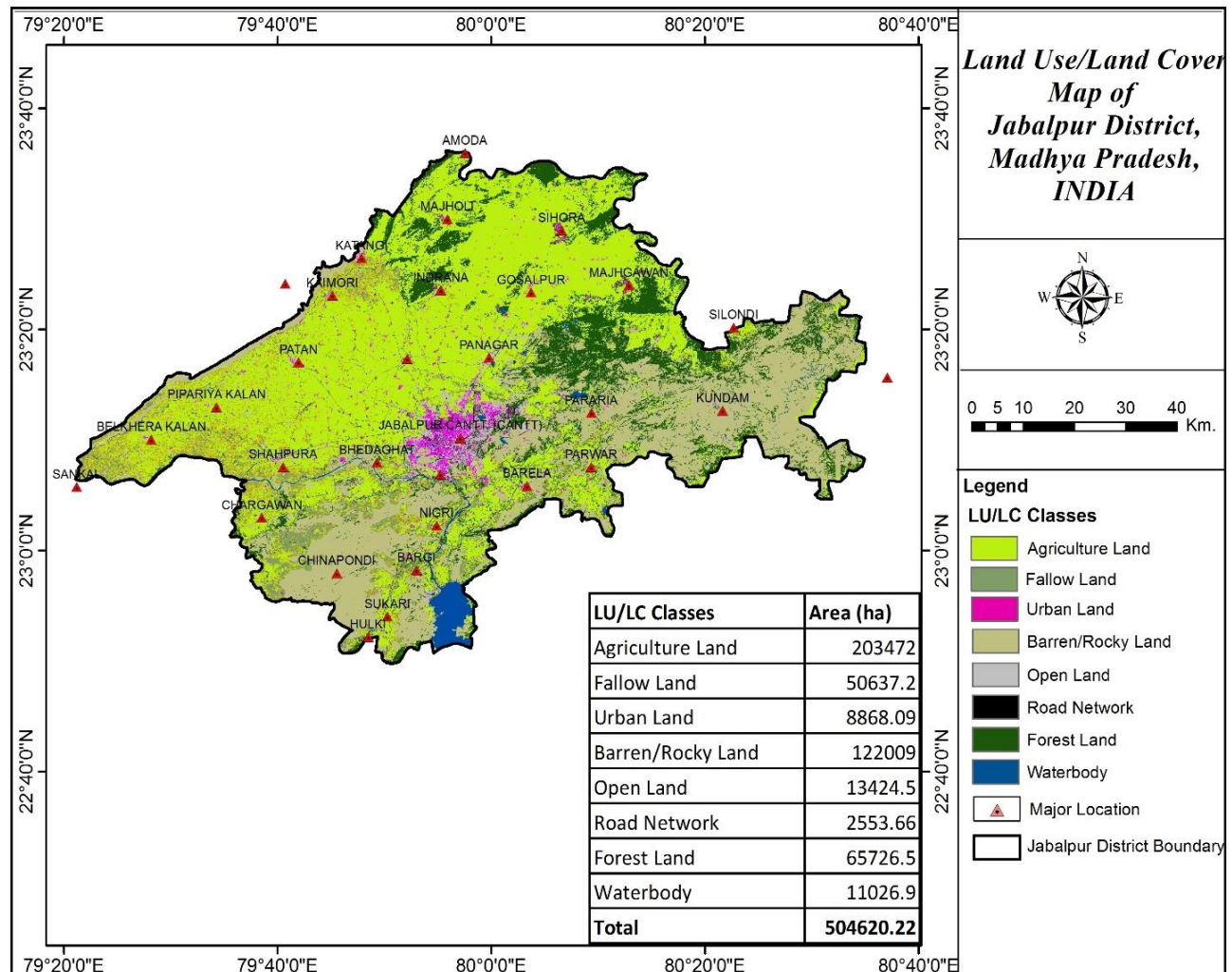
4	Characterization of fall army worm (FAW) infestation in maize crop through ground based hyperspectral remote sensing under field conditions.	<ol style="list-style-type: none"> <li>1.To characterise spectral signatures of FAW infested maize</li> <li>2.Derive hyperspectral vegetation indices to assess FAW damage levels in maize with spectral bands sensitive to the pest infestation</li> <li>3.To establish a relationship between FAW infestation gradient with changes in leaf chlorophyll, nitrogen &amp; relative water content and spectra in maize.</li> <li>4.Determination of Economic Threshold Level for Fall Army Worm</li> </ol>	<ul style="list-style-type: none"> <li>• Finalization of synopsis and plan of work for the research trial</li> <li>• Collection of review of literature</li> <li>• Enlisting of inputs required for conducting the research trials</li> <li>• Finalization of the required equipment's, compilation of their specifications and submitted to PI</li> <li>• Collection of FAW larvae from field</li> <li>• Mass rearing of FAW in the laboratory</li> <li>• Finalization of layout with area and net house requirements</li> </ul> <p>Finalization of specifications of the net house and processing for their procuremen</p>
5	Assessment of Spatial Recharge Quantum Requirement for Revival of Kanari River	<ol style="list-style-type: none"> <li>1.Delineation and Characterization of Kanari river watershed.</li> <li>2.Finding out causes of flow ceasation in the river.</li> <li>3.Determination of aquifer space to accommodate recharge water</li> <li>4.Identification of location of recharge sites for WHS</li> <li>5.Computation of water reach time and its longevity at the river site</li> </ol>	<ul style="list-style-type: none"> <li>• Identification of Kanari river watershed using SOI toposheet and Google Earth Pro</li> <li>• Validation the tracked river by ground truthing</li> <li>• Questionary survey for understanding the actual situation of the area</li> <li>• Delineation of Kanari river watershed using ERDAS Imagine and ArcGIS software</li> <li>• Delineation of sub watershed using ArcGIS software</li> </ul>
6	Ground Water Potential Zoning in Ken River Basin using RS and GIS	<ol style="list-style-type: none"> <li>1.To generate the various thematic maps using spatial data</li> <li>2.To identify the groundwater potential zones</li> <li>3.To identify the favorable sites for artificial groundwater recharge</li> <li>4.To suggest the suitable recharging structures for enhancing groundwater potential</li> </ol>	<ul style="list-style-type: none"> <li>• Selection of study area</li> <li>• Collection of Toposheets</li> <li>• Georeferencing of Toposheets</li> <li>• Processing of DEM datasets</li> <li>• Preparation of DEM map for study area</li> </ul>

7	Assessment of Groundwater Potential Zones and planning for vulnerable zones by using RS and GIS	<ol style="list-style-type: none"> <li>1.To prepare thematic map by using Remote sensing and Geographical information system</li> <li>2.To optimize the assigned weights of parameters using Saaty's Analytical Hierarchical Process (AHP)</li> <li>3.To delineate the groundwater potential zones by developing indices</li> <li>4.To suggest management plan for augmenting the groundwater resource in the vulnerable zones</li> </ol>	<ul style="list-style-type: none"> <li>• Preparation of slope map, Drainage density map, Soil map, Geology map, Geomorphology map, Lineament map, Land use land cover.</li> <li>• Exploration of weightage for different themes.</li> </ul>
8	Spectral Characteristics of Wheat as Influenced by Differential Nitrogen Levels	<ul style="list-style-type: none"> <li>• To assess leaf spectra of crop at different critical stages</li> <li>• To identify best level of nitrogen for enhance its use efficiency</li> </ul>	<ul style="list-style-type: none"> <li>• Experiment is planned</li> <li>• Layout and Plots are prepared</li> <li>• Dose of N calculated and fertilisers applied</li> <li>• Wheat crops is sown and Irrigation applied</li> </ul>
9	Assessment of Soil Carbon Footprints in Dominant Cropping System of Madhya Pradesh Using Hyper Spectral Remote Sensing and GIS	<ul style="list-style-type: none"> <li>• To assess the carbon fraction/pools in soils</li> <li>• To calibrate the spectra for the assessment of carbon footprint</li> </ul>	<ul style="list-style-type: none"> <li>• Study is planned and sampling strategy is prepared using ArcGIS</li> <li>• Sampling sites generated using satellite data and GIS</li> </ul>

#### 4. Development of user friendly spatial data products.

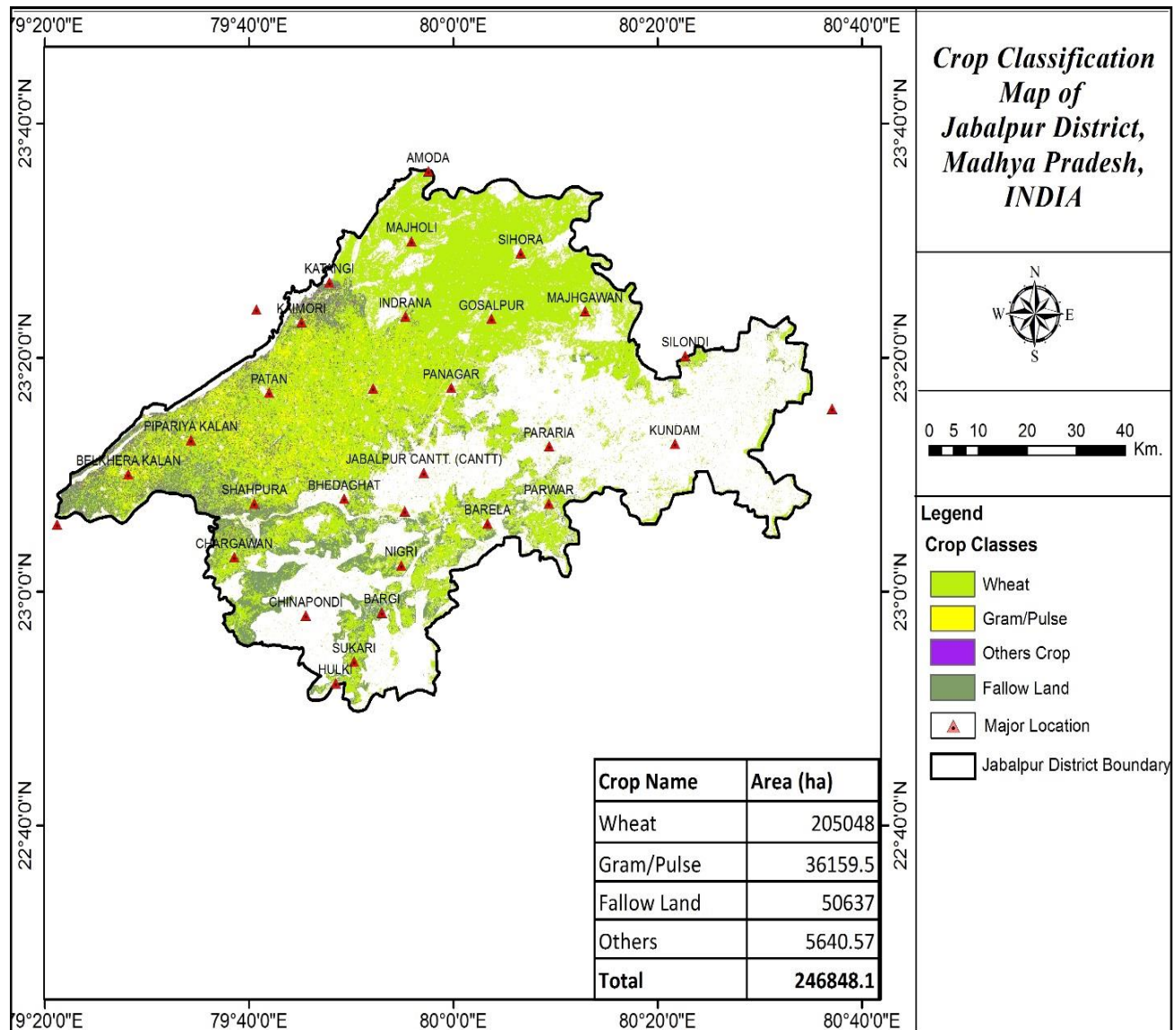
##### 4.1 Preparation of theme based map

**4.1.1 LULC classification map of a district:** Land use /land cover map is prepared using Sentinel-2 imagery of the Jabalpur, district Madhya Pradesh, India. Classification is performed by using Unsupervised Classification techniques. The classified image for 2020 was produced using the Sentinel data set. 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. The land-use categories for 2020 and their statistics are listed in Table 2.



**Fig 2 : LU/LC classification of Jabalpur district, Feb 2019**

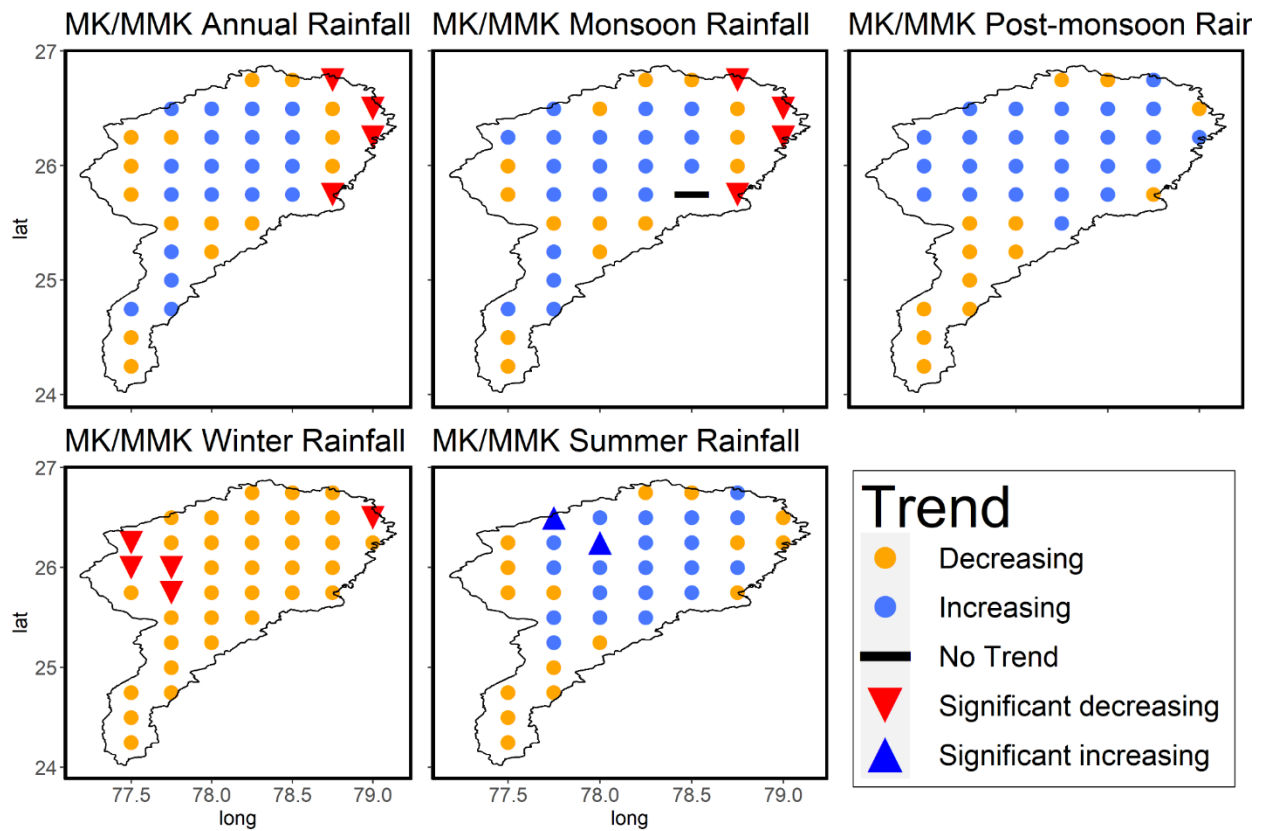
**4.1.2. Crop Classification map of a District :** A Crop classification map has been prepared using sentinel 2 data which comprised 13 spectral bands for this study only 4 bands (NIR, Red, Blue and Green) were used. For February 2019 classified maps shows that, agricultural land of Jabalpur district having wheat crop 83.07 %, Gram/ Pulses 14.64 % and other crop (2.28%).



**Fig 3: Crop classification of Jabalpur district, Feb, 2019**

**4.1.3. Spatial and temporal analysis of seasonal and annual rainfall :** The study was taken to analyze regional level long term trend analysis of rainfall, rainy days, and drought over the Sindh

river basin using 119 years daily rainfall data (1901-2019). The nonparametric Mann-Kendal and modified Mann-Kendall test was used to analyze the trend of rainfall, rainy days, and Standard Precipitation Index (SPI) series of different timescales (1, 3, 6, 9, and 12-month) at a 95% confidence level. The trend analysis of rainfall and rainy days showed a significant decreasing trend for the north-eastern part of the basin (part of Bhind District). 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 (38 grids) the basin have shown decreasing trends for rainfall and rainy days during the winter season. The findings of this study will provide assistance to the planner for regional level planning and implementing a sound policy against drought in the Sindh river basin.



**Fig 4 : Grid wise trend for annual and seasonal rainfall analysis for the Sindh river basin**

#### 4.2 Preparation of integrated map for decision making

The process of preparation of various thematic maps is under progress for the decision making related to identification of ground water potential zone.

## **5. Work progress under Equity Action Plan (EAP)**

### **5.1 To identify means to attract students to higher agriculture Education**

5.1.1 The glory of modern agriculture was introduced in the form of question and answer to the students at the outset of registration of the awareness program on the eve of agriculture education day on December 3<sup>rd</sup> 2020. Total participants were 2088 belongs to 67 schools from Jabalpur division. 97 students participated in essay writing and slogan competition titled “contribution of modern agriculture in building the self reliant India”

5.1.2 An awareness programme on RS and GIS was organised for school childrens from class 10<sup>th</sup> to 12<sup>th</sup>. Subject of RS and GIS was introduced in a simplified manner through PowerPoint presentation on interactive mode. Total participants were 107 from different schools namely Christ Church girls, Christ Church boys, Saint Aloysius and Saint Joseph Convent School. The program was liked by the students and they were interested in more program of larger duration.

### **5.2 Identification of weakness in students and remedial steps**

Two programs were organized one on spoken English and another on writing skills. The programs were for 10 days duration each. Pre and post assessment test were conducted to evaluate the weakness and performance after incorporating remedial steps.

#### **5.2.1 Improving Language Competency through Capacity Building in Spoken English**

Capacity-building in spoken English was organised 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 organised from Nov 23<sup>rd</sup> to Dec 2<sup>nd</sup> 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 belongs 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 test 1 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

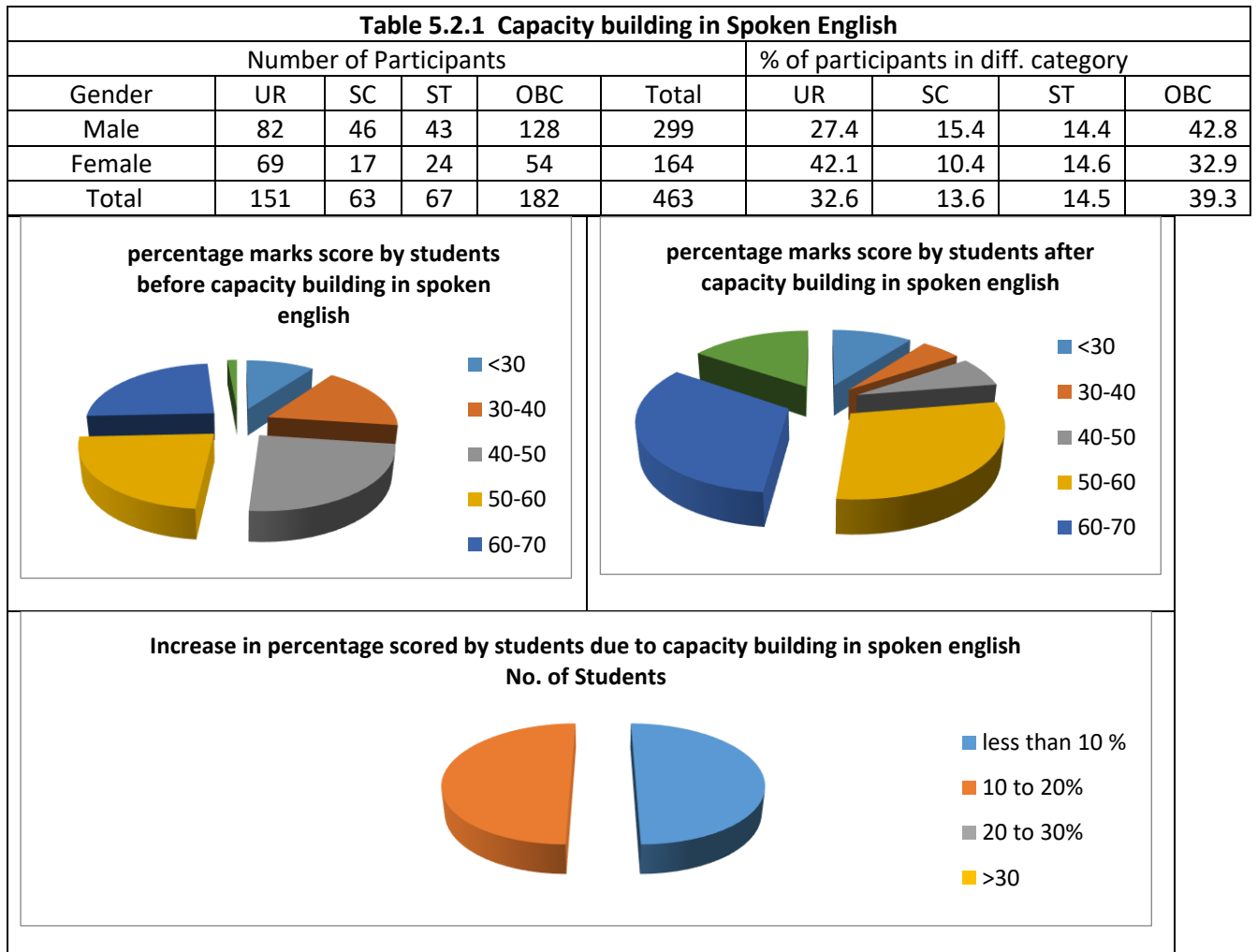
to 60%, 19 obtained 61 to 70% and 9 obtained more than 71% marks. . The participants have shown in significant improvement in mass as well as individually.

In both the test 19 participants were common and 14 participants out of them have shown 10 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 improvement in regular participants have shown a enthusiasm for further continuation of such program.

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

### Distribution of Participants





### 5.2.2 Improving Language Competency through Capacity Building in Writing Skill:

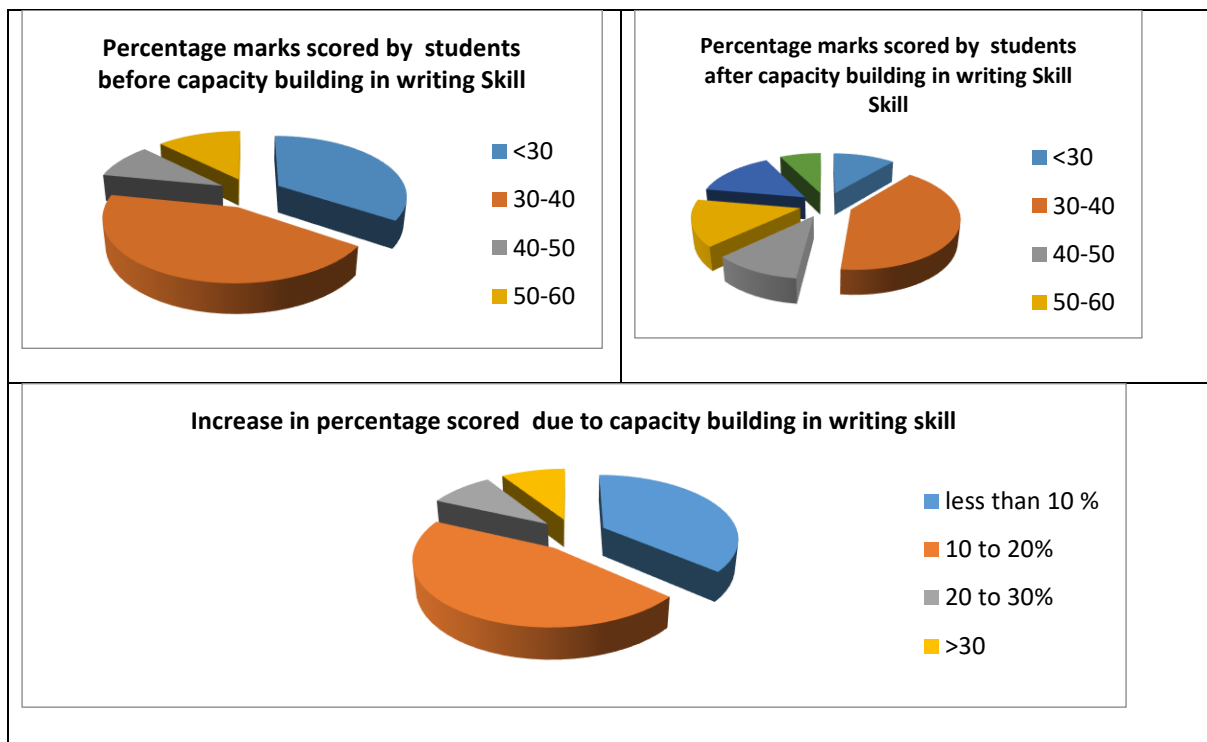
Capacity building in writing skills was organised to introduce learners to various strategies of formal written communication and to enhance learners confidence and ability to communicate effectively in writing in a variety of situations. The online communicative module on writing skill was organised from Dec 07<sup>th</sup> to 18<sup>th</sup> 2020. Total 149 candidates were registered for the program out of which 65.10 % were male and 34.9 % were female. The candidates belongs 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.

#### Distribution of Participants

Table 5.2.2 Capacity building in Writing skill									
Gender	Number of Participants					% of participants in diff. category			
	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



### 5.3 Opportunity to upgrade the domain knowledge of young faculty

- i. Python training program was organized with effect from Dec 08<sup>th</sup> to 17<sup>th</sup> Dec, 2020 for RA, SRF, YP2, PG, Ph.D. Students and Faculty Members. In all 274 registered themselves from the program but there participation ranged between 39 to 120. Out of registered candidate 50.3 % belongs to general followed by OBC (32.85%), SC (12.04%) and ST (0.05%). Out of total participants 65.33% were found to be male and 34.67% female.

**5.4** Training com orientation on Geoinformatics was organized from Dec 14<sup>th</sup> to 18<sup>th</sup>, 2020.

Total 9 candidate attended the program.

### 5.5 A three tier grievance Redress mechanism.

Grievance redress mechanism cell is working in College of Agriculture and Agricultural Engineering and at the university level.

### 5.6 Labor management plan.

The necessary advisory have already been issued to assistant engineer, civil works of different colleges by the Executive Engineer of university

## 6. Work progress under Environmental Sustainability Plan (ESP)

### 6.1 Safety Standards at Laboratories as per ESP

S.No	Safety Standards
1	Design & Construction <ul style="list-style-type: none"> <li>Sufficient space &amp; ventilation</li> </ul>
2	Electric supply & safety <ul style="list-style-type: none"> <li>Continuous supply of electricity with safety standards</li> </ul>
3	Fire safety measures <ul style="list-style-type: none"> <li>Fire extinguisher</li> <li>Mock trails</li> <li>Information boards</li> </ul>

### 6.2 Environment Ecofriendly Infrastructure / Best Practices adopted

S.No.	Category	Activity	Quantity( No./ area / unit)
1	Reduce the energy	Yes	Use of LED
2	Ecofriendly constructions	Yes	Sufficient ventilation, Water Harvesting units
3	Roof top solar system	Yes	Roof top solar system already installed (215 KWp, 190 KWp and 300 KWp)

### 6.3 Courses/ Workshop / Trainings / Awareness Programme

Activities	Proposed (No.)	Themes	Completed
Trainings	04	i. Road to Reach For NABL ACCREDITATION as Per ISO 17025:2017 ii. Rain water harvesting & its efficient use iii. Promotion of soil health iv. Food safety & standard Act 2006 v. Integrated farming system	Yes
Awareness programmes	01	Process of Registration of FASSAI license	Yes
Awareness Advisory	01	Civil construction / renovation work – Colleges, Research & Farms	Yes

### 6.3.1 Training programs :

#### 6.3.1.1 Road to Reach For NABL ACCREDITATION as Per ISO 17025:2017

Date	Speaker ( Designation &Organisation)	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.

**Table 6.3.1.1 Road to Reach For NABL ACCREDITATION as Per ISO 17025:2017**

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

#### 6.3.1. 2 Rain Water Harvesting & Its Efficient Use

Date	Speaker ( Designation &Organisation)	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.

**Table 6.3.1.2 Rain water harvesting**

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

**6.3.1.3 Promotion of Soil Health**

Date	Speaker ( Designation &Organisation)	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

**Table 6.3.1.3 Promotion of soil health**

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

**6.3.1.4 Food Safety & Standard Act 2006**

Date	Speaker ( Designation &Organization)	Theme / Topic	Participants attended			Impact
			Total	Female	Male	
08.12.20 20	Dr. S.S. Shukla, Professor & Head , Food Science &Technology , JNKVV, Jabalpur	Food Safety & Standard Act 2006	13	05	08	Student got information regarding “Food Safety Its Measure, Regulations standard Act ” &rated excellent experience of the graphical informative lecture

**Table 6.3.1.4 Food safety and standard Act 2006**

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

**6.3.1.5 Integrated Farming System**

Date	Speaker ( Designation &Organisation)	Theme / Topic	Participants attended			Impact
			Total	Female	Male	
26.12.2020	Dr. P. B. Sharma Chief Agronomist, AICRP-IFS, JNKVV, Jabalpur	Integrated Farming System	20	09	11	Student got information regarding “IFS & its principles. Students got detail information about IFS and advised to aware farmers to enhance & adopt the IFS system

**Table 6.3.1.5 Integrated Farming System**

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

**6.3.1.6 Process of Registration of FASSAI License**

Date	Speaker ( Designation &Organisation)	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	19	06	13	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
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**Table 6.3.1.6 Process of Registration of FASSAI License**

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

#### 6.4 . ES Indicators (M&E)

ES Indicators	Proposed (No.)	Executed
<b>ES Indicator 1</b>		
Number of courses / seminars/ workshops / lectures on environmental aspects	02	02
<b>ES Indicator 2</b>		
Number of ongoing research projects in AUs involving environmental and sustainable aspects	05	05
<b>ES Indicator 3</b>		
ESP prepared and implemented (Yes / No)	Yes	Yes
<b>ES Indicator 4</b>		
Lab safety and fire safety measures	02	02
1. Plant Protection activities	Recommendation of pesticides recommended by Central Insecticide Board & Registration Committee ( GOI	Recommending pesticides approved by CIB & RC
<b>ES Indicator 5</b>		
Green technology themes adopted		
1.Water conservation measures	01	01
2.Energy conservation measures	01	01
3.Waste management measures	01	01
4.Plantation / Green taken up	01	01
5.Any other	-	-

## 6.5 Impact of ESP

S.No.	Proposed	Activities	Impact
1.	Reduction in electricity consumption	Replacing with LED bulbs, Solar lights, <i>etc</i>	Consumption reduced
2.	Rainwater water harvesting structures	Facilitated to increase water availability and supply and to overcome water stress situation in : Colleges , Hostels, Irrigated crop cultivated area	Water harvesting and recharge of ground water
3.	Compost pit	Quantity of waste converted into manure	Utilization of field wastes and its conversion into manure
4.	Plantation	Increase in plantation - its impact on microclimate in the campus	Improved greenery and surrounding environment
5.	Any other	-	-

## 6.6 Status of Awareness & Capacity Building Programmes at the end of third quarter

S.No.	Programme	December		Percentage (%)
		Proposed	Conducted	
1.	<b>Awareness Programme</b>	02	01	<b>50.00</b>
2.	<b>Capacity Building &amp; Training</b>	13	05	<b>38.46</b>
3.	<b>Awareness Advisory</b>	03	01	<b>33.33</b>
	<b>Total</b>	<b>18</b>	<b>07</b>	<b>38.88</b>



## 7. Expenditure statement upto Dec 2020

S. No.	Particulars	Expenditure	Remark
A.	<b>Goods &amp; Equipment</b>		
	Equipment, Plant & Machinery		<b>supply order has been issued</b> Workstation = 36,08,325=00
	Office Equipment		Multifunctional Photocopier=2,39,820
	Laboratory Equipment		
	Furniture & Fixtures		
	Computers & Peripherals		Desktop computer=5,66,244 B&W printer = 28,917 Colour printer=1,04,309
	Books & Journals		
B.	<b>Civil Works</b>		
	Minor repair & renovation work		Estimates are prepared
C.	<b>Human Capacity Building</b>		
	National Level Training		
	International Level Training		
	Short visits/Seminars		
	Meetings & Workshops		
D.	<b>Consultancy</b>		
	National Level Consultancies		
E.	<b>Recurrent Cost</b>		
	Travel expenses		
	Contractual Services	841980=00	
	Operational Costs	173943=25	
	Institutional Charges		
	<b>Total</b>	<b>1015923=25</b>	

## 8. Publications:

Pawar, P. S., 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 (NAAS rating 5.38)

DOI: <https://doi.org/10.20546/ijcmas.2020.912.327>



**NAHEP**



**National Agricultural Higher Education Project (NAHEP)  
Centre for Advanced Agricultural Science & Technology (CAAST)  
Skill Development to use spatial data for Natural Resource  
Management in Agriculture**



**College of Agricultural Engineering**

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**Madhya-Pradesh**

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