

**University of Agricultural Sciences, Bangalore  
Centre of Excellence on Watershed Management**

**Call for Research Fellowship Applications under REWARD Program (2024)**

The Centre of Excellence on Watershed Management (CoE-WM) is established at the University of Agricultural Sciences, Bengaluru, during 2022 as a component of the World Bank supported Rejuvenating Watersheds for Agricultural Resilience through Innovative Development (REWARD) program, implemented by Watershed Development Department (WDD), Government of Karnataka. In Karnataka REWARD program will be implemented for five years from 2022-23 in 25 rain-fed districts of Karnataka (Chamarajanagar, Davanagere, Tumkur, Koppal, Kalaburagi, Yadagiri, Gadag, Bidar, Vijayapura, Chikkamagaluru, Raichur, Ballari, Haveri, Dharwad, Belagavi, Bagalkot, Shivamogga, Chitradurga, Chikkaballapura, Kolar, Hassan, Mandya, Mysore, Ramanagara and Bangalore rural). With the concept of model micro watershed 23 automatic weather stations are installed in 23 Taluks of REWARD districts to assess the all-hydrological parameters (Rainfall, temperature, wind speed, relative humidity, net radiation, sunshine hours and soil moisture at different depths).

One of the mandates of the Centre is to conduct pilot studies on contemporary issues related to advanced scientific watershed management. As part of this, the CoE-WM wants to get action research to be conducted on pilot mode through Ph.D. research and this is open for the Ph.D. students pursuing degree in the discipline of Soil and Water Engineering, Irrigation and Drainage Engineering, hydrology and water resources engineering from all the State Agricultural and other traditional Universities by offering fellowships (on the lines of ICAR norms) on the following five themes.

**1. Estimating runoff in ungauged watershed based on data generated in pilot watershed in REWARD project areas**

In the REWARD project, model micro watersheds (23 no.) are being monitored for capturing hydrological data viz., weather parameters, runoff, soil loss, surface and profile soil moisture, evapotranspiration and ground water in different Agro-hydro ecological regions of Karnataka. The runoff is being monitored in all the model micro watersheds of Karnataka under REWARD-hydrology project using the hydraulic structures coupled with advanced sensors generally called as silt monitoring stations (SMS) at the outlet of model micro-watersheds. It is intended to develop or use available hydrologic models by utilising the measured runoff data generated through silt monitoring stations (SMS) for estimating runoff in ungauged watersheds of REWARD project. Further, the soil phase wise runoff data to be generated for planning soil and water conservation, water harvesting and drainage line treatment plan for arable and non-arable lands respectively.

**2. Irrigation scheduling based on soil moisture, Leaf Area Index (LAI) and other parameters**

The intensive data on surface and profile soil moisture together with LAI data is being monitored in all the model micro watersheds (23 no.) of REWARD project spread across varied Agro-hydro ecological regions of Karnataka. In most of the watershed's irrigation is being done using ground water hence, for optimum use of irrigation water needs to be planned through irrigation scheduling. The appropriate scheduling tools techniques and indicators needs to be developed using measured soil moisture, LAI data being generated at each model micro-watersheds of REWARD project.

**3. Retrieval of root zone soil moisture from surface soil moisture by using remote sensing data**

Under REWARD-hydrology project intensive surface and profile soil moisture data is being monitored using digital soil moisture sensors (Hydrago and Time domain reflectometer (TDR)) at weekly interval for different soil mapping units within model micro watersheds spread across different Agro-hydro ecological regions of Karnataka. Alternatively, the surface soil moisture data is also being generated using remote sensing for all the model micro watersheds and data have been calibrated and validated using measured surface soil moisture data. Therefore, it is intended to develop suitable models for retrieval of root zone (Profile) soil moisture which is essentially required for scheduling of irrigation and quantity of water to be supplied to the specific crops.

**4. Impact of bunding on soil moisture, crop and farmer in a treated watershed compared to untreated/ control watershed**

The Scientific treatment of REWARD watersheds would be taken up for the REWARD saturation sub watersheds where bunding/TCB is an important intervention for soil and water conservation in arable lands. The study related to enhanced soil moisture and its distribution due to bunding/TCB is essential for understanding the impacts of bunding on soil moisture conservation, crop yield and economic levels of the farmers in comparison with treated and untreated/control watersheds in different Agro-hydro ecological regions of Karnataka.

**5. Leaf Area Index (LAI) to calibrate crop models for different crops**

In the REWARD project, the intensive data on LAI is being monitored in model micro watersheds (23 no.) spread across different Agro-hydro ecological regions of Karnataka. The crop evapotranspiration ( $ET_c$ ) requires crop coefficient ( $K_c$ ) values of different crops grown within model micro watersheds. Therefore, it is intended to develop suitable models for deriving  $K_c$  values for different crops using measured LAI data and further estimation of crop evapotranspiration which is one of the important water balance components of hydrologic cycle to assess the crop water requirement.

**Following are the guidelines for awarding fellowship:**

<b>Eligibility</b>	<ol style="list-style-type: none"><li>1. Students studying in the first/ second year Ph.D. in the discipline of Soil and Water Engineering, Irrigation and Drainage Engineering, hydrology and water resources engineering and other relevant departments</li><li>2. The students who are already the recipients of the Senior Research Fellowship (SRF) or any <b>other fellowship are not eligible</b></li></ol>
<b>Submission of application and Selection</b>	<ol style="list-style-type: none"><li>1. The application in the prescribed format as in Annexure along with the details of the research proposal should be submitted in duplicate (hard copy) to the Special Officer, CoE-WM, UAS, GKVK, Bangalore-560 065, through proper channel</li><li>2. The Major Advisor/ Chairperson should have expertise in the domain area of the theme</li><li>3. The selection will be based on the scrutiny by the Technical Expert Committee constituted for the pilot studies under the REWARD program, based on the relevancy of the theme, technical and methodological superiority as well as credentials of the Major Advisor/ Chair Person</li></ol>
<b>Number of fellowships and Duration</b>	Six fellowships will be awarded. The duration of the fellowship is for two years and will not be extended
<b>Emoluments</b>	Students will receive monthly fellowship of Rs. 35000/- during their second and third year of Ph.D. studies and a total contingency of Rs. 1.00 lakh for the study period

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**Form for submission of Program of Research by Ph.D. Student for the award of  
 fellowship under the REWARD program**

**PART-I: Personal Details****1. Particulars**

a.	Name of the student	:	
b.	Date of Birth	:	
c.	Gender	:	
d.	Aadhaar card Number	:	
e.	Email ID	:	
f.	Mobile number	:	
g.	Nationality	:	
h.	Social community (EWS/UR/OBC/SC/ST)	:	
i.	Name of the University	:	
j.	Year of Admission	:	
k.	Department	:	
l.	List of Publications (NAAS rating 5 and above) <i>to be enclosed separately</i>	:	

**2. Contact details**

a.	Permanent Address	:	
b.	Communication Address	:	

**3. Educational Qualifications**

<i>Certificate/Degree</i>	<i>Board/University</i>	<i>Percentage of marks obtained</i>	<i>OGPA obtained</i>

**PART-II: Technical details**

<i>Sl. No.</i>	<i>Item</i>		<i>Description</i>
1.	<b>Title of the Research</b>	:	
2.	<b>Abstract</b> (Maximum 300 words)	:	
3.	<b>Origin of the proposal</b> (Maximum 1 page) (Scientific rationale for doing this work should be elaborated)	:	
4.	<b>Review of status of Research and Development in the subject</b>		
4.1	<b>International status</b> (Maximum 2 pages) (Researchers working in the area worldwide and their contributions must be properly highlighted with recent references and reviews. A correct and faithful description of the international research status must be given)	:	
4.2	<b>National status</b> (Maximum 1 page) (Same as above to cover the contribution of Indian Scientists in the project area)	:	
5.	<b>Research gap</b> (Maximum 1 page) (Highlight what is the new area or gap which will be solved in the proposed research by relating what is already known. <i>This is a very important section to project the novelty content of the proposal</i> )	:	
6.	<b>Hypotheses</b>	:	
7.	<b>Objectives</b>	:	
8.	<b>Methodology</b>		
8.1	<b>Detailed program of work</b>	:	
8.2	<b>If the proposal is location specific, basis for selection of location to be highlighted</b> (Maximum ½ page)	:	
8.3	<b>Time schedule of activities giving milestones through PERT chart</b>	:	
9.	<b>Expected outcome/output from the project</b> (Maximum ½ page)	:	
10.	<b>Details of Major Advisor/Chairperson</b>		



**List of model micro watersheds in REWARD project areas, Karnataka**

<b>#</b>	<b>Partners</b>	<b>Taluk</b>	<b>District</b>
1.	UAS Bangalore	Tumkur	Tumkur
2.	UAS Bangalore	Turuvekere	Tumkur
3.	UAS Bangalore	Arasikere	Hassan
4.	UAS Bangalore	Bagepalli	Chikkaballapura
5.	UAS Bangalore	Kolar	Kolar
6.	UAHS Shivamogga	Ajjapura	Chikkamagaluru
7.	UAHS Shivamogga	Challakere	Chitradurga
8.	UAHS Shivamogga	Channagiri	Davanagere
9.	UAHS Shivamogga	Shikaripura	Shivamogga
10.	UAHS Bagalkot	Bijapur	Bijapura
11.	UAHS Bagalkot	Hunugund	Bagalkot
12.	UAHS Bagalkot	Aurad	Bidar
13.	UAS Raichur	Raichur	Raichur
14.	UAS Raichur	Yelburga	Koppal
15.	UAS Raichur	Wadagere	Yadgiri
16.	UAS Raichur	Kalburgi	Kalburgi
17.	UAS Raichur	Chittapura	Kalburgi
18.	UAS Dharwad	Ranebennuru	Haveri
19.	UAS Dharwad	Kundagol	Dharwad
20.	UAS Dharwad	Shrahatti	Gadag
21.	UAS Dharwad	Athani	Belgham
22.	UAS Dharwad	Babaleshwara	Bijapura
23.	IISc, Bangalore	Gudlupete	Chamarajanagara