

## Contents

Objectives: .....	2
1. Administrative Activities .....	3
1.1 Creation of Facilities .....	3
1.2 Preparation of Training Schedule.....	6
1.3 Selection of Participants for CSDA Fellowship: .....	6
1.4 Recruitment of contractual staff.....	6
2. Capacity building programs.....	7
2.1 Training on Image processing using Python:.....	7
2.2 Awareness Programme on Use of RS & GIS:.....	8
2.3 Fundamentals of Artificial Intelligence and Machine Learning .....	9
2.4 Online Awareness Program on Grievance Redressal Mechanism (GRM): .....	10
2.5 First Annual Workshop .....	11
2.6 Exposure to RS & GIS Application in Agriculture:.....	12
2.7 Awareness program on Human Rights for Agricultural Students.....	13
2.8 Lectures on Spatial Data use in Agriculture: .....	14
2.9 Downscaling of climate data and different climate models for analysis.....	15
2.10 Introductory course on Mobile Based App: .....	16
2.11 World water day celebration: .....	17
2.12 Training program on thesis writing and online thesis evaluation: 3rd march 2021 .....	19
3. Financial Expenditure: .....	21
4. Develop user friendly spatial data products using identified technologies for policy makers, researchers, field workers and farmers. ....	22
4.1 Review Information related to Android based Mobile Application.....	22
5. Spatio-temporal rainfall variability analysis over the Madhya Pradesh .....	23
6. Hydrological Modelling of Banjar River Watershed using HEC-HMS .....	30
7. Soil map: .....	33
8. Geospatial Techniques for assessing recharge requirement regarding river revival .....	34

**ICAR-NAHEP- Center for Advanced Agricultural Science and Technology**  
**COLLEGE OF AGRICULTURAL ENGINEERING**  
**JNKVV, JABALPUR**  
**Progress Report Quarter Jan to March 2021**

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 is 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	Item Supplied
<b>Hyper spectral Spectro radiometer (350-2500mn)</b>	<b>In process</b>				
Spectro Radiometer	in process	Identified	Yes	Yes	
Drone With multispectral sensor and application equipment's.	in process	-		-	
Thermal Imaging Camera	in process	-		-	
Work Station	Prepared	Identified	Yes	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	Contract signed	Item Supplied
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			<b>issued</b>		
Wall Mounted Smart LED TV	Prepared	Identified	Yes	yes	-
Public Address System	in process	Identified	Yes	yes	-
Multi-function Photo Copier	in process	identified	yes	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>	<b>Item supplied</b>
GEO Positioning System	in process	Identified	yes	Yes	Yes
Hand held crop nitrogen sensor	in process	-		-	
Large format Plotter A0 Size	in process	-		-	
Drone Image Processing Software	in process	-		-	
ArcGIS, ERDAS, Visual MODFLOW,	in process	Identified	Yes	yes	
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 equipment's	in process	Identified		-	
Interactive LED display with Digital podium.	in process	-		-	
45 MP Cameras	in process	-		-	
CCTV Camera with control Unit	in process	Identified	Yes	yes	
AIR Conditioner	in process	Identified	Yes	yes	yes
Chlorophyll SPAD meter	in process	Identified	Yes	yes	
Line quantum PAR sensor with logger	in process	Identified	Yes	yes	
Soil moisture meter with sensor	in process	Identified		-	

Off line UPS	in process	-		-	
Canopy Analyzer	in process	Identified	Yes	Yes	Yes
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	Item supplied
Book Shelves	Prepared	Identified	yes	Yes	yes
Steel Rack	Prepared	Identified	yes	Yes	yes
Lab Stool	Prepared	Identified	yes	Yes	yes
Executive Table & Chairs	Prepared	Identified	yes	Yes	yes
Computer Table & chairs	Prepared	Identified	yes	Yes	yes
Steel Almirah	Prepared	Identified	yes	Yes	yes
File Cabinet	Prepared	Identified	yes	Yes	yes
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	Item Supplied
Desktop Computer	Prepared	Identified	yes	Yes	yes
Black & White, Color Printer	Prepared	Identified	yes	Yes	yes
Portable HDD, Storage Devises, 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/offline deliberations and training for students and faculty for various departments were conducted.

### **1.3 Selection of Participants for CSDA Fellowship:**

Students pursuing MTech. 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.

Total 16 Students have from different departments of University have applied for this fellowship, out of them total 12 students are selected.

### **1.4 Recruitment of contractual staff**

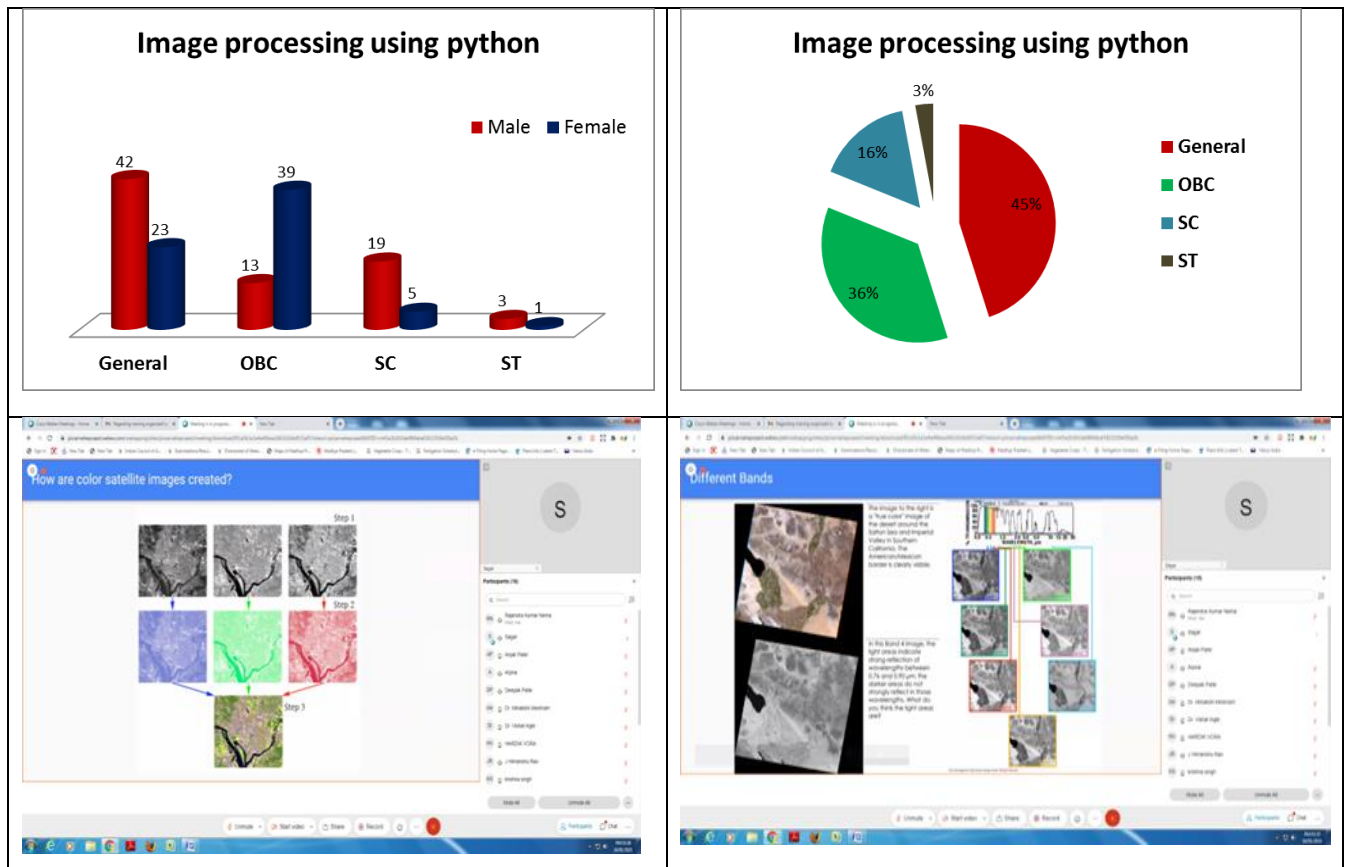
Appointment letters has been issued for RA (Big Data) at contractual position. Joining details are given below

<b>S. No</b>	<b>Name</b>	<b>Designation</b>	<b>Date of Joining</b>
1	Er. Alok Rajpoot	Research Associate	1/1/2021

## 2. Capacity building programs

**2.1 Training on Image processing using Python:** Five days online training program entitled “Image processing using python” was held on 11<sup>th</sup> Jan to 15<sup>th</sup> Jan 2021, under the guidance of Dr. M. K. Awasthi. The lecture was delivered by Mr. Sathish Singh. They discussed about the satellites images vs Normal images, Libraries specifically used for satellite images, Introduction of rasterio, 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 undergone attend the training on the subject.

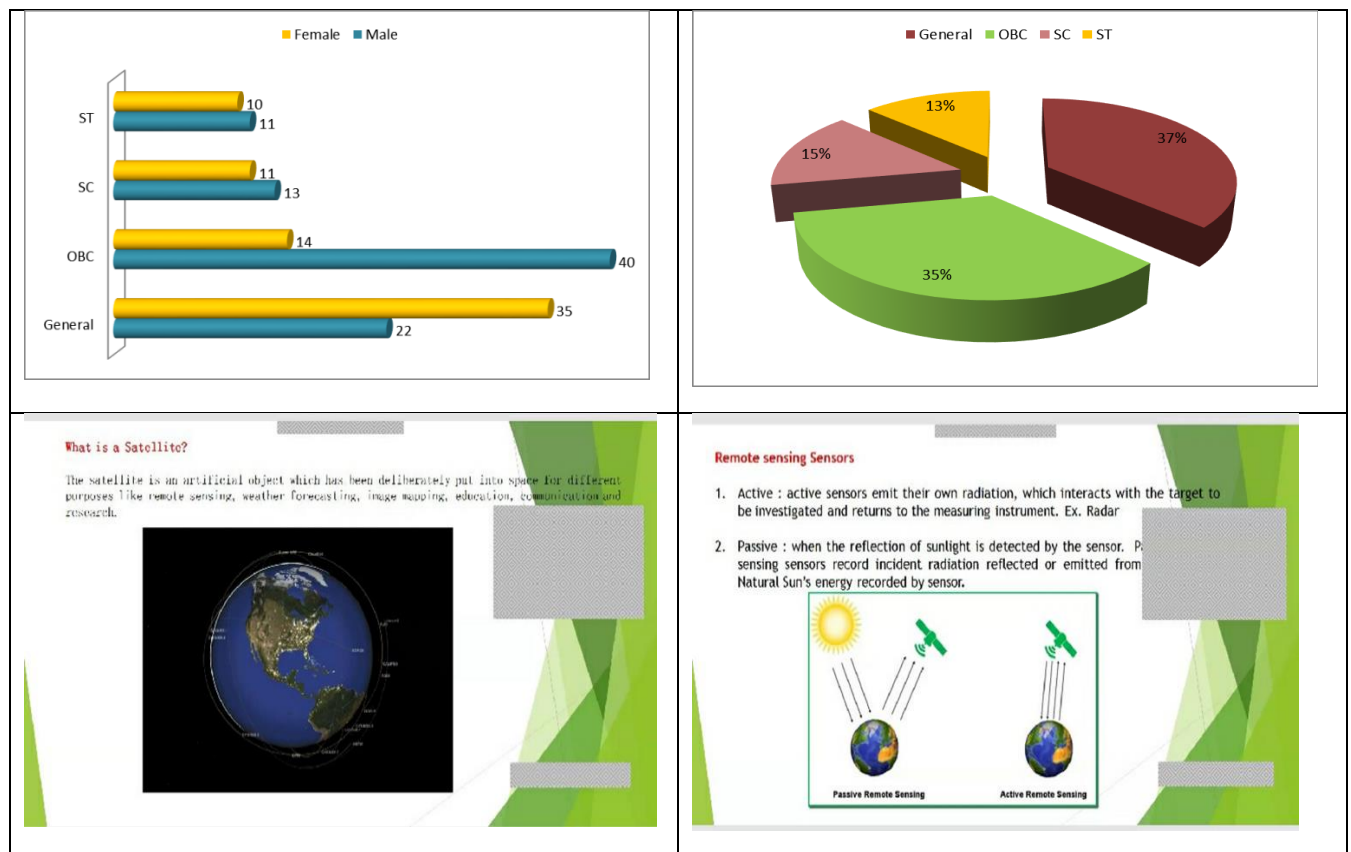
Table 2.1 Training on Image processing using Python									
Category	Number of Participants					% of participants in diff. category			
	General	OBC	SC	ST	Total	General	OBC	SC	ST
Male	42	13	19	03	77	55	17	25	3
Female	23	39	05	01	68	34	57	8	1
Total	65	52	24	04	145	45	36	16	3



**Plate 1: Shows the participation of student category wise and study material of python program**

**2.2 Awareness Programme on Use of RS & GIS:** An online training program entitled “Image processing using python” was held on 28<sup>th</sup> Jan 2021, under the guidance of Dr. M. K. Awasthi. The lecture was delivered by Dr. R. N. Shrivastava. They 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 and out of these eighty-one students have attended on training on the subject.

Table 2.2 Awareness program on use of RS & GIS									
Number of Participants						% of participants in diff. category			
Category	General	OBC	SC	ST	Total	General	OBC	SC	ST
Male	22	40	13	11	86	26	46	15	13
Female	35	14	11	10	70	50	20	16	14
<b>Total</b>	<b>57</b>	<b>54</b>	<b>24</b>	<b>21</b>	<b>156</b>	<b>37</b>	<b>35</b>	<b>15</b>	<b>13</b>



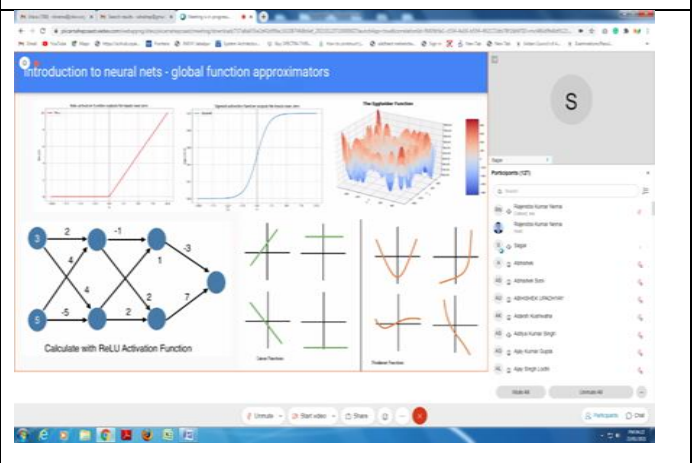
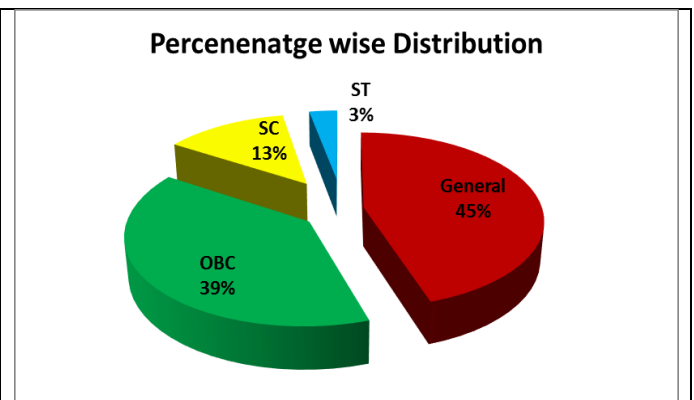
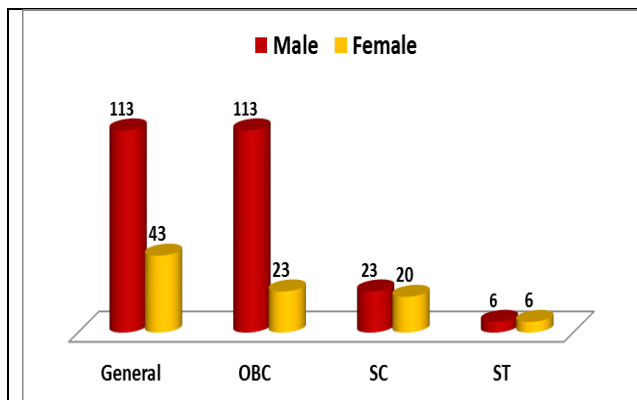
**Plate 2: Shows the participation of student category wise and slide presents on Use of RS & GIS**



**2.3 Fundamentals of Artificial Intelligence and Machine Learning:** Ten days online training program entitled “Image processing using python” was held on 21<sup>th</sup> Jan to 30<sup>th</sup> Jan 2021, under the guidance of Dr. M. K. Awasthi. The lecture was delivered by Mr. Sathish Singh. They discussed about Understanding - AI and Machine learning, Classification using ML algorithms (KNN, SVM, ANN), Data pre-processing using python, Introduction to deep learning, understanding convolutional neural networks, Deploying CNN for classification of aerial images, discussing recent trends in AI. Three hundred forty-seven participants registered for in fundamentals of artificial intelligence and machine learning and out of these two hundred ninety-four students have attended on training on the subject.

**Table 2.3 Fundamentals of Artificial Intelligence and Machine Learning**

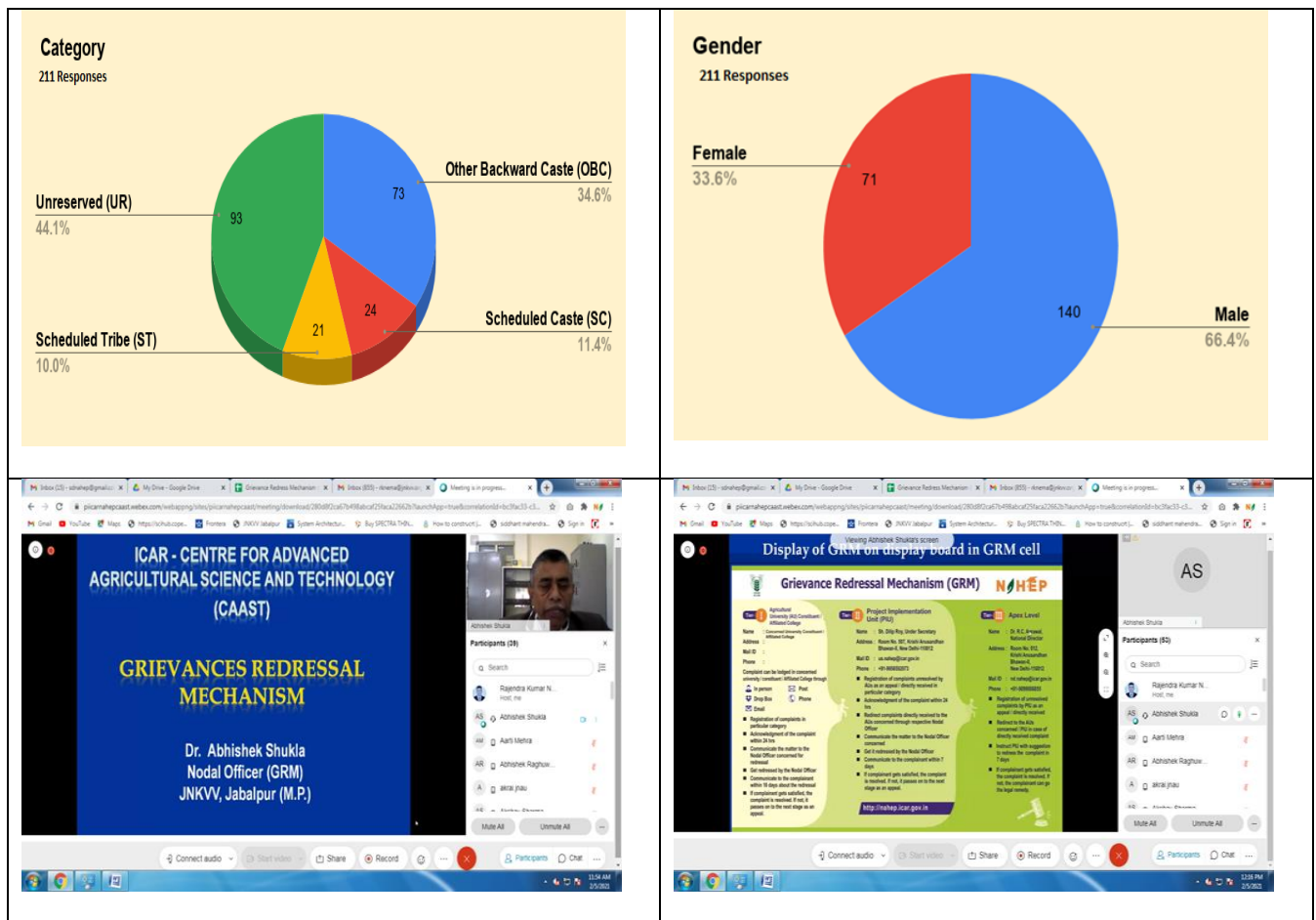
Category	Number of Participants					% of participants in diff. category			
	General	OBC	SC	ST	Total	General	OBC	SC	ST
Male	113	113	23	06	255	44	44	9	2
Female	43	23	20	06	92	47	25	22	6
<b>Total</b>	<b>156</b>	<b>136</b>	<b>43</b>	<b>12</b>	<b>347</b>	<b>45</b>	<b>39</b>	<b>13</b>	<b>3</b>



**Plate 3: Shows the participation of student category wise and slide presents Fundamental of AI & ML**

**2.4 Online Awareness Program on Grievance Redressal Mechanism (GRM):** Online awareness program entitled “On Grievance Redressal Mechanism (GRM)” was held on 5<sup>th</sup> 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 form, what can be the possible grievances and how grievance should be redressed by committee. How the person can approach, what are the point raised in front of redressed forum and how they mechanized. All these points will be discussed in awareness program.

Table 2.4 Awareness Program on Grievance Redress 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
<b>Total</b>	<b>93</b>	<b>24</b>	<b>21</b>	<b>73</b>	<b>211</b>	<b>44.1</b>	<b>11.4</b>	<b>10.0</b>	<b>34.6</b>



**Plate 4: Shows the participation of student category wise and slide presents in GRM**

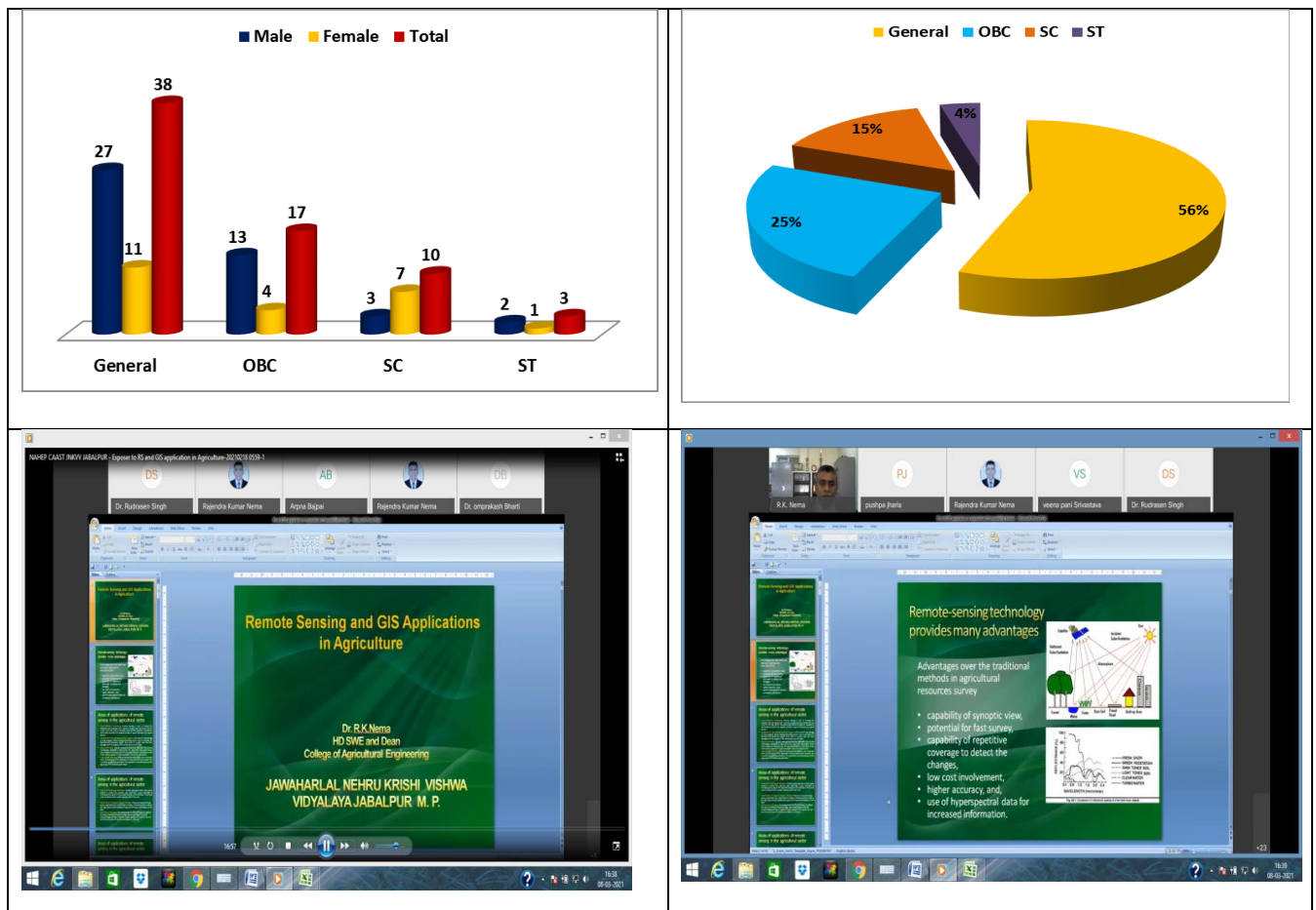
**2.5 First Annual Workshop:** The 1<sup>st</sup> Annual workshop was held on 12<sup>th</sup> February 2021 at Kotilya Hall, Agri-Business Management & Development, JNKVV, Jabalpur, under the chairmanship of Hon'ble Vice Chancellor, other dignitaries of JNKVV i.e. Dean Faculty, Director Research Services, Director Extension Services and Director ATARI also gave there immense presence in 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. As the detail discussion were carried out some salient points were emerged. Remarks were made by Nodal Officer of Monitoring & Evaluation Cell Dr. Dharendra 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.



**Plate 5: Shows the Photographs of First Annual Workshop**

**2.6 Exposure to RS & GIS Application in Agriculture:** Online program entitled “Exposure to RS & GIS Application in Agriculture” was held on 18<sup>th</sup> Feb 2021, under the guidance of Dr. R. N. Nema, PI, NAHEP. They 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 and out of these Fifty-three participants have attended the training.

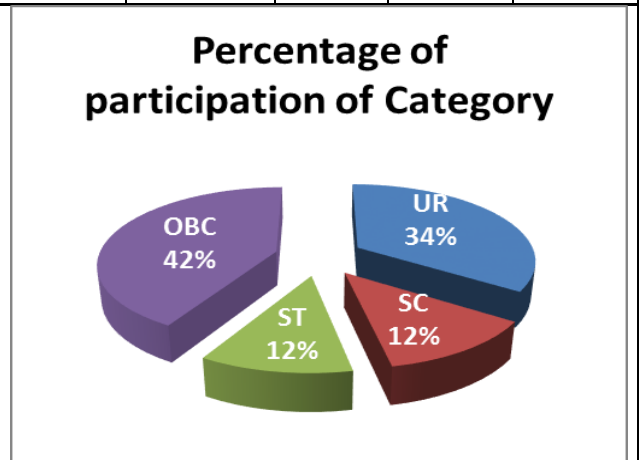
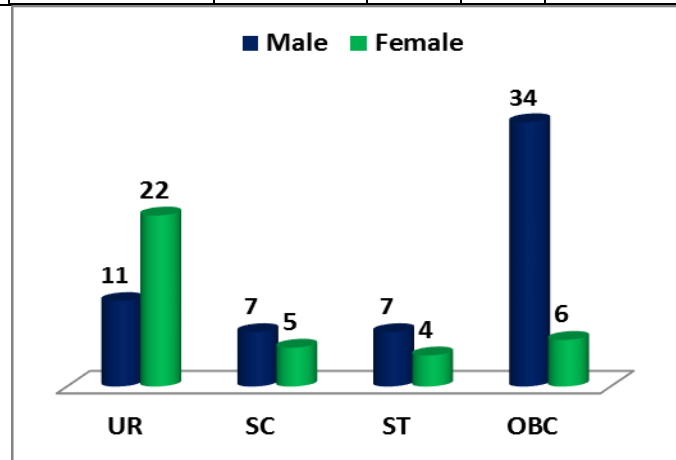
Table 2.6 Exposure to RS & GIS Application in Agriculture									
Number of Participants					% of participants in diff. category				
Gender	General	OBC	SC	ST	Total	General	OBC	SC	ST
Male	27	13	03	02	45	60	29	07	4
Female	11	04	07	01	23	48	17	30	5
<b>Total</b>	<b>38</b>	<b>17</b>	<b>10</b>	<b>03</b>	<b>68</b>	<b>56</b>	<b>25</b>	<b>15</b>	<b>4</b>



**Plate 6: Shows the participation of student category wise and slide presents**

**2.7 Awareness program on Human Rights for Agricultural Students:** One day Basic Awareness Program entitled “Human Rights for Agricultural Students was conducted by NAHEP. 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.

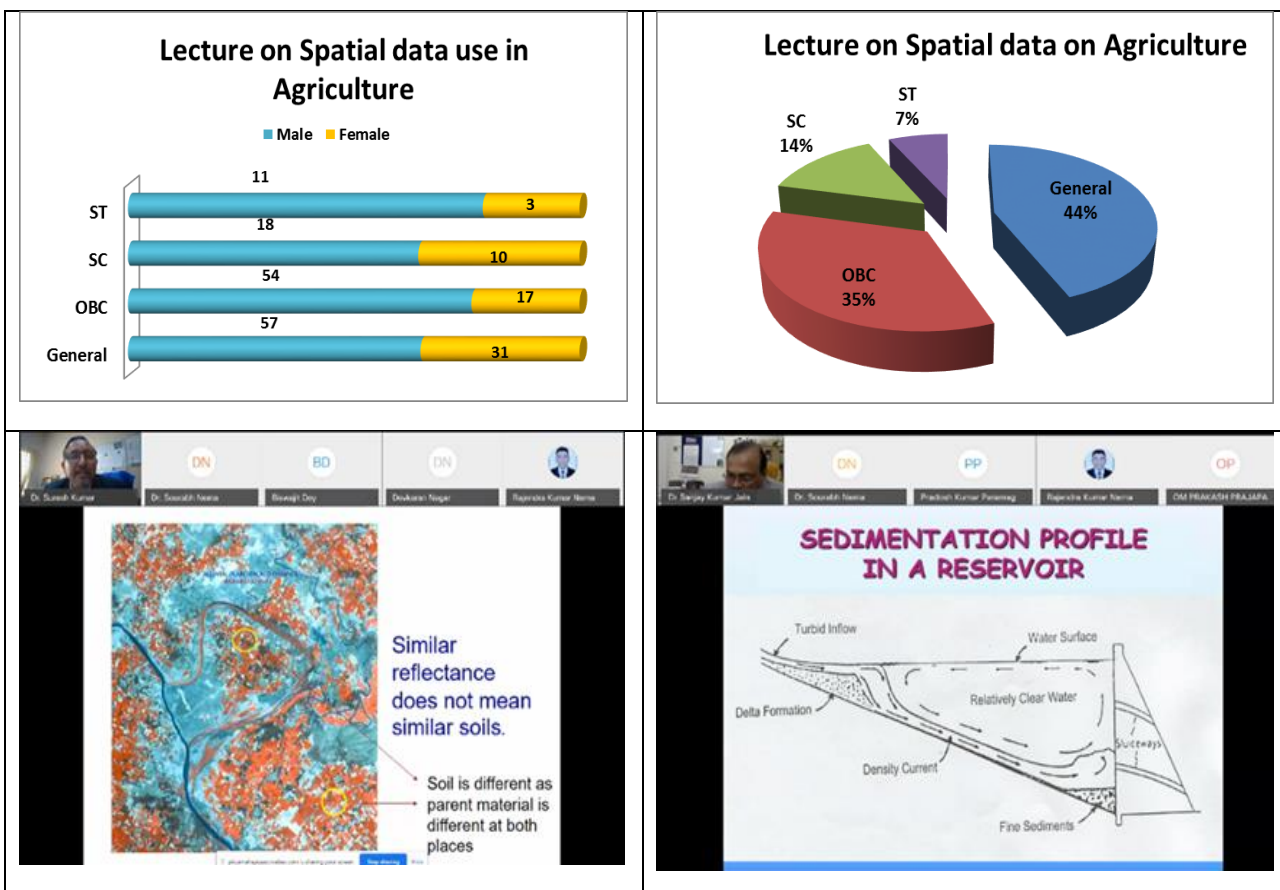
Number of Participants					% of participants in diff. category				
Gender	UR	SC	ST	OBC	Total	UR	SC	ST	OBC
Male	11	7	7	34	59	19	12	12	57
Female	22	5	4	6	37	60	13	11	16
Total	33	12	11	40	96	34	12	12	42



**Plate 7: Shows the participation of student & Hon’ble Chief Guest released the Manual for Human Rights**

**2.8 Lectures on Spatial Data use in Agriculture:** 5 days online program entitled “Lectures on Spatial Data use in Agriculture” was held on 8<sup>th</sup> Feb to 12<sup>th</sup> Feb 2021, under the guidance of Dr. M. K. Awasthi, Co-PI Skill Development Nationals. The lectures was delivered by guest Scientists from IIT, Roorkee, NIM Roorkee, IIRS Dehradun, and Dean JAU. They discussed different aspect of exposed the Basic of RS, Satellites Data & GIS, Hydrological application of remote sensing, Land use and land cover classification: Visual & Digital methods, crop discrimination and acreage estimation, RS in crop condition assessment: biotic and abiotic stress, Microwave RS in crop inventory, RS & GIS application in crop water requirement. Two hundred one participants registered for the course and out of these one hundred eighty students have undergone attend the training on the subject.

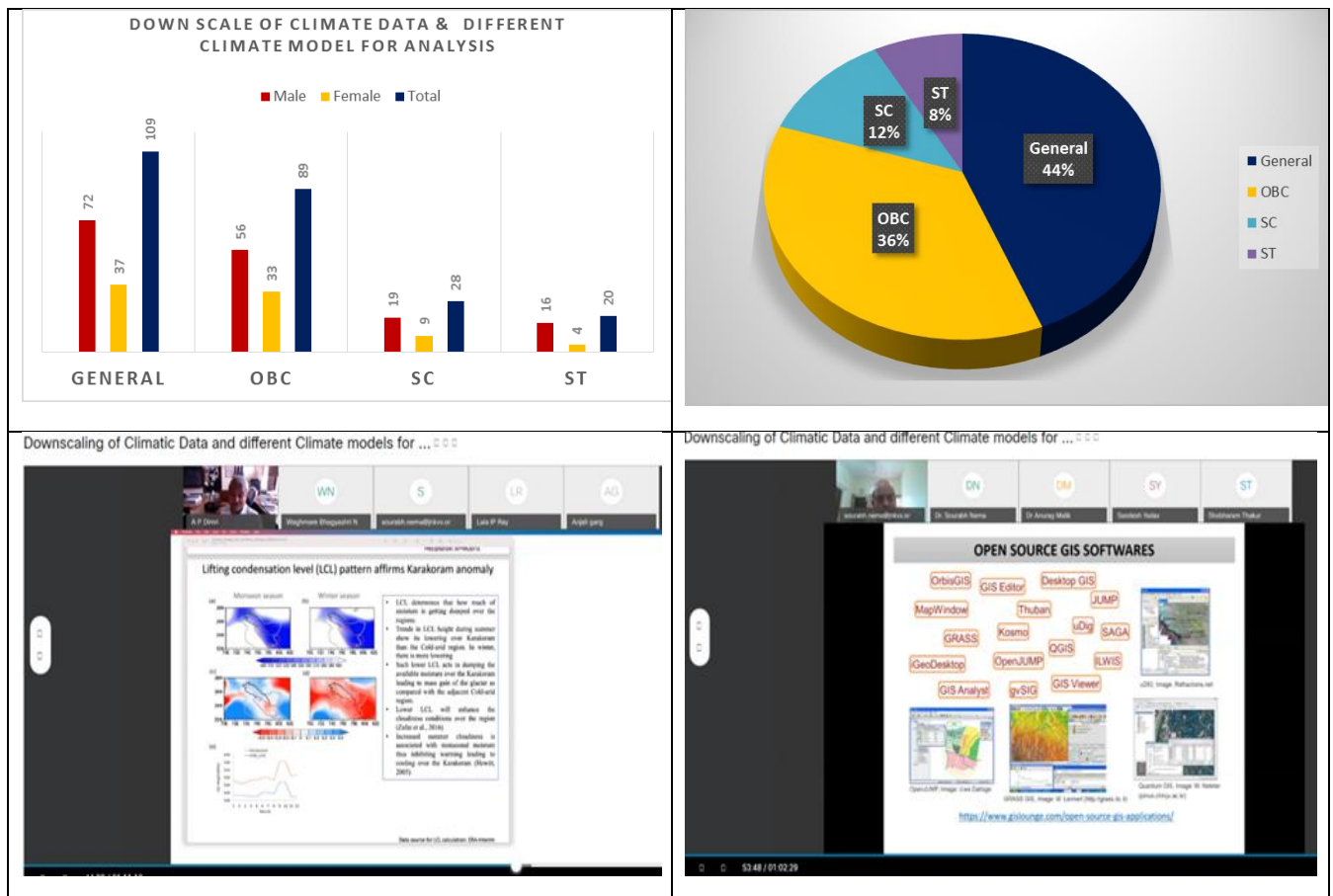
Table 2.8 Lectures on spatial data use in Agriculture									
Number of Participants					% of participants in diff. category				
Gender	UR	SC	ST	OBC	Total	UR	SC	ST	OBC
Male	57	54	18	11	140	41	38	13	8
Female	31	17	10	03	61	51	28	16	5
<b>Total</b>	<b>88</b>	<b>71</b>	<b>28</b>	<b>14</b>	<b>201</b>	<b>44</b>	<b>35</b>	<b>14</b>	<b>7</b>



**Plate 8: Shows the participation of student & the presentation slides on spatial data**

**2.9 Downscaling of climate data and different climate models for analysis:** 3 days online program entitled “Downscaling of climate data and different climate models for analysis” was held on 9<sup>th</sup> to 12<sup>th</sup> March 2021, under the guidance of Dr. M. K. Awasthi, Co-PI Skill Development Nationals. The lectures were delivered by guest Professor from School of Environmental Science, JNU, New Delhi, Dr. A.P. Dimri. He delivered on 9<sup>th</sup> and 10<sup>th</sup> of March and covered the topic “Different Climate Models (GCM/RCM) and their applicability in Agriculture, downscaling of climate data” and on 12<sup>th</sup> of March 2021 Dr Sourabh Nema, RA, NRM, JNKVV, Jbp delivered lecture on Down scale of Climate Data & different Climate Model for Analysis. Two hundred forty-six participants registered for the course and out of these one hundred twenty-three students have undergone attend the training on the subject.

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
<b>Total</b>	<b>109</b>	<b>89</b>	<b>28</b>	<b>20</b>	<b>246</b>	<b>44</b>	<b>36</b>	<b>12</b>	<b>8</b>



**Plate 9: Shows the participation of student & the presentation slides on Downscaling of climate data**

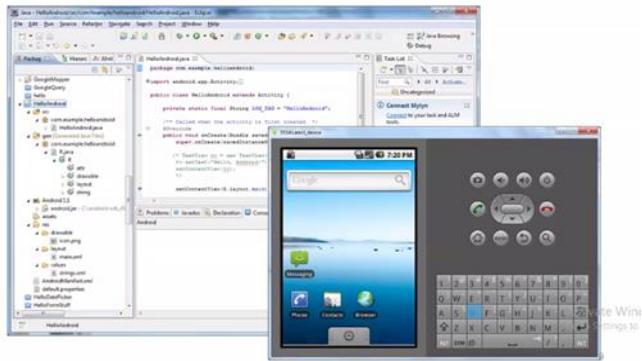
**2.10 Introductory course on Mobile Based App:** 3 days online program entitled “Introductory course on Mobile based app” was held on 09<sup>th</sup> to 11<sup>th</sup> Feb, 2021, under the guidance of Dr. A. K. Rai, Co-PI Product Development. The lectures were delivered by Vikram Singh Rajput, Database Developer, Center of Excellence, MAP\_IT. He delivered An Overview of Mobile Devices and Developing Mobile Applications, Scope of Mobile App, Development Environment, Overview of Android Versions & advanced system administration options in Mobile based app. Two hundred eighty-four participants registered for in mobile based app and out of these one hundred five students and faculties have attended on training on the subject.

Table 2.10 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
	143	29	22	90	284	50	10	8	32

### What is iOS

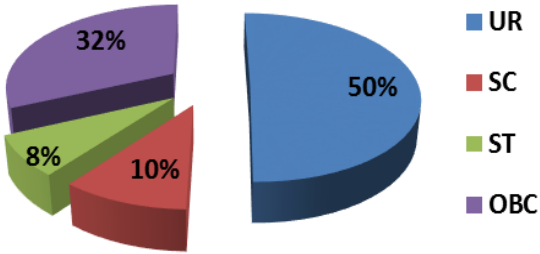
- Apple’s mobile OS for phones (iPhone), tablets (iPad), handhelds (iPod),
- based on BSD Unix
- Application programming done in Objective C
- Supports Bluetooth, Wi-Fi, and 3G and 4G networking

### Eclipse and Android Emulator



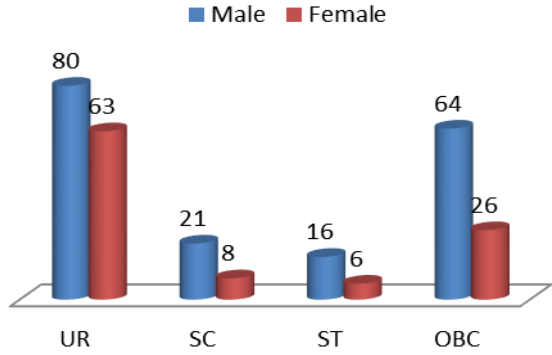
### Percentage of participation of Category

284 responses



Category	Percentage
UR	50%
SC	10%
ST	8%
OBC	32%

### Gender & Category



Category	Male	Female
UR	80	63
SC	21	8
ST	16	6
OBC	64	26

**Plate 10: Shows the participation of student & the presentation slides on Mobile based app**



### 2.11 World water day celebration:

Online world water day was celebrated with students, faculties, and KVK Scientists on 22nd March 2021. The whole program was organized under the guidance of Dr. R.K. Nema Dean & PI NAHEP and coordinated by Dr. R.N. Shrivastava. Hon'ble Vice-Chancellor Dr. P.K.Bisen had enlightened about the continuous decreasing per person water availability. He had also elaborated the future road-map of water management that should include supply as well as demand-side management. Dr. Dharendra Khare, Dean faculty of Agriculture told about the importance of water and the Continuous decrease in groundwater level every year. He also described the relevance of the water budget preparation. Dr. Awadhesh Nema, Deputy Director Farmer Welfare & Agriculture Development Department had presented the numerical statistics of different sources of water and also detailed the various scientific methods and advanced techniques in agriculture. i.e. Contour Farming, Mixed Farming, etc. Our keynote speaker of the Program, Mr. Vivek Dave Deputy Commissioner, Watershed Management Department of Agriculture M.P. had introduced all about the River Rejuvenation Program and the steps taken by State Government. Miss. Ayushi Trivedi, Ph.D. Scholar at the institute also presented details of Research Work going on, in university. 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. As per ICAR guidelines, an online Essay Writing Competition on the title "Importance of water in Human life and Agriculture". Three hundred ten participants registered for the course and out of these one hundred Seventy-two students have undergone attended the program. The program was concluded by Dr. M.K.Hardha with a vote of thanks.

<b>Table 2.11 World Water Day Celebration</b>									
<b>Number of Participation</b>					<b>Percentage of participation of Category</b>				
<b>Gender</b>	<b>UR</b>	<b>SC</b>	<b>ST</b>	<b>OBC</b>	<b>Total</b>	<b>UR</b>	<b>SC</b>	<b>ST</b>	<b>OBC</b>
<b>Male</b>	98	27	7	90	<b>222</b>	44	12	3	41
<b>Female</b>	42	12	9	25	<b>88</b>	48	14	10	28
<b>Total</b>	140	39	16	115	<b>310</b>	45	13	5	37

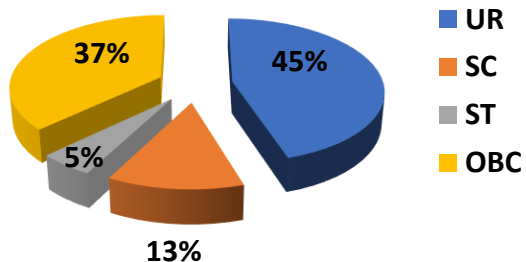


World Water Day Celebration on... □ □ □



### Percentage of participation of Category

310 responses

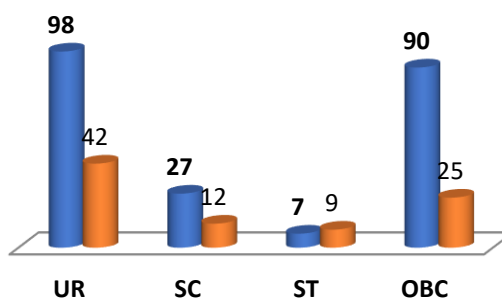


### Gender

Male Female

310

responses



### Designation

310 responses

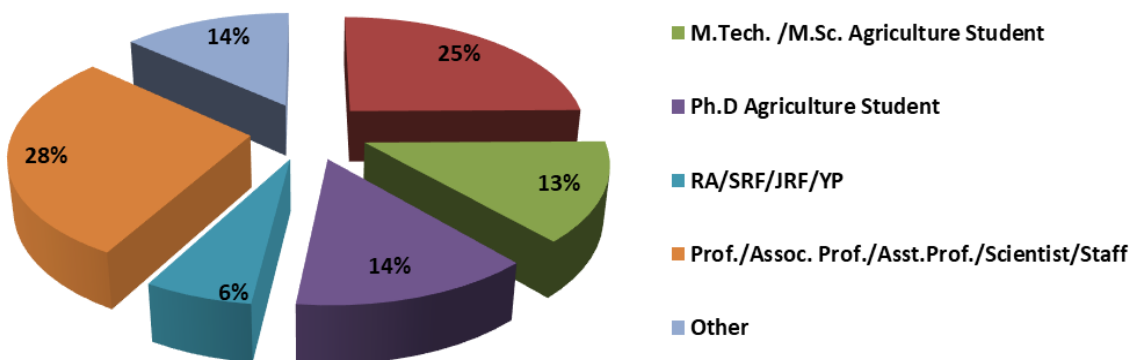


Plate 11: Shows the participation of student & the presentation slides on World Water Day celebration

## 2.12 Training program on thesis writing and online thesis evaluation: 3rd march 2021

One Day Basic Awareness Program on “Thesis Writing and online Thesis Evaluation” was organized by College of Agricultural Engineering, JNKVV, Jabalpur on 3rd March, 2021. Venue of Programme was Sardar Vallabh Bhai Patel Auditorium, JNKVV, Jabalpur. The programme was sponsored by NAHEP, CoAE, JNKVV, Jabalpur.

In Inaugural session Dr. Anupama Varma, Assistant Professor, CoA, JNKVV, Jabalpur had welcomed former Dean, College of Agriculture, Dr. M. N. Khare. In his speech he said 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. Dharendra Khare, said that the Common Errors in Thesis Writing, is writing of thesis in English, they said that many students prepare the sentence in Hindi and with the help of guide thesis can be prepared. Director of Instruction, Dr. Abhishek Shukla said knowledge of studies and research prior research is very necessary points in synopsis preparation and thesis writing, Dr. S. B. Das explained about Lab & Field Planning for Thesis Research. Dr. R. K. Nema, had explained Curricular Research in Agricultural Engineering. Er. Sharad Jain had explained about Online Evaluation of Thesis. Dr. Yogita Gharde explained about Statistical software available for analysis of agricultural data.

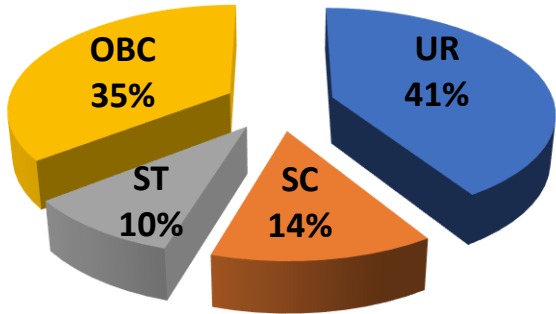
A total of 492 students of the university registered & participated in the one-day training programme. Out of which 58% were male and 42% were female. They belong to UR (41%), OBC (36%), SC (14%) and ST (10%) categories.

The students and faculties from almost all the stream and degree program registered for this event. Out of 96 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%)

### Statistical Distribution of Participants-

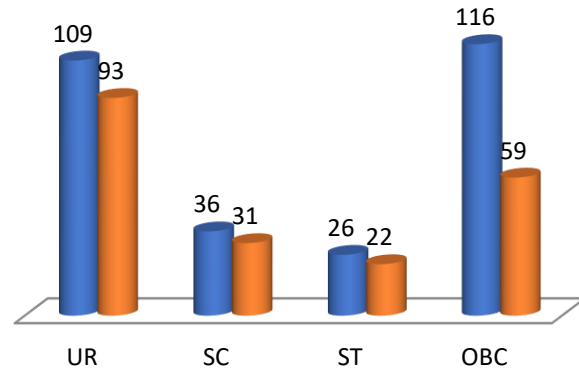
Number of Participation					Percentage of participation of Category				
Gender	UR	SC	ST	OBC	Total	UR	SC	ST	OBC
Male	109	36	26	116	287	38	13	9	40
Female	93	31	22	59	205	45	15	11	29
Total	202	67	48	175	492	41	14	10	36

### Percentage of participation of Category



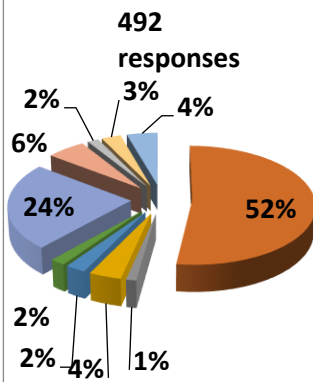
### Gender

492 responses Male Female



### Qualification

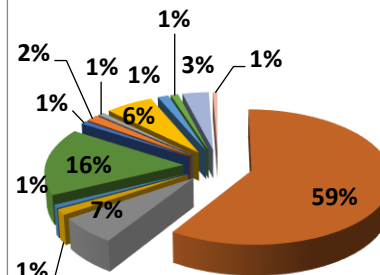
- M. Sc. Ag.
- M. Sc. Forestry
- M. Sc. Horti.
- M. Tech. Agril. Engg.
- Ph. D.
- Ph. D. Ag.
- Ph. D. Agril. Engg.
- Ph. D. Forestry
- Ph. D. Horti.
- Others



### Designation

492 responses

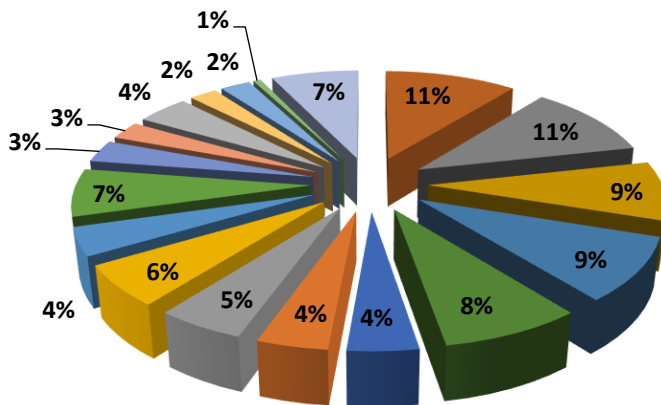
- Student
- Assistant Professor
- Associate Professor
- Faculty
- Ph.D. Scholar
- Professor
- Programme Assistant
- Research Associate
- Scientist
- Senior Research Fellow
- Sr. Scientist
- Technical Staff
- Young Professional



### Departments

492 responses

- Entomology
- Plant Pathology
- Genetics & Plant Breeding
- Agronomy
- Agril. Extension & Communication
- Food Science & Technology
- Horticulture ( Fruit Science)
- Horticulture (Vegetable Science)
- Soil Science & Agril. Chemistry
- Biotechnology
- Agril. Economics & Farm
- Plant Physiology
- Agroforestry
- Soil & Water Engg.
- Farm Machinery & Power
- Post Harvest Process & Food Engg.
- Agril. statistics





**Plate 12: Shows the participation of student & the photographs of thesis writing and Online thesis Evaluation program**

### 3. Financial Expenditure:

<b>Table 3: List of Financial activities and their Expenditure</b>	
<b>(a) Goods and Equipment's</b>	
Expenditure on equipment plant & machinery INR Lakhs	<b>49,39,725</b>
Expenditure on office equipment INR lakhs	<b>4,32,797</b>
Expenditure on Lab equipment, furniture & fixture INR lakhs	<b>7802333</b>
Expenditure on computers and peripherals INR lakhs	<b>699470</b>
<b>(b) Civil Works</b>	
Expenditure on Minor repair and renovation works INR lakhs	<b>47,465</b>
<b>(c) Recurrent Cost</b>	
Travel expenses INR Lakhs	<b>5,324</b>
Contractual services INR lakhs	<b>17,86,474</b>
Institutional charges INR lakhs	<b>7,93,037</b>
Operational costs INR lakhs	<b>11,69,607</b>
<b>Grand Total</b>	<b>2,18,40,298</b>

#### 4. Develop user friendly spatial data products using identified technologies for policy makers, researchers, field workers and farmers.

##### 4.1 Review Information related to Android based Mobile Application

Total 25 android based mobile apps were identified, the complete list is as follows:

	Iffco kisan	Agri mart
	Chana ki unnat kheti	Crop farmers app
	Farm Bee	Bijak
	Kvk app	Dehaat kisan
	Kisaan	Krishi network
	Kheti point	FARMS
	Kisaan sathi	Agriculture Kisan App, Kheti, Pashu Mela: Krishify
	Farmers E Market	Amul Farmers App
	Plantix-your crop doctor	Farmers Crop Survey App
	Farms App (Related Farm Machinery)	Farm Rise -Mandi Prices, Weather Update & Agronomy
	Agri Zone: All in one Agri App	AgriGyaan
	Kisan School of Agriculture	Farmers Family

**Table 4.1: List and details of Android based Mobile Apps reviewed are as follows: -**

S.N.	Name of Application	Objective	Beneficiaries	Available Platform	User Rating Out of 5
1.	CHANE KI UNNAT KHETI	Providing beneficial information related to chickpea cultivation for farmers of Central India	Farmers, students, stakeholders and all those who want Information related to chickpea farming	Play Store	5
2.	KISAAN SATHI	Agriculture Counselling & Support	Farmers	Play Store	4.4
3.	KRISHI NETWORK	For live market rates and weather Forecast	Farmers	Play Store	4.6
4.	CROP FARMERS APP	Summarized guide for farmers dealing in crops, fruit and vegetables	Farmers, Students	Play Store	4.3
5.	IFFCO KISAAN	Motivating farmers to buy agricultural Product Online	Farmers	Play Store	3.6
6.	BIJAK APP	Provide phone numbers of mandi buyers & sellers, better rate and more income	This app is for farmer, students and all those who want to sell their agricultural	Play Store	3.9

			products.		
7.	BHARAT AGRI	Provide farming Solution and Agri doctor	Farmers, Students	Play Store	4.0
8.	FARM APP	Designed to help farmers predict reliable onset days	Farmers	Play Store	4.7
9.	FARMER CONNECT	Farmers can choose their Pioneer Hybrids, purchase, make payment and receive their products at their doorstep. They can also subscribe to crop advisory services from Pioneer for the chosen hybrid.	Farmers	Play Store	3.4
10	JAIVIK KHETI	Provide new trick for farming (Organic Farming)	Farmers	Play Store	3

## 5. Spatio-temporal rainfall variability analysis over the Madhya Pradesh

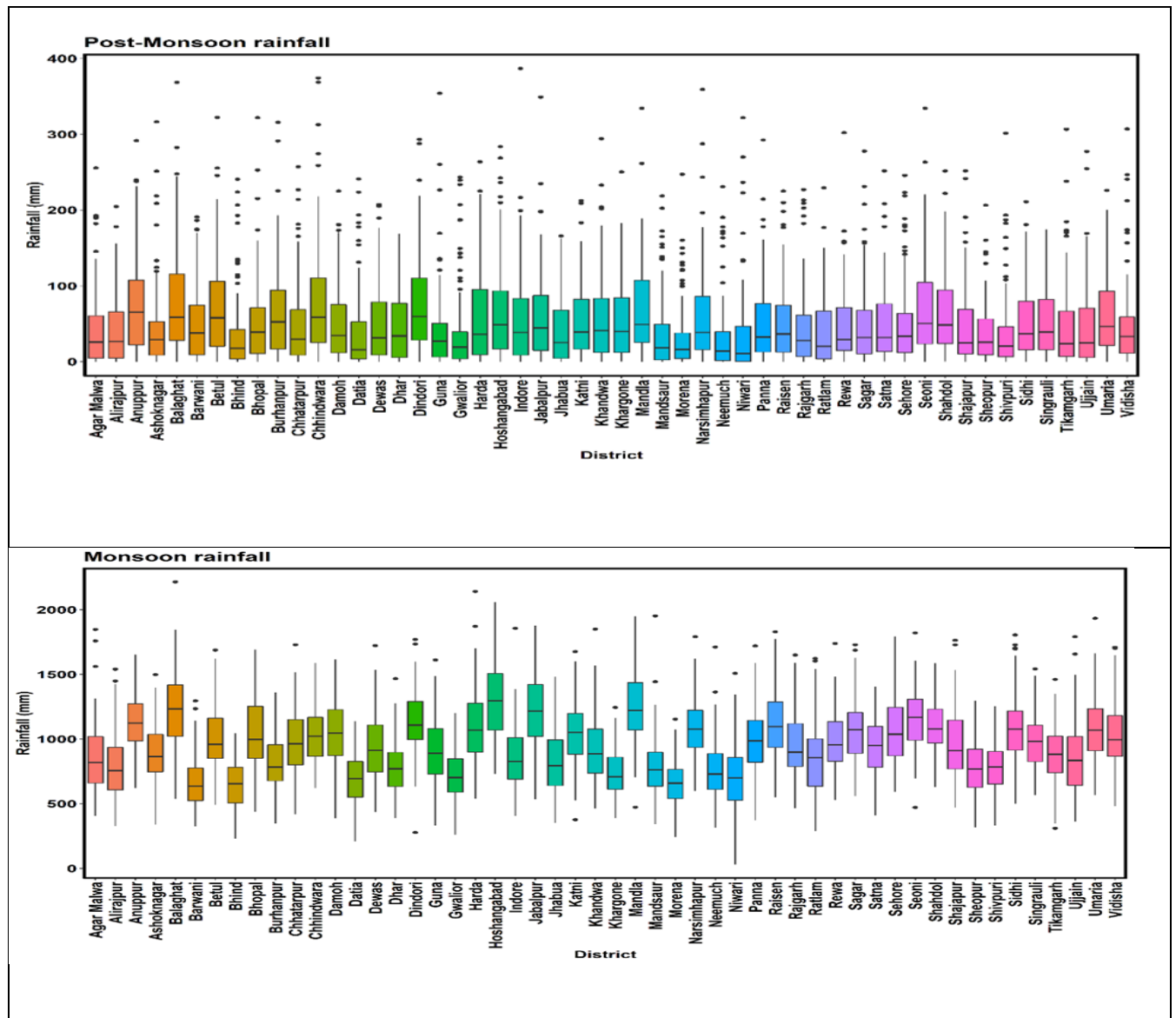
This study was carried out to investigate the spatial and temporal variability of rainfall at 52 districts of the Madhya Pradesh (MP), India. Data for the period of 119 years (1901–2019) on annual and seasonal basis was used. The daily gridded rainfall data ( $0.25^{\circ} \times 0.25^{\circ}$ ) for 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. 5.1).

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.





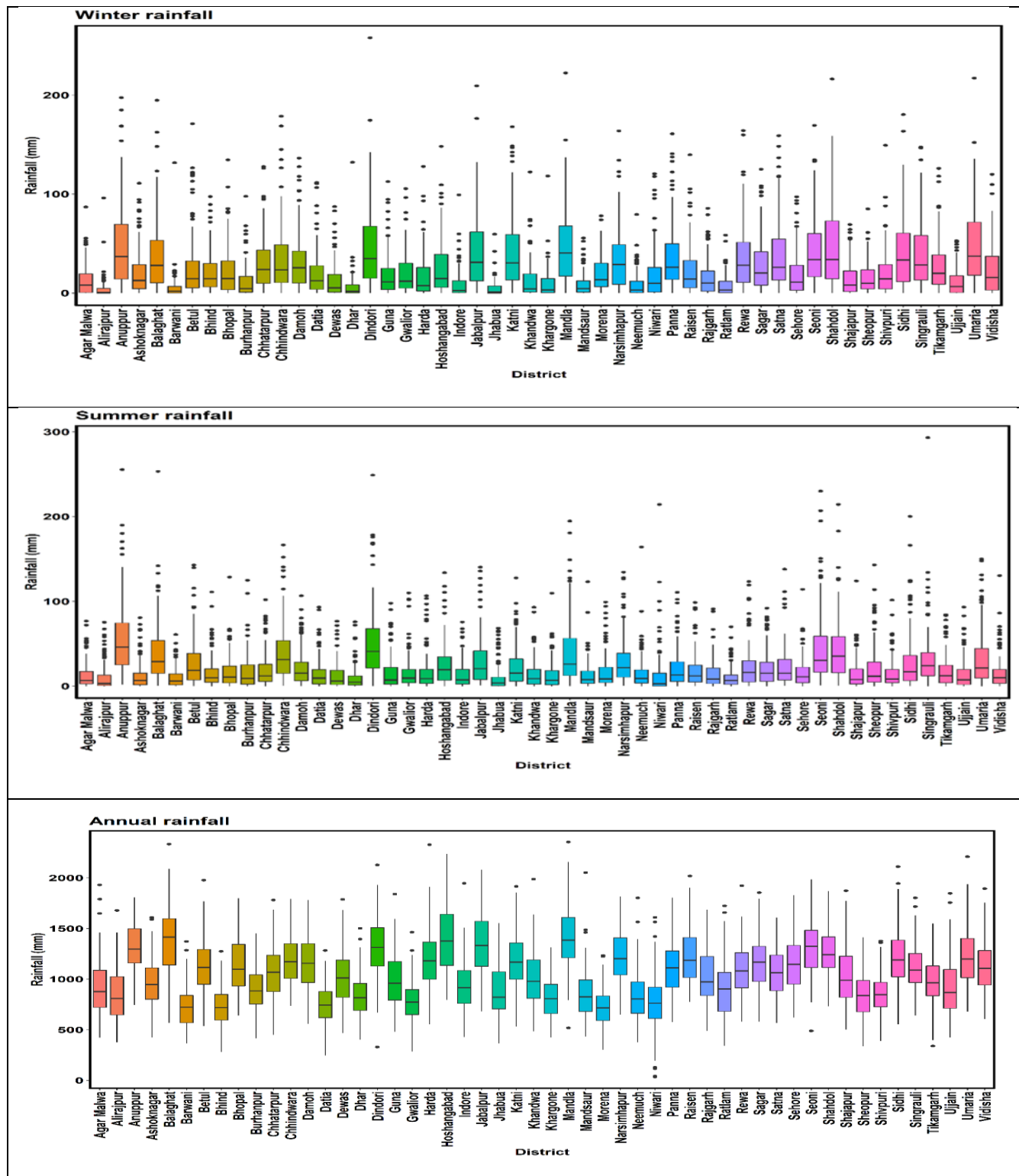
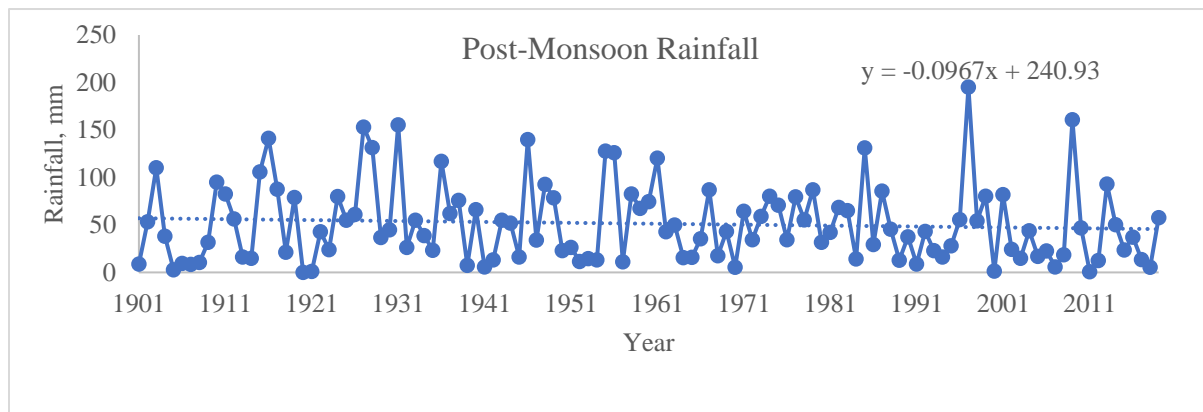
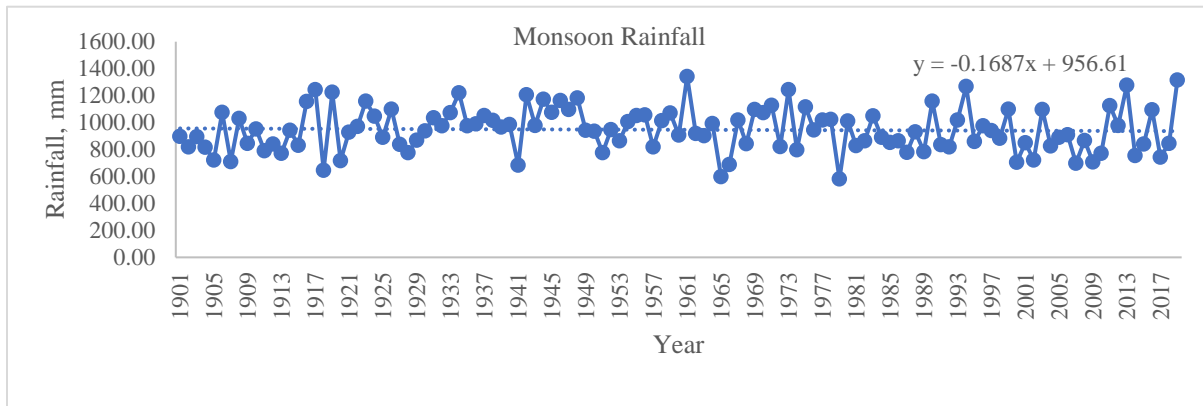
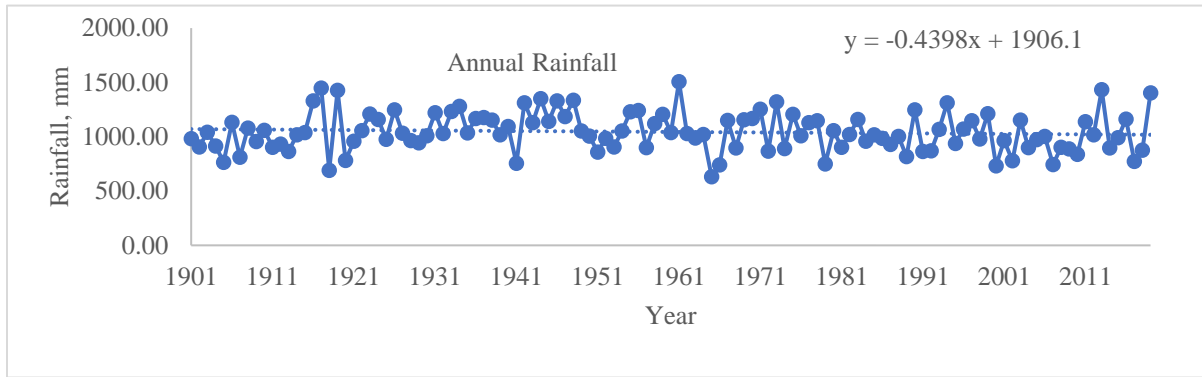
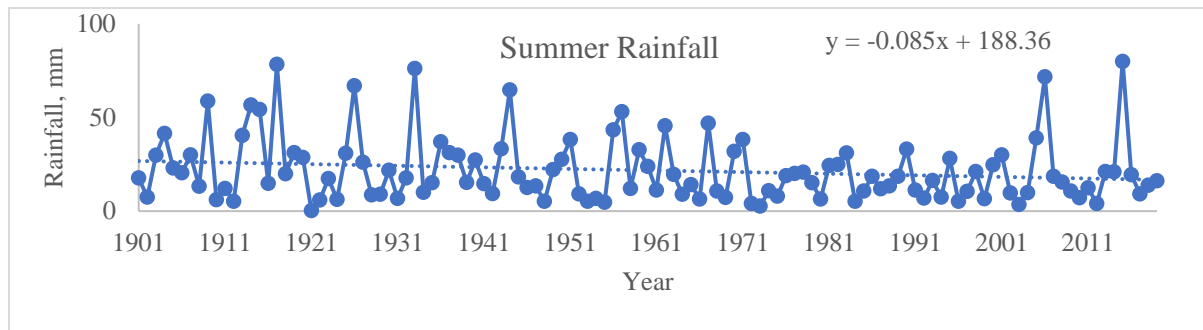
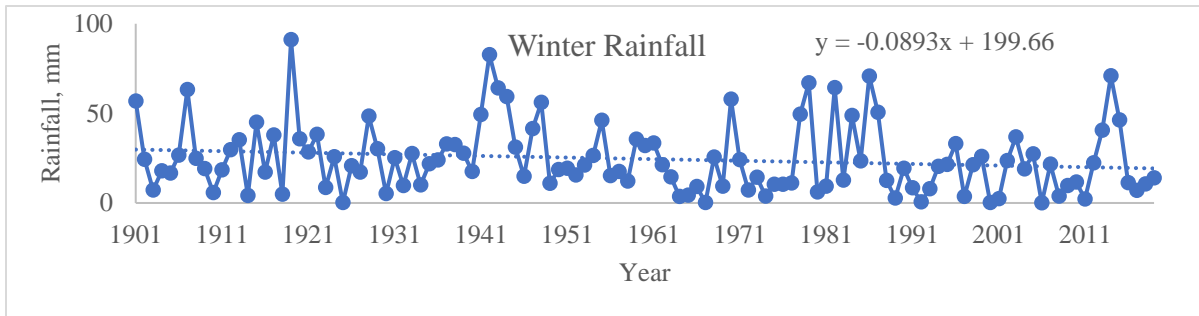


Plate 5.1 Rainfall variability at each district of Madhya Pradesh

The annual and seasonal rainfall variations of the state are depicted in Fig. 5.2 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.





**Plate 5.2 Temporal pattern of mean rainfall over the Madhya Pradesh**

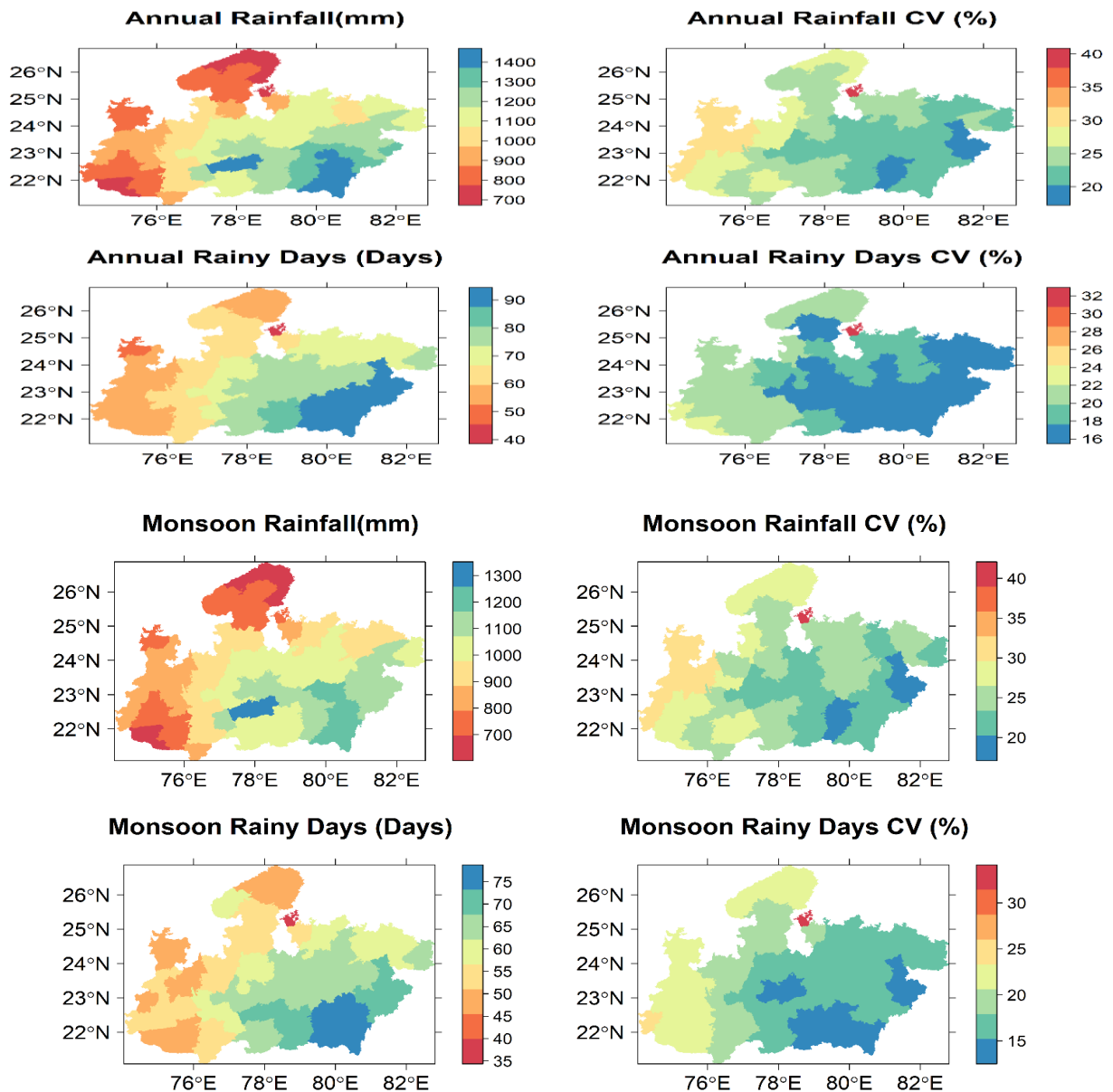
The spatial variability of annual and seasonal rainfall and rainy days over the Madhya Pradesh is depicted in Fig. 5.3. The average annual rainfall less than 750 mm were observed for the districts Barwani, Bhind and Morena. Out of 52 districts, 26 district received mean annual rainfall greater than 1044 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).

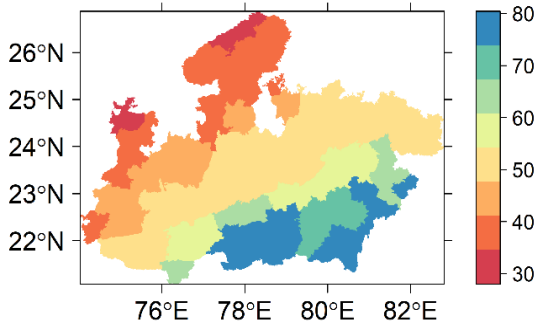
In case of mean monsoon rainy days, 26 district out of 52 having rainy days greater than 60 days. The highest number of mean monsoon rainy days was observed at Balaghat (76 rainy days) followed by Seoni (75 rainy days) and Mandla district (73.59 rainy days).

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.

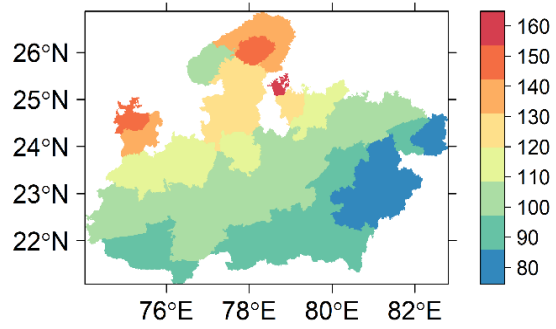
The seasonal and annual rainfall variability analysis along with the maps would be useful for effective planning and efficient use of water resources and also for district-level water management.



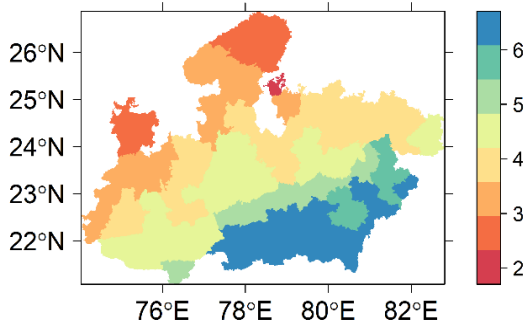
**Post-Monsoon Rainfall(mm)**



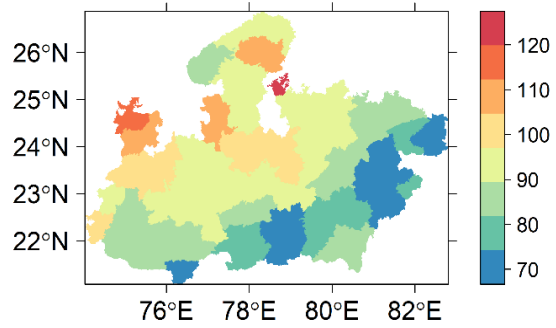
**Post-Monsoon Rainfall CV (%)**



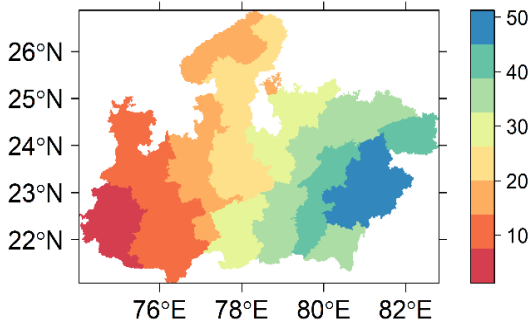
**Post-Monsoon Rainy Days (Days)**



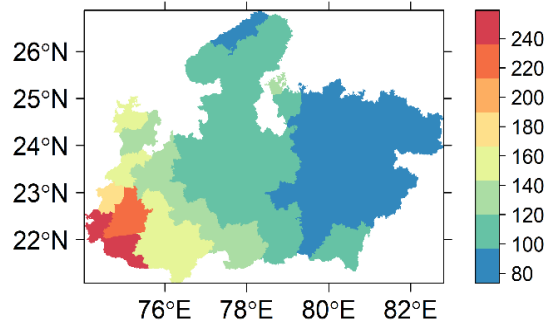
**Post-Monsoon Rainy Days CV (%)**



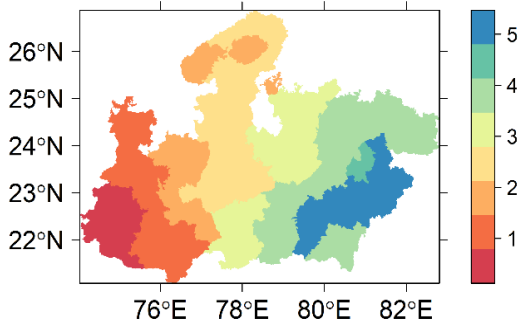
**Winter Rainfall(mm)**



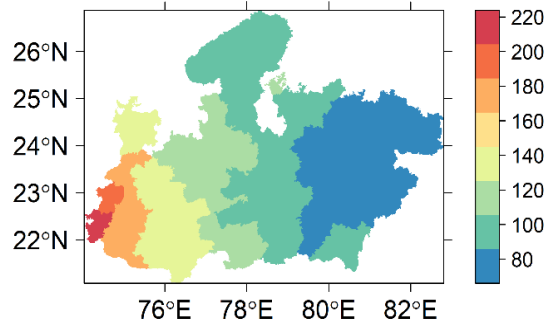
**Winter Rainfall CV (%)**

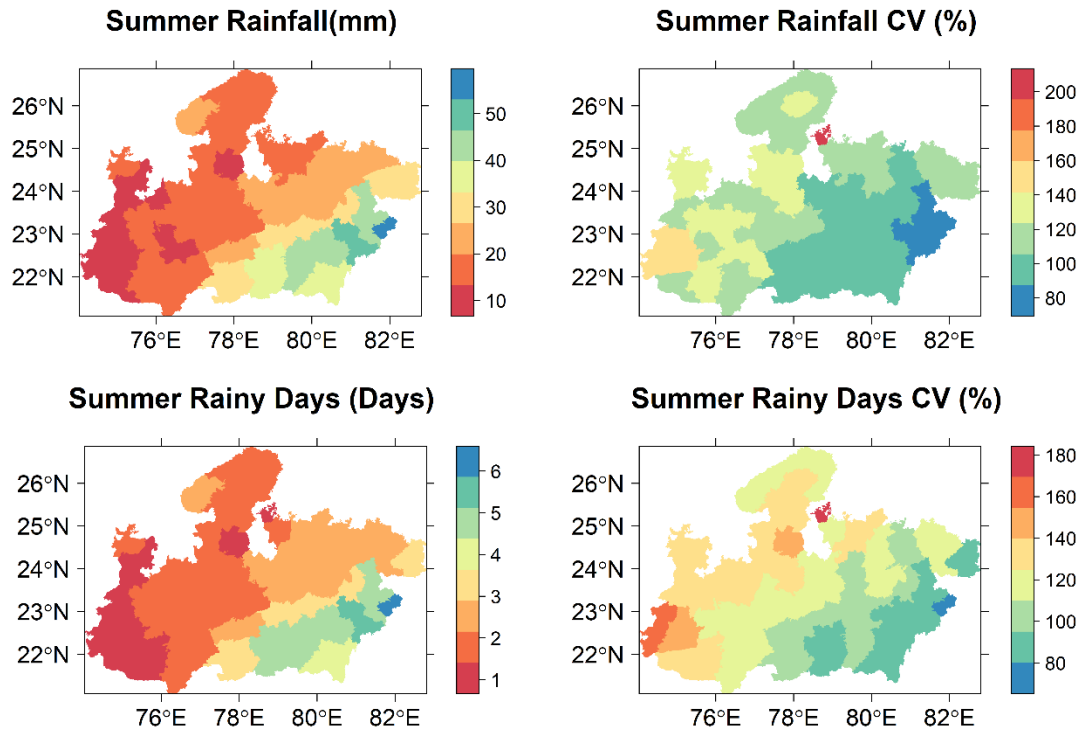


**Winter Rainy Days (Days)**



**Winter Rainy Days CV (%)**





**Plate 5.3 Spatial variability of mean rainfall and rainy days over the Madhya Pradesh**

## **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.6.1).

The overall methodology is represented in the (Fig 6.2). 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.6.3). 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.

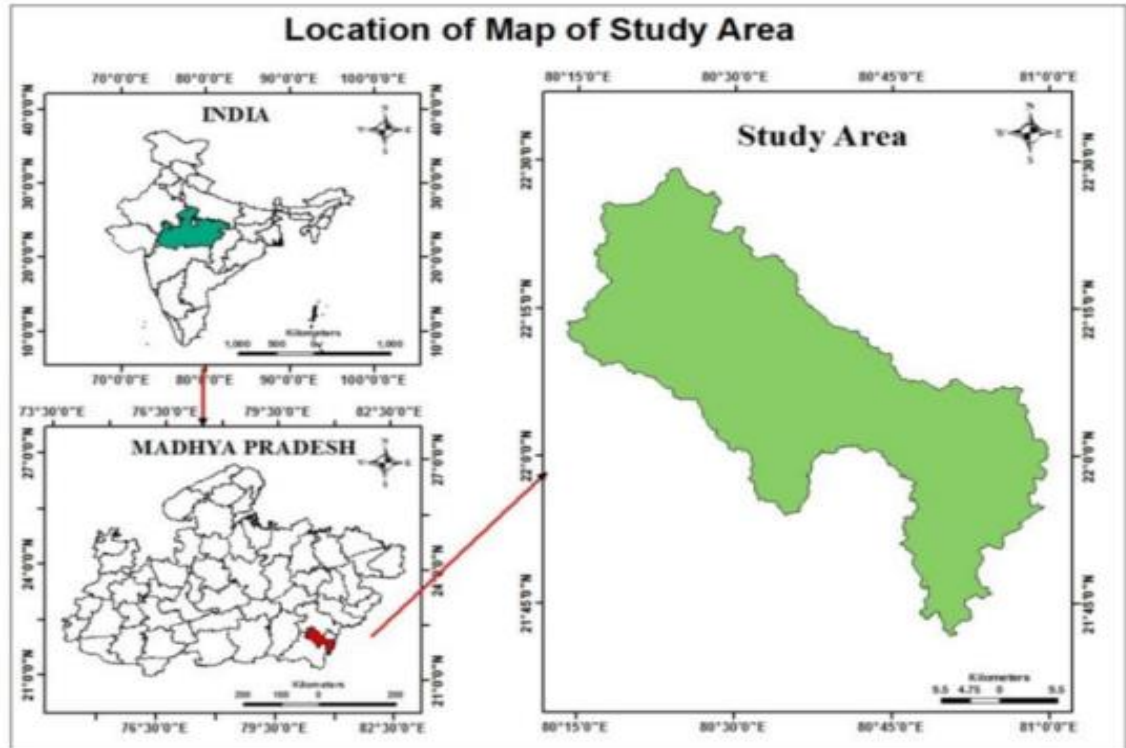


Plate. 6.1 Location map of study area.

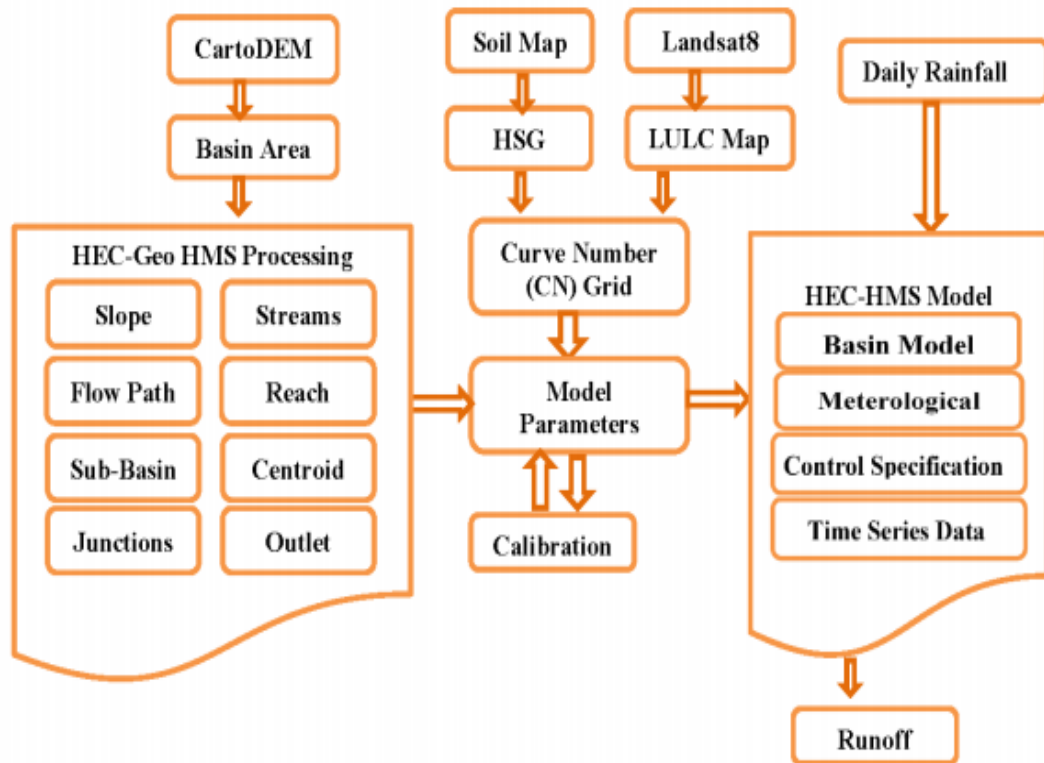
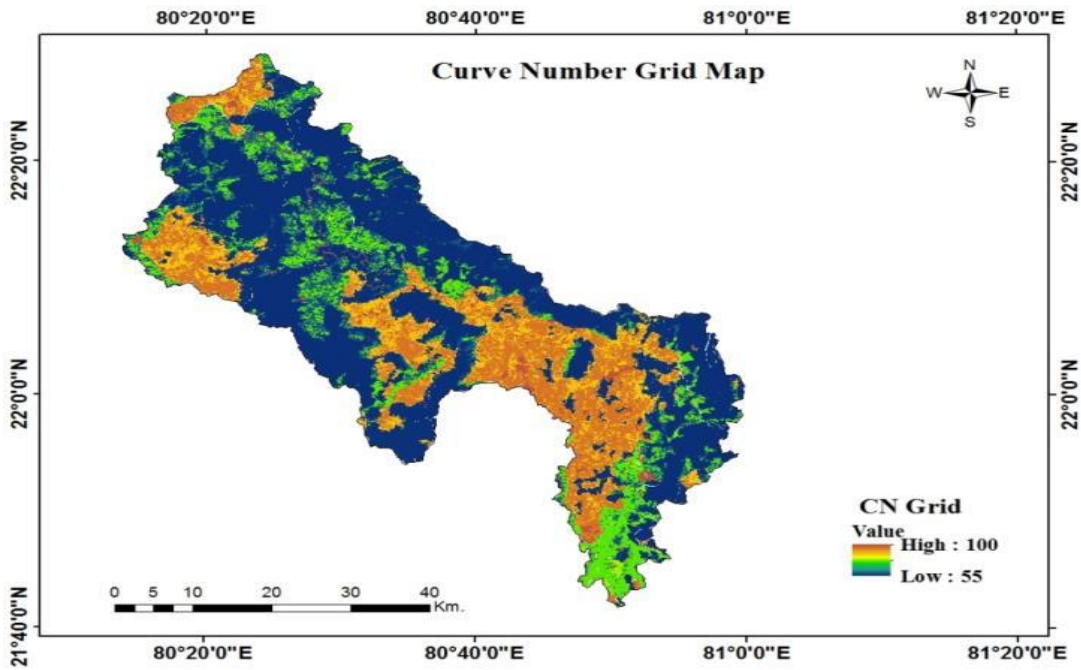


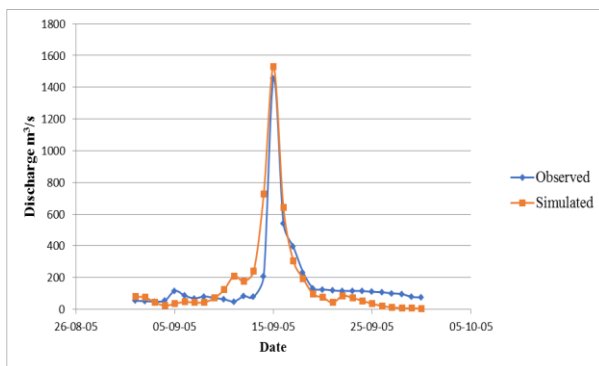
Plate 6.2 Flow Chart of Methodology



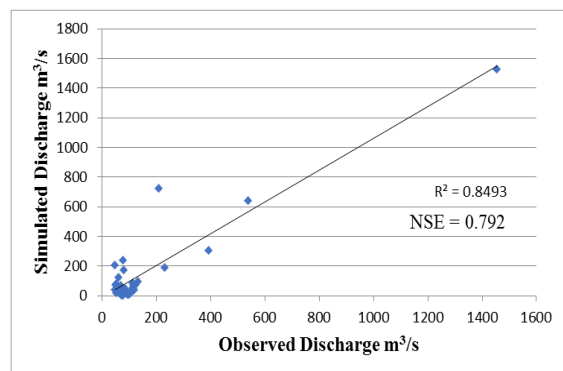
**Plate 6.3 Curve number map**

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 (Fig 6.4 to Fig 6.7) .

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.

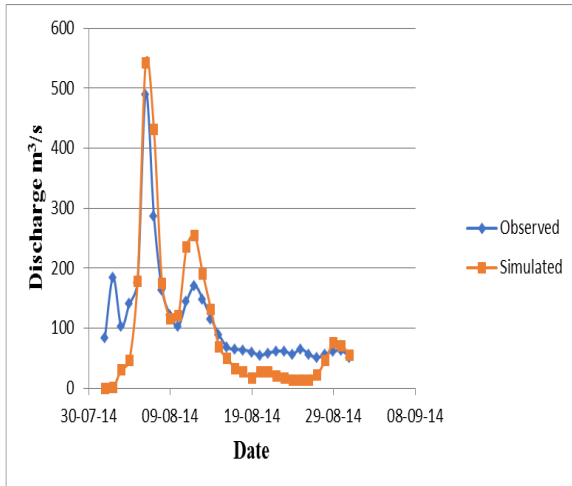


**Plate 6.4 Observed and Simulated discharge for the calibration period**

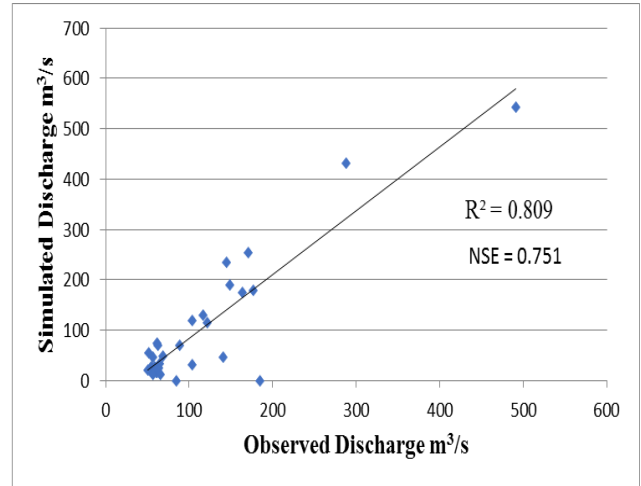


**Plate 6.5 Scatter plots of observed discharge versus simulated discharge for the calibration period**





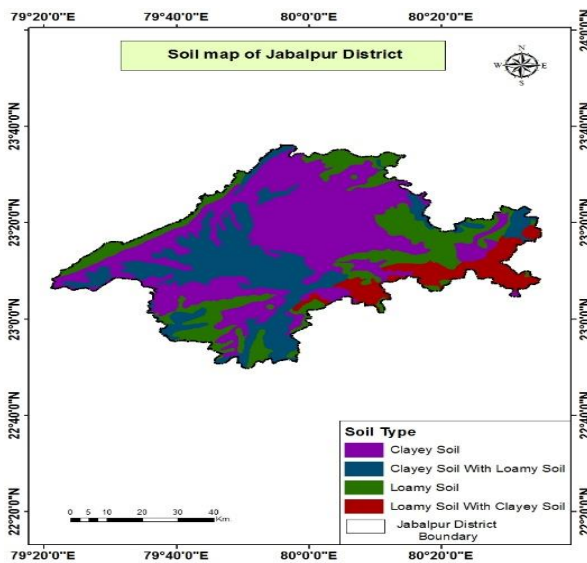
**Plate 6.6 Observed and Simulated discharge for the validation period**



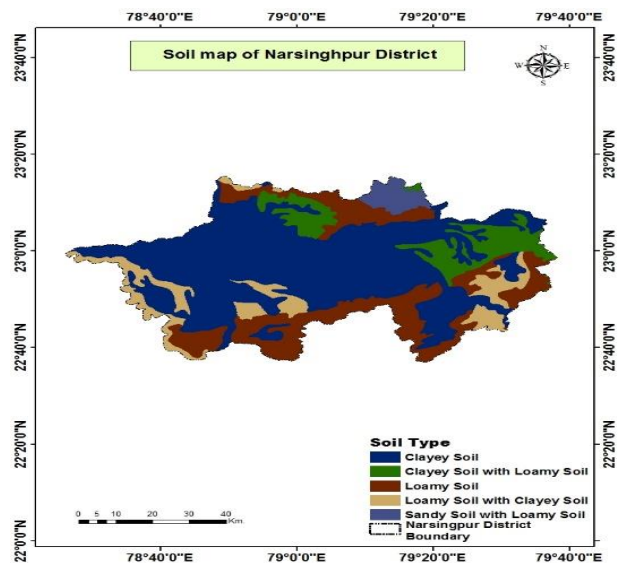
**Plate 6.7 Scatter plots of observed discharge versus simulated discharge for the validation period.**

## 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. 7.1 and 7.2 represents the soil map of Jabalpur and Narsinghpur district.



**Plate 7.1 Soil map of Jabalpur district**



**Plate 7.2 Soil map of Narsinghpur district**

## **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.