

**CENTRAL AGRICULTURAL UNIVERSITY,  
IMPHAL, MANIPUR**



**SELF STUDY REPORT FOR THE**  
**Ph. D. in**  
***SOIL AND WATER CONSERVATION ENGINEERING,***  
**COLLEGE OF AGRICULTURAL ENGINEERING**  
**AND POST HARVEST TECHNOLOGY, RANIPOOL, GANGTOK**  
**2018-19 to 2020-21**

**SUBMITTED TO**  
**Indian Council of Agricultural Research,**  
**Krishi Bhavan, New Delhi.**

**SUBMITTED BY**  
**Central Agricultural University,**  
**Imphal, Manipur- 795004**

## **PREFACE**

Soil and water are two important natural resources and the basic needs for agricultural production. During the last century it has been observed that the pressure of increasing population has led to degradation of these natural resources. In other words, increase in agricultural production to feed the increasing population is only possible if their sufficient fertile land and water are available for farming. In India, out of 328 million hectares of geographical area, 68 million hectares are critically degraded while 107 million hectares are severely eroded. That's why soil and water should be given first priority from the conservation point of view and appropriate methods should be used to ensure their sustainability and future availability.

Water conservation is the use and management of water for the good of all users. Water is abundant throughout the earth, yet only three percent of all water is fresh water, and less than seven-tenths of freshwater is usable. Much of the usable water is utilized for irrigation. Detailed analysis will show that in about fifteen years, about two-thirds of the world's population will be living in some sort of water shortage. Water is used in nearly every aspect of life. There are multiple domestic, industrial and agricultural uses. Water conservation is rapidly becoming a hot topic, yet many people do not realize the importance of soil conservation.

To produce world class soil and water engineer professionals who are equipped to meet the demands of global outfit, have analytical abilities and entrepreneurship for making career of self-employment and as contributors to livelihood and food/nutritional security, College of Agricultural Engineering and Post Harvest Technology (CAEPHT) was established by CAU in the year 2006 to address the issue of shortage of trained manpower (human resource) in the disciplines of agricultural engineering and post-harvest technology besides other issues, pertaining to natural resource management, farm mechanization, post-harvest technology, processing & value addition, utilization of renewable sources of energy, creation of agro-industries etc. in the region. The Govt. of Sikkim, through the Department of Food Security and Agricultural Development (FSADD) transferred the land of its Marchak Farm, Ranipool, East Sikkim to CAU, Imphal. Dr. N.L. Maurya, the then Director of Instruction, CAU, Imphal was appointed by university as Officer on Special Duty for establishment of CAEPHT and after his assuming this new assignment on May 20, 2006, the college started functioning with the admission of first batch of students in B. Tech. Agricultural Engineering programme. Prof. P.P.

Dabral, is presently the Dean of the college since 2017 till date. CAEPHT is one of the constituent college which is functioning under the Central Agricultural University, Imphal, Manipur. The college offers undergraduate, postgraduate and Ph.D. courses and has the admission capacity of 43 students from seven north eastern states and 10 ICAR seats for undergraduate students, 21 students for Masters programme in five departments and 3 students for Ph.D. degree programme in three departments annually. Students of this college have excelled not only in curriculum but also in extracurricular activities and national level competitive examinations and the college is making continuous efforts to improve the quality of education offered here. The ICAR has introduced the procedure of accreditation, which help in assessing facilities available to impart the quality education offered by the college. Since the college is due for further accreditation, the present report provides all the necessary information about the college activities performed during **last four years**.

The departmental (College) level and University Level Task Force and Steering Committee has been gratefully acknowledged for their help, guidance and suggestions given in preparing the report. The departmental college level Steering Committee and Task Force have done a great job in compiling information and bringing out this report to be submitted to Accreditation Board of ICAR. My heartfelt thanks to all those who are involved in preparation of this report.

CAEPHT, Ranipool

January, 2021

Dean

(P.P. Dabral)

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## **6.4 Self-Study Report for Ph. D in Soil and Water Conservation Engineering at CAEPHT, RANIPOL, SIKKIM.**

### **6.4.1 Brief History of the Degree Programme**

College of Agricultural Engineering & Post Harvest Technology, Ranipool was established during the year 2006 under the administration of Central Agricultural University, Imphal) to address the issue of shortage of trained manpower (human resource) in the disciplines of agricultural engineering and post-harvest technology besides other issues, pertaining to natural resource management, farm mechanization, post-harvest technology, processing & value addition, utilization of renewable sources of energy, creation of agro-industries etc. in the region.

The Department of Soil and Water Conservation Engineering (SWCE) started offering Ph.D. in Soil and Water Conservation Engineering degree during the academic year 2018-19. The activity of the department includes the areas of soil and water conservation, irrigation water management, hydrology, watershed management, ground water hydrology, irrigation systems and pumps and GIS and Remote sensing.

SWCE department gives exposures about different techniques for rain water harvesting, soil conservation, water conservation, degraded land reclamation, water quality analysis and modelling, remote sensing and GIS, waste water management, watershed management, etc.

The Department of Soil and Water Conservation Engineering is mainly engaged in teaching to under graduate and post graduate and Ph.D. students. It offers various courses of PG like Watershed Hydrology, and GIS and Remote Sensing for Land & Water Resource Management, open channel hydraulics, Water quality and pollution control, Soil and Water Conservation Structures, etc. to the PG students.

The faculty of the department is actively engaged in academic, research as well as extension activities based on local and future needs of the farmers, field engineers and entrepreneurs. The faculty of the department has completed 4 Extra Mural Research Project and 6 Intra Mural Research Project. Presently the faculty of the department is handling 2 Extra Mural Research Project of which one is ongoing and another is awaiting sanctioned. In addition, the department is also handling the AICRP on PET in the department. The Ph.D. programme started in the academic year 2018-19. To date, 2 students are presently undergoing their Ph. D in Soil and Water Conservation Engineering in the department.

SWCE department is having Soil Water Conservation & Soil Mechanics Lab, Remote Sensing & GIS Lab, Surveying and Levelling Laboratory, Strength of Materials Lab, Applied Mechanics Lab and AICRP on PET Lab to provide practical knowledge to the students and also

to demonstrate and organize training to farmers and field engineers, entrepreneurs etc. Many farmers, women and local peoples, NGO and others often visit the department to gain knowledge of different soil and water engineering aspects.

### Statistics of Ph.D.degree programme (2018-19 to 2020-21)

Year of Admission	Admitted			Dropped			Passed			Degree award during the year	Remarks
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total		
2018-19	1	0	1	-	-	-	-	-	-		Yet to complete
2019-2020	-	-	-	-	-	-	-	-	-		
2020-2021	1	0	1	-	-	-	-	-	-		Yet to complete
<b>Total</b>	<b>2</b>		<b>2</b>								

### Award of CAU, GOI & ICAR authorities' Scholarships

Ph.D.(SWCE)	Scholarship Type			
	University Scholarship (CAU)	ICAR scholarship(NTS)	SC/ST Fellow Ship	GOI Scholarship (SC+ST)
2018-19	1			
2019-20	-			
2020-21	1			
<b>TOTAL</b>	<b>2</b>			

## 6.4.2. FACULTYSTRENGTH

### Faculty Strength (Cadre-wise)

Designation / Cadre	2015			2016			2017			2018			2019			2020			2021		
	S	F	V	S	F	V	S	F	V	S	F	V	S	F	V	S	F	V	S	F	V
Professor	1	0	1	1	0	1	1	0	1	1	0	1	1	1	0	1	1	0	1	1	0
Associate Professor	4	4	0	4	4	0	2	2	0	2	2	0	2	1	1	2	1	1	2	1	1
Assistant Professor	5	4	1	5	4	1	3	2	1	3	2	1	3	2	1	3	2	1	3	2	1
<b>Total</b>	<b>10</b>	<b>8</b>	<b>2</b>	<b>10</b>	<b>8</b>	<b>2</b>	<b>6</b>	<b>4</b>	<b>2</b>	<b>6</b>	<b>4</b>	<b>2</b>	<b>6</b>	<b>4</b>	<b>2</b>	<b>6</b>	<b>4</b>	<b>2</b>	<b>6</b>	<b>4</b>	<b>2</b>
Contract	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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S-Sanctioned, F-Filled, V-Vacant

\* SWE department was bifurcated into Soil and Water Conservation Engg. (SWCE) and Irrigation & Drainage Engg. (IDE) department from 2017 onwards.

### Faculty Strength

Department	Sanctioned Faculty			Faculty in place			Vacant position			Recommended by ICAR			Deviation from ICAR recommendation		
	Prof.	Assoc. Prof.	Asst. Prof.	Prof.	Assoc. Prof.	Asst. Prof.	Prof.	Assoc. Prof.	Asst. Prof.	Prof.	Assoc. Prof.	Asst. Prof.	Prof.	Assoc. Prof.	Asst. Prof.
SWCE	1	2	3	1	1	2	0	1	1	1	2	3	0	0	0
Total	1	2	3	1	1	2	0	1	1	1	2	3	0	0	0

### 6.4.3. TECHNICAL AND SUPPORTING STAFF

Sl. No.	POST	2020-21				
		Sanctioned	Filled	Vacant	Recommended by CAU	Diversion from recommendation (Sanctioned)
1.	Lab. Assistant		0			
2.	Messenger(MTS)		3			
3.	Lab Labour					
	Total		3			

### 6.4.4. CLASSROOMS AND LABORATORIES:

#### Classrooms

Sl. No.	Class room No.	Area (sq. m)	Seating capacity	Other facilities (LCD, Projectors, Computers, Smart board etc.)
1.	PG classroom 1	16.00	8	Whiteboard
2.	PG classroom 2	10.00	8	Whiteboard, LCD, Projector, Computers

#### Laboratory

The Soil and Water Conservation Engineering department has 7 laboratories to carry out UG/ PG practical as well as Ph.D. research. All the laboratories are well equipped with all facilities to carry out research.

Sl. No.	Name of the laboratory	Area (sq.m)	Seating capacity
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1.	Remote Sensing & GIS Lab	39.00	25
2.	Strength of Materials Lab.	81.00	30
3.	Soil Water Conservation & Soil Mechanics Lab (2 lab)	135.00	25
4.	Applied Mechanics Lab.	105.00	25
5.	Engineering Drawing Lab	58.50	28
6.	AICRP on PET Lab	40.32	15
7.	Surveying and Levelling Laboratory	16.00	8

### Major equipment's

Sl. No	Particulars	No.
1.	Hook's Law	4
2.	Young Modulus Apparatus	4
3.	Worm & Worm Wheel	4
4.	Link Polygon Apparatus	4
5.	Joint of Roof Truss on Wheels	4
6.	Law of Moment Apparatus	4
7.	Law of Conservation of Mass Apparatus	4
8.	Drainage & Seepage Tank	1
9.	Anemometer	1
10.	Constant Temperature Water Bath	1
11.	Rain Gauge (Self Recording)	1
12.	Rain Gauge (Non Recording)	1
13.	Stage level recorder	1
14.	Unconfined Compression Tester	1
15.	Planimeter	2
16.	Theodolite	3
17.	Arc GIS	2
18.	Geometica Software	5
19.	GPS	1
20.	Fatigue Testing Machine	1
21.	Hardness test machine	1
22.	Universal testing machine	1
23.	ERDAS	1
24.	Plotter	1



### Average Number of Students in Theory and Practical Classes

Ph.D. students are grouped into one theory batch and one practical batch.

Sl. No.	Name of the department	Theory Batch	Practical Batch
1.	Soil and Water Conservation Engineering	Full strength	Full strength



### 6.4.5. CONDUCT OF PRACTICAL AND HANDS-ON-TRAINING










Course curriculum for Ph.D. degree programme has been designed with special emphasis on novel areas of soil and water conservation engineering. Further as a part of their course curriculum, the Ph.D. students are taken to exposure visits to different research institutes, progressive farmers' field, private industries and state government agencies. Industry/Institute Trainings as a part of their course curriculum is mandatory for the students. Several exposure visits organized by department is also contributing for better understanding of the subject and to enrich their practical knowledge.

#### Practical Credit details

Sl.No.	Discipline	Number of credits for practical	Per cent of time spent	
			In laboratory	In field*
1	Soil and Water Systems Simulation and Modelling	1	40	60
2	Modelling Soil Erosion Processes	1	60	40

#### Glimpses of Practicals and exposure visits

Labs. under Dept. of SWCE:-	
	
Remote Sensing & GIS Lab. (39 m <sup>2</sup> )	Remote Sensing & GIS Lab. (39 m <sup>2</sup> )

	
<p>Strength of Materials Lab. (81 m<sup>2</sup>)</p>	<p>Strength of Materials Lab. (81 m<sup>2</sup>)</p>
	
<p>Soil Water Conservation &amp; Soil Mechanics Lab. (135 m<sup>2</sup>)</p>	<p>Soil Water Conservation &amp; Soil Mechanics Lab. (135 m<sup>2</sup>)</p>
	
<p>Applied Mechanics Lab. (105 m<sup>2</sup>)</p>	<p>Applied Mechanics Lab. (105 m<sup>2</sup>)</p>
	
<p>Engineering Drawing Lab. (58.5 m<sup>2</sup>)</p>	<p>Engineering Drawing Lab. (58.5 m<sup>2</sup>)</p>
	
<p>AICRP on PET Lab. (40.32 m<sup>2</sup>)</p>	

<p><b>Labs. under Dept. of IDE:-</b></p>	
	
<p>Irrigation, Drainage &amp; Fluid Mechanics Lab. (225 m<sup>2</sup>)</p>	<p>Irrigation, Drainage &amp; Fluid Mechanics Lab. (225 m<sup>2</sup>)</p>
	
<p>Soil &amp; Water Quality Lab. (40.32 m<sup>2</sup>)</p>	
	
<p>Students of College of Agriculture, Iroishemba, visit at CAEPHT, ranipool</p>	<p>Inauguration of solar dryer tunnel dryer on the roof of SC progressive farmer under the SCSP scheme of the AICRP on PET, CAEPHT, CAU, Ranipool, East Sikkim.</p>



Awareness camp at Padamchey, East Pandam., Pakyong



Glimpse after installation of drip irrigation system at a farmers farm land.

Local area MLA interact with farmers inside the newly inaugurated NVP



His Excellency, Shri. Ganga Prasad ji (Governor of Sikkim) interacting with participants of the 90 days Skill Development Training Programme and Course Directors at the construction site of Hi-tech polyhouse at Vanvashi Kalyan Ashram, Ranipool, Sikkim.



Farm pond constructed at the resident of a farmer (Girimaan Dahal )at Tashiding , West Sikkim

### 6.4.6. SUPERVISION OF STUDENTS IN PGPROGRAMME

Every student shall have Advisory Committee with a Chairperson, Major Advisor, Minor Advisor and at least four members among whom two members shall be from outside the major field of specialization. Programme of Research proposed by the Advisory Committee and approved by the Director of Instruction(DI) will be carried out by the student under the supervision of Advisory Committee.

Sl. No.	Year	Department	No. of PG recognized teachers		Student to teacher ratio		
				Total	Ph.D.	Total (Ph. D. students)	
1.	2018-19	Soil and Water Conservation Engineering	02	02	01	01	1:2
2.	2019-20		02	02	-	-	-
3.	2020-21		02	02	01	01	1:2

### 6.4.7. FEEDBACK OF STAKEHOLDERS (STUDENTS,PARENTS, INDUSTRIES, EMPLOYERS, FARMERSETC.)

Sl. No.	Feed back	Action taken
Farmers/Student :		
2019-20		
1.	Hands on practical for Installation of Gravity-fed Irrigation system in the Green house of a local progressive farmer.	The installation was done with the Ph.D. student along with faculty members of SWCE and IDE department at Assam Lingzey, Sohreni Village, East Sikkim,
2.	Installation and request for providing farm pond at	In-situ demonstration of installation of farm pond was done at the farm land of Mr. Girimaan Dahal, a resident of Tashiding, west Sikkim. (pics at the glimpses)

### 6.4.8. STUDENT INTAKE AND ATTRITION IN THE PROGRAMME FOR LAST FIVE YEARS

Year wise information on sanctioned strength, actual intake and attrition during the last five years of the Degree Programme are furnished in the tabular form.

Ph.D. in Soil and Water Conservation Engineering in the department.

Year	Departments	Sanctioned seats	Actual intake	Attrition on	Attrition Percentage
2018-19	Soil and Water Conservation Engineering	1	1	0	0
2019-20		1	-	0	0
2020-21		1	1	0	0

### 6.4.9. ICT APPLICATION IN CURRICULADELIVERY

ICT enabled teaching-learning encompasses a variety of techniques, tools, content and resources aimed at improving the quality are a variety of options available to the teacher and students to utilize various ICT tools at CAEPHT, Ranipool for effective teaching and learning. Teachers participate in selection and critical evaluation of digital content and resources. They are also encouraged to develop their own digital resources, sharing them with colleagues and students through the digital repositories. For this each individual staff allotted with high configured computer system and connected with high speed Internet facilities for sharing digital contents. During the time of corona pandemic, the classes were conducted totally via online mode using Google meet, zoom etc.

Below Mentioned ICT facilities are well established in the college during the period of 2018-19 to 2020-21. Detailed ICT Lab facilities are listed below:

S.No.	Name of Lab	Equipment	Usage
1.	ICT Enabled Class Rooms	1 PG Class rooms with Computer Systems and LCD Projectors	For educational video, PPT, conferencing , teaching and learning
2.	PG óR & GIS Computer Lab	10 Computers Systems	For working with different watershed, rainfall-runoff simulation
3.	ICT Enabled Seminar Hall	High Speed Internet Line connectivity, camera	For online interaction with University key officials by students and staff, online interaction with different subject experts in different streams

**Different ICT Software's Used at CAEPHT, SWCE department**

S. No	ICT Application	Usage
1.	Arc GIS software	ArcGIS is a geographical information system (GIS) software that allows handling and analyzing geographic information by visualizing geographical statistics through layer building maps like climate data or trade flows.
2.	ERDAS	image processing software package that allows users to process both geospatial and other imagery as well as vector data. Erdas can also handle hyperspectral imagery and LiDAR from various sensors. Erdas also offers a 3D viewing module (VirtualGIS) and a vector module for modeling.
3.	Geometica Software	a complete and integrated desktop <b>software</b> that features tools for remote sensing, digital photogrammetry, geospatial analysis, map production, mosaicking and more.
4.	Surface Water Modelling	SMS (surface-water modeling system) is a comprehensive environment for one, two, and three dimensional hydrodynamic modeling.
5.	Watershed Modelling System	A proprietary water modelling software application used to develop watershed computer simulations. The software provides tools to automate various basic and advanced delineations, calculations, and modeling processes.
6	Ansys Academic Mechanical	The software is being used by the masterø students in the design of a greenhouse.



**6.4.10.** The information pertaining to 6.4.1 to 6.4.9 has been provided for PG programme *i.e.*, M.Tech. (Agricultural Engineering) in Soil and Water Conservation Engineering of College of Agricultural Engg & PHT, CAU, Ranipool Gangtok Sikkim, Sikkim is correctly.

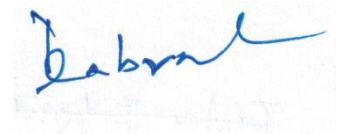
**6.4.11.** Since the accreditation of Programmes is related to the All India Admission from ICAR and also having weightage for College accreditation, therefore the data presented in the section 6.4 is liable to the verification at any stage.

**6.4.12**

### **CERTIFICATE**

I the Dean, P. P. Dabral, College of Agricultural Engineering & Post Harvest Technology, Ranipool, Sikkim, hereby certify that the information contained is furnished as per the records available in the college and degree awarding university.

Date:



(P. P. Dabral)

Dean