(Comp. No. 3014250)
No. K-11011/08/2024-WDC-PMKSY-Part(1)
भारतसरकार/ Government of India
ग्रामीणविकासमंत्रालय/ Ministry of Rural Development
भूमिसंसाधनविभाग / Department of Land Resources
वाटरशेडप्रबंधनप्रभाग / Watershed Management Division

2nd Floor, Shivaji Annexe Building,
Connaught Place, New Delhi
Dated: 23rd May, 2025

Inviting Research Proposals for undertaking Research from reputed National Institutions and Individuals

Department of Land Resources (DoLR), Ministry of Rural Development invites research proposals from reputed experienced National Institutions and Individuals for ***"Research and Innovation Development Support under Watershed Development Component of Pradhan Mantri Krishi Sinchayee Yojana 2.0 (WDC-PMKSY 2.0)".***Accordingly research proposals are invited on following topics from relevant and experienced National Institutions/Individuals:-

i. Scope for Energy Crops under WDC PMKSY 2.0 Projects for enhancing the farmer's income.

ii. Development of a Decision Support System for Watershed Management using Data Analytics.

iii. Assessing the Impact of Climate Change on Land Degradation and Suggesting Mitigation and Adaptation Strategies.

iv. Assessing the Impact of Land Resource Inventory on Hydrologic Outcomes in Watershed Planning and Management under watershed projects: A Case Study.

v. Community-Based Springshed Management for ensuring Water Security & Livelihoods in Indian Himalayan States.

vi. Evaluating the Effectiveness of Watershed Management Policies in India: A Comparative Study of Success Stories and Challenges.

vii. Water Governance and Watershed Management: An Analysis of Policy and Institutional Frameworks in India.

viii. The Public-Private- People (PPP) Partnership approach in Watershed Development.

ix. Promotion of Ecotourism in Watershed Development Projects.

x. Scope for Convergence of Relevant Schemes for Sustainable Watershed Management and suggest Mechanism for Effective Convergence.

2. The details of Institutional / Individual Research Grant Guidelines including eligibility criteria and prescribed application formats etc., are **enclosed** and also given at the official website of this Department i.e. ***https://dolr.gov.in/document/guidelines-for-research-studies-under-wdc-pmksy-2-0/.*** Interested experienced National Institutions and Individuals may send their proposals in the prescribed format duly signed (scanned / PDF) through e-mail at recruit.reward-dolr@gov.in only. Proposal received through email will be only considered and proposal received physically will be not entertained. The proposal should be addressed to Under Secretary (WM), Watershed Management Division, Department of Land Resources, Shivaji Annexe Building, Connaught Place, New Delhi. **The last day of receiving research proposals is 8th June, 2025.**

Encl: As above

(प्रेम नाथ)
अवर सचिव भारत सरकार
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Distribution:

1. Chairman/CEO, State Level Nodal Agency (SLNA) for WDC-PMKSY 2.0 in States/ UTs.
2. The Vice Chancellor, all Agricultural Universities in the country (as per list enclosed)
3. Relevant ICAR Institutes (as per list enclosed).

Institutional Research Grant Guidelines for WDC-PMKSY

1. Objective:

The Institutional Research Grant under the Watershed Development Component of Pradhan Mantri Krishi Sinchayee Yojana (WDC-PMKSY) aims to provide financial support to universities and research institutions engaged in applied core research. This initiative seeks to advance knowledge and practices in climate-resilient watershed management and sustainable agriculture by promoting innovative, futuristic, and data-driven solutions, including the integration of Artificial Intelligence (AI) and other advanced technologies.

2. Key Points:

a) Eligibility Criteria:

i. The University/ College/ Research Institutions of repute, recognized by National/ International bodies, involved in watershed & agricultural development and any other related field.

ii. University/ College/ Research Institutions must have at least 10 years of research experience, and successful completion of at least 20 sponsored projects till date.

iii. The University/ College/ Research Institutions will designate a Principal Investigator who is suitably qualified, experienced, and holds a Ph.D. in a relevant field.

iv. Research should align with the goals of WDC-PMKSY, particularly in areas such as water conservation, soil health, and watershed management, such as referring to Artificial Intelligence in Watershed Management, Block chain for Water Resource Governance, Smart Sensors for Real-Time Monitoring, Digital Twins of Watersheds, Climate-Resilient Crop Varieties, Automated Decision Support Systems, Bio systems for Nutrient Recycling, Drones for Watershed Surveillance, Community-Based Crowd sourcing for Data Collection etc.

b) Grant Details:

i. The research grant is for two years, with the provision of 10 grants in a year (or as specified by the competent authority).

ii. The University/ College/ Research Institutions will propose a research topic that aligns with the advancement of watershed development in India, as mentioned above.

iii. The total grant amount is Rs. 50lakh, which can be used for minor equipment, hiring of two to three research fellows, consumables, fieldwork, travel (domestic only), and contingencies.

iv. The grant cannot be used for international travel, purchasing furniture.
v. Equipment procured will be the property of the hosting institution.
vi. Eligible University/ College/ Research Institutions should submit their application using the formats annexed. The submission must include a concise and well-defined hypothesis, along with a clear and detailed methodology.

3. Selection Process:

i. Applications will be submitted online and evaluated by a panel of referees based on the research proposal's merit, the University/ College/ Research Institutions professional background, and the relevance to the watershed development, and or related field etc.
ii. The evaluation criteria include the potential impact of the research on watershed management, innovation, and alignment with national priorities.
iii. A list will be published based on the referee's scores, and award letters will be issued digitally.

4. Grant Activation and Utilization:

i. The selected institution/ principal investigator must activate the grant within one month of receiving the award letter, with an extension up to three months in exceptional cases.
ii. The first instalment of 50% will be released upon acknowledgment and acceptance of the award letter, followed by 25% after submitting the utilization report for the first instalment. The remaining 25% will be released based on the final report approval and claims.
iii. The grant period is strictly for two years, with no extensions, and funds must be fully utilized within this period.

5. Monitoring and Evaluation:

i. The University/ College/ Research Institutions should make two presentations before the review panel, one on the progress of the research and the other on the research findings and recommendations.

ii. Upon completion, the institution should submit a final report summarizing the research outcomes along with any published papers.

6. Termination of Grant:

The grant may be terminated in cases of misconduct, false information, failure to meet research milestones, or unethical practices such as plagiarism. The awardee will have an opportunity to defend their case before termination.

Annexure-I

Application for Research

PHOTO

1. Name of the Topic:
2. Name of University/ College/ Research Institutions:
3. Name of the designated Principal Investigator:
4. Designation:
5. Brief about the University/ College/ Research Institutions:
6. Experience University/ College/ Research Institutions:
7. List out 5 applied research in relevant topics and output of research in last 5 years:
8. Hypothesis and Methodology of the research topic:

Annexure-II

Certificate

This is to certify that Mr./Ms_____is Principal Investigator and working with the Department of _____University/College/Institute_____as _____with effect from_____.

He/She will be the designated Principal Investigator for the research proposed and provided with all necessary facilities during the tenure of award. The University/College/Institute fully accepts the terms and conditions of the offer. It is also certified that he/she is an employee of the University/College/Institute and demonstrates both the commitment and the capability to successfully conduct research in the specified area under the Department.

Signature of Principal Investigator Date:
Name:

Signature of Head of Department Date: Seal:	Signature of Head of Institution: Date: Seal:
Name:	Name:
Designation:	Designation:

Annexure-III

UTILISATIONCERTIFICATE

Certified that an amount of Rs._____(Rupees_____ _____) has been utilized out of the sanctioned grant of Rs. _____(Rupees_____)

for the purpose for which it was sanctioned in accordance with the terms and conditions laid down by the WM Division to Prof./Dr._____ _____

Principal Investigator for the research topic_____ _____,sanctioned vide letter number___, dated _____ ___to_____ the

University/ College/ Research Institution has utilised sum of Rs._____ _____. _____The balance of Rs……..remaining unutilized at the end of the year has been surrendered to Government(vide No. Total .....dated.....)/will be adjusted towards the grants payable during the next year.....If, as a result of check or audit objection, some irregularity is noticed at a later stage, action will be taken to refund/adjust or regularize the objected amount.

Signature of Principal Investigator:
Name:

Signature of Head of Department:	Signature of Head of Institution:
Date:	Date:
Seal:	Seal:
Name:	Name:
Designation:	Designation:

Note: For any correspondence in this regard, the WM division letter number and date may please be quoted without fail.

Annexure-IV

UndertakingfromtheUniversity/Institution

This is to certify that Prof./Dr._____Designated Principal Investigator is a permanent faculty of the Department of _____of___ _____University/College/Institution. His/Her date of retirement/superannuation from the University/College/Institution is_____.

He/She will be provided required laboratory, necessary infrastructure for carrying out his/her research work during the sanctioned period of the two years,

Forwarded by:

Signature of HoD /Signature of Registrar

Dated:

Individual Research Grant Guidelines for WDC-PMKSY

1. Objective:

The purpose of the individual research grant under the WDC-PMKSY (Watershed Development Component of Pradhan Mantri Krishi Sinchayee Yojana) is to provide financial assistance to faculty members working in relevant institutions to pursue research in watershed management, rainfed area development, degraded land development, sustainable agriculture, and related subject.

2. Key Points:

a) Eligibility Criteria:

i. Faculty must be employed at Institutions/ Research Centres recognized by Universities, or at deemed to be Universities or at Institutions/ Research Centres funded by Central/ State Governments.

ii. Applicants must have at least 10 years of service left in the institution and a proven record in Ph.D. supervision (minimum 5 students) and successful completion of at least two sponsored projects funded by national/ international Govt or Private agencies.

iii. Research should align with the goals of WDC-PMKSY, particularly in areas such as water conservation, soil health, community engagement, and watershed management, Evidence based Detailed Project Report preparation using Decision Support System (DSS) & Land Resource Inventory (LRI), Optimizing Watershed Structure Placement through GIS-Based Hydrological Modelling in Semi-Arid Regions, Hydrological Response and Water Balance Assessment for Efficient Watershed Structure Placement in Degraded Lands, Impact of Watershed Structures on Groundwater Recharge and Surface Runoff, Climate resilience Hydrological Analysis for Enhancing the Efficiency of Water Harvesting Structures in Watershed Management etc.

b) Grant Details:

i. The research grant is for two years, with the provision of 20 grants in a year (or as specified by the competent authority).

ii. The total grant amount is Rs. 10 lakh, which can be used for purchasing items like minor equipment, hiring of one research fellow, consumables, fieldwork, travel (domestic only), and contingencies.

iii. The grant cannot be used for international travel, purchasing furniture etc.

iv. Equipment procured will be the property of the hosting institution.

v. Eligible applicants should submit their application in theformats annexed.

vi. The submission must include a concise and well-defined hypothesis, along with a clear and detailed methodology.

3. **Selection Process:**
    i. Applications will be submitted online and evaluated by a panel of referees based on the research proposal's merit, the candidate's professional background, and the institution.
    ii. The evaluation criteria include the potential impact of the research on watershed management, innovation, and alignment with national priorities.
    iii. A merit list will be published based on the referees' scores, and award letters will be issued digitally.

4. **Grant Activation and Utilization:**
    i. The selected faculty must acknowledge and accept the grant within one month of receiving the award letter.
    ii. The first instalment of 50% will be released upon receipt of the acknowledgement and acceptance letter, followed by 25% after submitting the utilization report for the first instalment. The remaining 25% will be released based on the final report approval and claims.
    iii. The grant period is strictly for two years, with no extensions, and funds must be fully utilized within this period.

5. **Monitoring and Evaluation:**
    i. The applicant should make two presentations before the review panel: one on the progress of the research and the other on the research findings and recommendations.
    ii. Upon completion, the institution concerned should submit a final report summarizing the research outcomes along with any published papers.

6. **Termination of Grant:**

The grant may be terminated in cases of misconduct, false information, failure to meet research milestones, or unethical practices such as plagiarism. The awardee will have an opportunity to defend their case before termination.

Application for Research **Annexure-I**

PHOTO

1. Name of the Topic:

2. Name of the Faculty:
3. Name of the Institute:
4. Present Designation:

5. Qualification:

6. Experience:

7. Hypothesis and Methodology of the proposed research topic:

Annexure-II

Certificate

This is to certify that Mr./Ms_____is a faculty working with the Department of_____University/ Collage / Institute_____as _____with effect from_____. He/She will be provided with all necessary facilities during the tenure of award. The faculty fully accepts the terms and conditions of the offer. It is also certified that he/she is an employee of the University/College/Institute and demonstrates both the commitment and the capability to successfully conduct research in the specified area under the Department.

Signature of Faculty Date:
Name:

Signature of Head of Department Date: Seal:	Signature of Head of Institution: Date: Seal:
Name:	Name:
Designation:	Designation:

Annexure-III

UTILISATIONCERTIFICATE

Certified that an amount of Rs._____(Rupees_____ _____) has been utilized out of the sanctioned grant of Rs. ____(Rupees_____) for the purpose for which it was sanctioned in accordance with the terms and conditions laid down by the WM Division to Prof./Dr. _____ (Faculty) for the research topic_____, sanctioned vide letter number__, dated _____to____the applicant has utilised sum of Rs._____ _____._____The balance of Rs.……..remaining unutilized at the end of the year has been surrendered to Government (vide No. Total .....dated.....)/will be adjusted towards the grants payable during the next year.....

If, as a result of check or audit objection, some irregularity is noticed at a later stage, action will be taken to refund/adjust or regularize the objected amount.

Signature of Principal Investigator:
Name:

Signature of Head of Department:	Signature of Head of Institution:
Date:	Date:
Seal:	Seal:
Name:	Name:
Designation:	Designation:

Note: For any correspondence in this regard, the WM division letter number and date may please be quoted without fail.

Annexure-IV

Undertaking from the University/Institution

This is to certify that Prof./Dr._____ _____Principal Investigator is a permanent faculty of the Department of _____of_____ _____University/Institution. His/Her date of retirement/superannuation from the University/Institution is_____ _____. He/She will be provided required laboratory, necessary infrastructure for carryout his/her research work during the sanction period of the two years,

Forwarded by:

Signature of HoD / Signature of Registrar

Dated:

Watershed Management Division, DoLR

Topics Identified for undertaking Thematic Research through specialized Institutions/ Individuals (both Govt. and Non-Govt.).

1. Scope for Energy Crops under WDC PMKSY 2.0 Projects for enhancing the farmers income.
2. Development of a Decision Support System for Watershed Management using Data Analytics.
3. Assessing the Impact of Climate Change on Land Degradation and Suggesting Mitigation and Adaptation Strategies.
4. Assessing the Impact of Land Resource Inventory on Hydrologic Outcomes in Watershed Planning and Management under watershed projects: A Case Study.
5. Community-Based Springshed Management for ensuring Water Security & Livelihoods in Indian Himalayan States.
6. Evaluating the Effectiveness of Watershed Management Policies in India: A Comparative Study of Success Stories and Challenges.
7. Water Governance and Watershed Management: An Analysis of Policy and Institutional Frameworks in India.
8. The Public-Private- People (PPP) Partnership approach in Watershed Development
9. Promotion of Ecotourism in Watershed Development Projects
10. Scope for Convergence of Relevant Schemes for Sustainable Watershed Management and suggest Mechanism for Effective Convergence

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Research Topics for Institutions / Individual (both Govt. and Non-Govt.) researchers on Watershed Development

1. Scope for Energy Crops under WDC PMKSY 2.0 Projects for enhancing the farmers income

Introduction

India's growing energy demand and the need for sustainable agricultural practices have led to an increased focus on renewable energy sources, including bioenergy. The Watershed Development Component (WDC) under the Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) 2.0 presents a strategic opportunity to integrate energy crops into production systems, aligning with the goals of sustainable land and water management, Rain Water Use Efficiency(RWUE) enhanced agricultural productivity, and energy security.

Background

The WDC-PMKSY 2.0 aims to improve Natural Resources Management (NRM), productivity and resource efficiency of rain-fed agriculture through watershed management. The integration of food crops in align with energy crops, which are grown specifically for their ability to be converted into biofuels or other forms of renewable energy, can play a crucial role in achieving these objectives. Energy crops such as Pongamia, Cactus, Napier grass, Energy Cane, Sweet Sorghum, and Switchgrass have the potential to provide both environmental and economic benefits in watershed development areas.

Objectives

The primary objectives of this research are:

- To assess the potential of energy crops as a sustainable component of production systems in watershed areas.
- To evaluate the impact of energy crops on soil health, water use efficiency, and overall agricultural productivity.
- To develop models and guidelines for the integration of energy crops into existing farming systems under the WDC-PMKSY 2.0 framework.
- To analyze the socio-economic benefits of adopting energy crops for farmers and local communities.

Research Questions

a. What are the most suitable energy crops for different agro-climatic zones within the WDC-PMKSY 2.0 project areas?

b. How do energy crops affect soil health and water conservation in watershed regions?

c. What are the best practices for integrating energy crops into existing farming systems?

d. What are the economic implications for farmers adopting energy crops as part of their production systems?

e. How can the cultivation of energy crops contribute to the broader goals of sustainable development and energy security?

Methodology

The research will be conducted in selected watershed areas under the WDC-PMKSY 2.0 projects. The methodology will include:

- **Site Selection:** Identification of suitable watershed regions with varying agro-climatic conditions.
- **Crop Selection:** Evaluation of energy crops like Sweet Sorghum, Switchgrass, etc based on crop suitability.
- **Field Trials:** Establishment of demonstration plots for energy crops to study growth patterns, yield, and resource use efficiency.
- **Soil and Water Analysis:** Monitoring the impact of energy crops on soil quality and water use efficiency.
- **Economic Analysis:** Cost-benefit analysis to determine the financial viability for farmers.
- **Stakeholder Engagement:** Involvement of local farmers, government agencies, and industry stakeholders in the planning and execution of the project.

Expected Outcomes

- **Guidelines for Integration:** Development of practical guidelines for the integration of energy crops into production systems under WDC-PMKSY 2.0.
- **Improved Soil and Water Management:** Enhanced understanding of how energy crops contribute to soil health and water conservation.
- **Economic Benefits:** Evidence of the economic viability of energy crops for smallholder farmers.
- **Policy Recommendations:** Recommendations for policymakers on promoting energy crops as part of sustainable agricultural practices.

Conclusion

Integrating energy crops into the production systems of watershed areas under WDC-PMKSY 2.0 presents a unique opportunity to enhance agricultural sustainability, Carbon sequestration, improve resource management, and contribute to India's renewable energy goals. This research

aims to provide a comprehensive framework for the successful adoption and scaling of energy crops in these regions, ultimately benefiting both the environment and local communities.

2. **"Development of a Decision Support System for Watershed Management using Data Analytics".**

- **Introduction:**

Watershed management is a critical approach for sustainable land, water, and environmental management, particularly in regions facing water scarcity, land degradation, and climate variability. The integration of advanced data analytics and decision support systems (DSS) into watershed management can revolutionize the way we assess, plan, and implement conservation measures. This project aims to develop a Decision Support System (DSS) using data analytics to enhance watershed management under the Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) 2.0 projects.

- **Problem Statement:**

Current watershed management practices are often hindered by inadequate data integration, delayed decision-making, and insufficient predictive capabilities. The absence of a cohesive system that utilizes real-time data analytics limits the efficiency and effectiveness of watershed interventions. A DSS leveraging data analytics can address these issues, providing a robust platform for planners, policymakers, and stakeholders to make informed decisions.

- **Objectives:**
  - To develop a data-driven Decision Support System for watershed management.
  - To integrate multi-source data (geospatial, hydrological, meteorological, and socioeconomic) for comprehensive watershed analysis.
  - To create predictive models for water availability, soil health, and crop productivity.
  - To provide scenario analysis and decision-making tools for sustainable watershed interventions.

- **Scope and Methodology:**
  - **Scope:** The DSS will be designed to support decision-making in watershed management activities under the PMKSY 2.0 initiative. It will focus on areas including water resource management, soil conservation, crop selection, and monitoring of watershed interventions.
  - **Methodology:**

  ✓ **Data Collection and Integration:**

    - Collect and integrate data from various sources, including satellite imagery, sensor data, hydrological models, and field surveys.
    - Incorporate socio-economic data to understand community needs and intervention impacts.

  ✓ **Data Analytics:**

- Apply machine learning algorithms and statistical models to analyze hydrological and environmental data.
- Develop predictive models for water flow, soil erosion, and crop yield potential.

✓ **Decision Support System Development:**

- Design a user-friendly DSS interface with visualization tools for data interpretation.
- Integrate scenario analysis features to evaluate different watershed management strategies.

✓ **Validation and Pilot Testing:**

- Conduct pilot testing in selected watersheds to validate the DSS's effectiveness.
- Incorporate feedback from stakeholders to refine the system.

- **Expected Outcomes:**

✓ A comprehensive DSS that integrates multi-source data for enhanced watershed management.

✓ Improved predictive capabilities for water resource availability, soil conservation, and agricultural planning.

✓ Enhanced decision-making for policymakers and stakeholders, leading to more efficient watershed interventions.

- **Significance of the Study:**

The proposed DSS will significantly contribute to sustainable watershed management, enabling data-driven decisions that enhance water use efficiency, improve crop productivity, and reduce land degradation. By aligning with PMKSY 2.0 objectives, this project will support the government's mission of enhancing water security and promoting sustainable agricultural practices.

- **Implementation Strategy:**
  - Collaborate with government agencies, academic institutions, and technology partners for data access and system development.
  - Ensure capacity building and training for stakeholders to use the DSS effectively.
  - Establish monitoring and feedback mechanisms for continuous improvement of the system.

- **Budget and Resources:**
  - Estimated budget allocation for data collection, software development, hardware procurement, and pilot testing.
  - Resource needs include data analysts, GIS specialists, software developers, and watershed management experts.

- **Conclusion:**

The development of a Decision Support System for watershed management using data analytics represents a transformative approach to addressing current challenges in watershed planning and implementation. This project will create a scalable, adaptable, and data-driven solution to optimize watershed interventions, benefiting both the environment and local communities.

3. **"Assessing the Impact of Climate Change on Land Degradation and Suggesting Mitigation andAdaptation Strategies"**

- **Introduction:**

  Climate change is a significant driver of land degradation, manifesting in various forms such as soil erosion, desertification, loss of soil fertility, and changes in land cover. These processes threaten food security, biodiversity, and the livelihoods of millions of people worldwide. Understanding the impacts of climate change on land degradation and developing effective mitigation and adaptation strategies are crucial for sustainable land management and environmental conservation.

- **Problem Statement:**

  The intensifying effects of climate change—rising temperatures, altered precipitation patterns, and increased frequency of extreme weather events—are exacerbating land degradation globally. However, the specific impacts of climate change on different land degradation processes are not fully understood, leading to gaps in the implementation of targeted and effective mitigation and adaptation measures. This research aims to assess these impacts comprehensively and develop strategies to combat land degradation in the face of climate change.

- **Objectives:**

  1. To assess the impacts of climate change on land degradation processes, including soil erosion, desertification, and loss of soil organic matter.
  2. To identify regions and ecosystems most vulnerable to climate-induced land degradation.
  3. To develop and suggest effective mitigation and adaptation strategies tailored to different land degradation scenarios.
  4. To provide policy recommendations for sustainable land management under changing climatic conditions.

- **Scope and Methodology:**

  - **Scope:**

  The research will focus on analyzing the impacts of climate change on land degradation across diverse ecosystems, including arid, semi-arid, and humid regions. Special attention

will be given to agricultural lands, rangelands, and forested areas that are particularly vulnerable to degradation.

- **Methodology:**
  - Data Collection and Analysis:
    - Collect data on climate variables (temperature, rainfall, extreme events) from meteorological stations and satellite imagery.
    - Use remote sensing and GIS tools to map land degradation patterns over time.
    - Analyze soil samples to assess changes in soil properties related to climate-induced degradation.
  - Climate Impact Assessment:
    - Use climate models to project future climate scenarios and their potential impacts on land degradation processes.
    - Assess the vulnerability of different regions to climate-induced land degradation using indicators such as soil erosion rates, vegetation loss, and changes in land cover.
  - Mitigation and Adaptation Strategy Development:
    - Develop mitigation strategies focusing on soil conservation, reforestation, and sustainable land management practices.
    - Propose adaptation measures, including climate-resilient cropping systems, water management techniques, and community-based land restoration programs.
  - Stakeholder Engagement:
    - Conduct workshops and interviews with local communities, land managers, and policymakers to gather insights on existing challenges and potential solutions.
    - Involve stakeholders in co-designing adaptation strategies to ensure their relevance and applicability.
- **Expected Outcomes:**
  - ✓ A comprehensive assessment of the impacts of climate change on various land degradation processes.
  - ✓ Identification of the most vulnerable regions and ecosystems requiring urgent intervention.
  - ✓ A set of evidence-based mitigation and adaptation strategies tailored to specific degradation scenarios.
  - ✓ Policy recommendations to guide sustainable land management in the context of climate change.
- **Significance of the Study:**

This research will provide valuable insights into the links between climate change and land degradation, informing the design of targeted interventions to mitigate these impacts. The proposed strategies will help enhance the resilience of ecosystems and communities, contributing to sustainable land management and climate adaptation efforts at local, national, and global levels.

- **Implementation Strategy:**
  - ✓ Collaborate with academic institutions, government agencies, and local communities for data collection and analysis.
  - ✓ Develop pilot projects to test and validate proposed mitigation and adaptation strategies.
  - ✓ Provide training and capacity-building initiatives for stakeholders to implement recommended practices effectively.
- **Budget and Resources:**
  - ✓ Estimated budget allocation for field data collection, climate modeling, stakeholder engagement, and strategy development.
  - ✓ Resource needs include climate scientists, soil experts, GIS specialists, community engagement coordinators, and policy analysts.
- **Conclusion:**

  Assessing the impact of climate change on land degradation and developing suitable mitigation and adaptation strategies are essential steps towards achieving sustainable land management. This research aims to provide a science-based framework to guide policymakers and land managers in addressing climate-induced degradation challenges and building resilience for the future.

4. **"Assessing the Impact of Land Resource Inventory on Hydrologic Outcomes in Watershed Planning and Management under watershed projects: A Case Study.**

- **Introduction:**

  Land Resource Inventory (LRI) is a crucial tool in watershed planning and management, providing detailed information about land use, soil types, topography, and vegetation cover. By integrating LRI into watershed management, planners can make informed decisions to optimize land and water resources, improve hydrologic outcomes, and enhance the overall sustainability of watershed projects. This study aims to assess the impact of LRI on hydrologic outcomes in watershed planning and management, focusing on a specific case study to illustrate its effectiveness.

- **Problem Statement:**

  The effectiveness of watershed management largely depends on accurate information about land resources. However, many watershed projects lack comprehensive LRI data, leading to suboptimal hydrologic outcomes such as poor water retention, increased soil erosion, and inefficient water use. This research examines how the integration of LRI influences hydrologic outcomes, demonstrating the value of detailed land resource data in watershed planning and decision-making.

- **Objectives:**
  - ✓ To assess the role of Land Resource Inventory in enhancing hydrologic outcomes in watershed projects.
  - ✓ To evaluate how LRI data influences planning and management decisions in watershed interventions.
  - ✓ To analyze specific hydrologic outcomes such as water availability, soil erosion control, and groundwater recharge in the selected case study.
  - ✓ To provide recommendations for integrating LRI into future watershed planning and management efforts.

- **Scope and Methodology:**
  - **Scope:**

  The study will focus on a selected watershed project as a case study, where LRI data has been integrated into planning and management. The research will cover hydrologic outcomes including water availability, runoff patterns, soil erosion, and groundwater recharge, providing insights into the effectiveness of LRI in watershed management.

- **Methodology:**
  - ✓ **Case Study Selection:**
    - Select a watershed project that has utilized LRI data in its planning and management process.
    - Collect baseline data on the watershed's hydrologic conditions before and after the implementation of LRI-based interventions.

  - ✓ **Data Collection:**
    - Compile LRI data including land use, soil types, slope, vegetation cover, and other relevant land characteristics.
    - Gather hydrological data such as rainfall, runoff, infiltration rates, and groundwater levels from project reports, field measurements, and remote sensing.

  - ✓ **Impact Assessment:**
    - Analyze the impact of LRI on hydrologic outcomes using statistical tools and hydrological models (e.g., SWAT, HEC-HMS).
    - Compare hydrologic conditions before and after LRI-based watershed management interventions to assess changes in water availability, soil erosion rates, and groundwater recharge.

  - ✓ **Stakeholder Analysis:**
    - Conduct interviews and surveys with project stakeholders, including local communities, watershed planners, and government officials, to understand the perceived impact of LRI on project outcomes.

  - ✓ **Data Analysis and Interpretation:**
    - Use GIS and remote sensing tools to visualize changes in land use and hydrologic parameters.
    - Evaluate the effectiveness of LRI-based interventions in enhancing water resource management within the watershed.

- **Expected Outcomes:**
  - ✓ A comprehensive evaluation of how LRI contributes to improved hydrologic outcomes in watershed management.
  - ✓ Insights into the specific benefits of LRI, such as reduced runoff, improved water retention, and enhanced groundwater recharge.
  - ✓ Identification of key factors that influence the effectiveness of LRI in watershed planning.
  - ✓ Recommendations for best practices in integrating LRI data into watershed management processes.

- **Significance of the Study:**
  The study will demonstrate the critical role of LRI in enhancing hydrologic outcomes, providing evidence to support the use of detailed land resource data in watershed planning

and management. The findings will help policymakers, planners, and stakeholders make informed decisions to optimize watershed interventions, ensuring sustainable water and land resource management.

- **Implementation Strategy:**
  - ✓ Collaborate with local agencies, academic institutions, and project teams involved in the selected watershed case study.
  - ✓ Share findings and recommendations through workshops, reports, and policy briefs to encourage the adoption of LRI in watershed planning.
  - ✓ Develop capacity-building initiatives to train stakeholders on the use of LRI data in hydrologic modeling and decision-making.

- **Budget and Resources:**
  - ✓ Estimated budget allocation for field data collection, hydrologic modeling, GIS analysis, and stakeholder engagement.
  - ✓ Resource needs include hydrologists, GIS specialists, data analysts, and community engagement experts.

- **Conclusion:**

This research will highlight the value of Land Resource Inventory in watershed planning, showcasing how it enhances hydrologic outcomes and supports sustainable watershed management. By illustrating the positive impacts of LRI, the study will advocate for the broader adoption of LRI data in future watershed projects, contributing to improved water resource management and resilience against climate variability.

5. Community-Based Springshed Management for ensuring Water Security& Livelihoodsin Indian Himalayan States.

- **Introduction:**

  Springs are vital sources of water for communities in the Indian Himalayan states, providing essential support for drinking water, agriculture, and ecosystem services. However, these springs are increasingly under threat due to factors such as climate change, deforestation, land-use changes, and unplanned development. Community-based springshed management (CBSM) has emerged as an effective approach to revitalize springs, enhance water security, and support local livelihoods. This research focuses on assessing the effectiveness of CBSM in ensuring water security and improving livelihoods in the Indian Himalayan region.

- **Problem Statement:**

  The degradation and drying up of springs in the Indian Himalayan states have severe consequences for water availability, agriculture, and the livelihoods of local communities. Traditional knowledge and community management practices are often overlooked in conventional water management approaches. CBSM offers a participatory, decentralized, and eco-friendly solution to springshed conservation but requires systematic study and integration into policy frameworks to maximize its potential.

- **Objectives:**
  - ✓ To assess the impact of community-based springshed management on water security in selected Himalayan communities.
  - ✓ To evaluate the influence of CBSM on enhancing local livelihoods and building community resilience.
  - ✓ To document traditional knowledge and practices related to springshed management.
  - ✓ To provide recommendations for scaling up CBSM in the Indian Himalayan states.

- **Scope and Methodology:**
  - **Scope:**

  The research will focus on selected case studies of CBSM initiatives in the Indian Himalayan states, including Uttarakhand, Himachal Pradesh, Sikkim, and Arunachal Pradesh. It will analyze the impacts of these initiatives on water availability, agriculture, and community livelihoods.

- **Methodology:**
  - **Case Study Selection:**
    - Identify successful CBSM projects in the Indian Himalayan states that demonstrate a clear impact on water security and livelihoods.

- Include diverse geographical settings and community structures to provide a comprehensive analysis.

- **Data Collection:**
  - Collect primary data through field surveys, focus group discussions, and key informant interviews with local communities, project implementers, and experts.
  - Compile secondary data from project reports, government publications, and academic literature on springshed management.
- **Hydrological Assessment:**
  - Conduct hydrogeological mapping of springs to understand recharge areas, water flow patterns, and seasonal variability.
  - Measure key hydrological parameters, such as spring discharge, water quality, and groundwater levels, before and after CBSM interventions.
- **Livelihood Analysis:**
  - Evaluate changes in agricultural productivity, income levels, and employment opportunities linked to improved water availability.
  - Analyze the role of CBSM in supporting allied activities such as horticulture, animal husbandry, and eco-tourism.
- **Community Engagement and Traditional Knowledge:**
  - Document traditional practices and indigenous knowledge systems related to springshed management.
  - Assess the role of community participation, governance structures, and gender dynamics in CBSM initiatives.

- **Expected Outcomes:**

✓ A comprehensive assessment of the impact of CBSM on water security and community livelihoods in the Indian Himalayan states.
✓ Documentation of successful CBSM models and traditional practices that can be replicated in other regions.
✓ Insights into the role of community participation, local governance, and traditional knowledge in springshed management.
✓ Policy recommendations for scaling up CBSM to enhance water security and livelihoods in vulnerable Himalayan communities.

- **Significance of the Study:**

The study will highlight the importance of community involvement in water resource management, showcasing CBSM as a sustainable and effective approach to springshed conservation. By emphasizing the role of traditional knowledge and community governance, the research will provide valuable insights for policymakers, water managers, and development practitioners aiming to enhance water security and support livelihoods in the Himalayan region.

- **Implementation Strategy:**

✓ Collaborate with local NGOs, community groups, and government agencies involved in springshed management.
✓ Share research findings through workshops, policy briefs, and community training sessions to promote the adoption of CBSM.

- ✓ Develop capacity-building initiatives to empower local communities in springshed management and monitoring.

- **Budget and Resources:**
  - ✓ Estimated budget allocation for field data collection, hydrological assessments, community engagement activities, and dissemination of findings.
  - ✓ Resource needs include hydrogeologists, social scientists, community mobilizers, and data analysts.

- **Conclusion:**

Community-Based Springshed Management offers a promising approach to ensure water security and enhance livelihoods in the Indian Himalayan states. By leveraging traditional knowledge and community participation, CBSM can help rejuvenate springs, secure water resources, and improve the socio-economic conditions of mountain communities. This research will provide evidence-based recommendations to scale up CBSM practices, contributing to sustainable development and resilience-building in the region.

6. **"Evaluating the Effectiveness of Watershed Management Policies in India: A Comparative Study of Success Stories and Challenges".**

- ***Background:*** Watershed management is crucial for India's water security, but policy effectiveness varies across regions.
- ***Objective:*** To evaluate the effectiveness of watershed management policies in India, identifying success stories and challenges, and informing policy improvements.
- ***Methodology:***
  - ✓ Literature review: Analyzing existing policies and programs
  - ✓ Case studies: Selecting successful and challenging watersheds for in-depth analysis
  - ✓ Stakeholder engagement: Interviews with policymakers, implementers, and beneficiaries
  - ✓ Comparative analysis: Identifying factors contributing to success or failure
  - ✓ Policy recommendations: Informing improvements and scaling up successes
- ***Expected Outcomes:***
  - ✓ Comprehensive evaluation of watershed management policies in India
  - ✓ Identification of success stories and challenges
  - ✓ Insights into effective policy design and implementation
  - ✓ Recommendations for policy improvements and scaling up successes
  - ✓ Contribution to informed decision-making for sustainable watershed management
- ***Significance:*** This research will provide valuable insights into the effectiveness of watershed management policies in India, supporting policy improvements and sustainable water resource management.

7. **"Water Governance and Watershed Management: An Analysis of Policy and Institutional Frameworks in India".**

- ***Background:*** Effective water governance and watershed management are crucial for India's water security, but policy and institutional frameworks are fragmented and ineffective.
- ***Objective:*** To analyze policy and institutional frameworks for water governance and watershed management in India, identifying strengths, weaknesses, and areas for improvement.
- ***Methodology:***
  - ✓ Policy analysis: Reviewing national and state-level policies related to water governance and watershed management
  - ✓ Institutional analysis: Examining roles and responsibilities of government agencies, NGOs, and community organizations
  - ✓ Case studies: Selecting watersheds for in-depth analysis of policy and institutional frameworks
  - ✓ Stakeholder engagement: Consulting with policymakers, experts, and local communities
  - ✓ Gap analysis: Identifying policy and institutional gaps and inconsistencies
- ***Expected Outcomes:***
  - ✓ Comprehensive analysis of policy and institutional frameworks for water governance and watershed management
  - ✓ Identification of strengths, weaknesses, and areas for improvement
  - ✓ Recommendations for policy and institutional reforms
  - ✓ Insights into effective water governance and watershed management practices
  - ✓ Contribution to informed decision-making for sustainable water management

Significance: This research will provide critical insights into policy and institutional frameworks for water governance and watershed management in India, supporting reforms and ensuring sustainable management of India's water resources

8. The Public-Private- People (PPP) Partnership approach in Watershed Development

Background: The PPP (Public-Private-People) Partnership approach in watershed development involves collaboration between government bodies, private entities, and community to implement, manage and improve watershed areas. This approach leverages the strengths and resources of each sector to achieve sustainable and effective watershed management. The research topic should be able to address the following issues;

- ✓ How PPP approach help resource mobilisation by combining public funds with private investment in large scale watershed projects.
- ✓ How the involvement of Private sector involvement can help to introduce new technologies and methods, improving the efficiency and effectiveness of watershed management.
- ✓ How collaboration helps to balance environmental, economic, and social goals, leading to more sustainable outcomes.
- ✓ How collaboration will help the watershed community to support other backward and forward linkages to achieve economically viable production.

9. Promotion of Ecotourism in Watershed Development Projects

Background: A watershed is an area of land where all the water under it or draining off of it goes into the same place, such as a river or lake. Watershed development involves managing and protecting these areas to ensure sustainable water supply, soil conservation, and habitat preservation. Ecotourism focuses on responsible travel to natural areas that conserve the environment, respect local cultures, and promote the well-being of local communities. It aims to educate travellers while fostering conservation efforts. The research topic should able to address the following issues;

1. What type of interventions need to be taken under scientific watershed management to address the economy, equity and ecology in addition to promotion of tourism
2. What should be the communication strategy to promote effective ecotourism, which is cost effective, educative as well as revenue generating model
3. How to effectively involve the line departments as well as the private organisations for promotion of ecotourism under watershed development.
4. Mechanism for benefit sharing between government, community and private sector organisations involved in the ecotourism model.

10. Scope for Convergence of Relevant Schemes for Sustainable Watershed Management and suggest Mechanism for Effective Convergence

- **Introduction:**

Sustainable watershed management is essential for ensuring water security, improving agricultural productivity, enhancing livelihoods, and conserving natural resources. In India, several government schemes and programs aim to address these challenges, but their impacts often remain limited due to isolated and fragmented implementation. Converging relevant schemes can optimize resources, eliminate duplication, and ensure a holistic approach to watershed management. This research explores the scope for convergence among existing schemes and suggests mechanisms for effective convergence to achieve sustainable watershed management.

- **Problem Statement:**

Watershed management in India is supported by multiple schemes across various ministries, including agriculture, rural development, water resources, and environment. However, lack of coordination and synergy between these schemes often leads to overlapping efforts, resource wastage, and suboptimal outcomes. There is a need to identify convergence opportunities and establish mechanisms that promote coordinated action among various stakeholders involved in watershed management.

- **Objectives:**

1. To identify relevant schemes and programs that can be converged for sustainable watershed management.

2. To assess the scope and benefits of convergence in optimizing resources, enhancing outcomes, and improving implementation efficiency.

3. To suggest mechanisms and frameworks for effective convergence of schemes at various levels (central, state, and local).

- **Scope and Methodology:**
  - **Scope:**

The research focuses on examining the scope of convergence between key schemes relevant to watershed management, such as the Pradhan Mantri Krishi Sinchayee Yojana (PMKSY), Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS), National Mission for Sustainable Agriculture (NMSA), and the Green India Mission, among others. The study will analyze convergence opportunities at the central, state, and local levels, emphasizing rural and semi-arid regions where watershed management is critical.

- **Methodology:**

- Scheme Identification and Analysis:
    - Identify key schemes relevant to watershed management, including those targeting water conservation, soil health improvement, afforestation, and rural development.
    - Analyze the objectives, funding patterns, implementation mechanisms, and geographic focus areas of these schemes to identify potential convergence points.
- Stakeholder Consultations:
    - Engage with stakeholders, including government officials, implementing agencies, community representatives, and experts, to understand existing convergence challenges and opportunities.
    - Conduct interviews and focus group discussions to gather insights on best practices and gaps in the current system.
- Case Study Analysis:
    - Analyze case studies of successful convergence models from different states to identify key factors contributing to their success.
    - Examine the institutional arrangements, coordination mechanisms, and community involvement strategies that facilitated effective convergence.
- Framework Development:
    - Develop a framework for convergence that outlines roles, responsibilities, and coordination mechanisms among various stakeholders.
    - Propose tools and strategies for monitoring, evaluation, and adaptive management to ensure the sustainability of convergence efforts.

- **Scope for Convergence:**
    - Resource Optimization:
        - Combining financial resources from different schemes can enhance the scale and impact of watershed management activities.
        - Leveraging human resources, technical expertise, and infrastructure from various programs can improve implementation efficiency.
    - Holistic Watershed Management:
        - Convergence enables an integrated approach to managing soil, water, vegetation, and livelihoods, addressing multiple aspects of watershed health simultaneously.
        - Coordinated actions can lead to comprehensive land and water conservation, enhancing agricultural productivity and ecosystem resilience.

- Community Engagement and Capacity Building:
    - Converging schemes can streamline community mobilization and capacity-building efforts, fostering greater participation and ownership of watershed interventions.
    - Combining resources from social development and livelihood schemes can enhance the socio-economic benefits of watershed management.
- Policy Coherence and Improved Governance:
    - Convergence helps align policy objectives across ministries and departments, reducing policy contradictions and enhancing governance.
    - It fosters multi-stakeholder collaboration, promoting transparency, accountability, and adaptive management.

- **Suggested Mechanisms for Effective Convergence:**
    - Institutional Coordination Platforms:
        - Establish multi-departmental coordination committees at the central, state, and district levels to oversee the convergence of relevant schemes.
        - Designate a nodal agency or officer responsible for facilitating convergence and resolving inter-departmental conflicts.
    - Integrated Planning and Budgeting:
        - Develop integrated watershed management plans that outline the roles and contributions of each scheme, aligning financial allocations and timelines.
        - Use Geographic Information Systems (GIS) and decision-support tools to identify convergence hotspots and plan targeted interventions.
    - Common Monitoring and Evaluation Framework:
        - Create a unified monitoring and evaluation framework to track the progress of converged activities, ensuring accountability and adaptive management.
        - Use digital platforms for real-time data sharing and feedback among stakeholders to facilitate coordinated decision-making.
    - Capacity Building and Knowledge Sharing:
        - Conduct joint training programs and workshops for government officials, implementing partners, and community members to build capacity for integrated watershed management.
        - Develop knowledge-sharing platforms to disseminate best practices, success stories, and lessons learned from convergence initiatives.
    - Community-Based Convergence Models:

- Encourage community-led planning and implementation of converged activities, promoting local solutions and building social capital.
- Utilize participatory rural appraisal (PRA) tools to engage communities in identifying convergence opportunities and setting priorities.

- **Expected Outcomes:**
  - ✓ Enhanced impact and sustainability of watershed management interventions through resource optimization and coordinated actions.
  - ✓ Improved water security, soil health, and agricultural productivity in targeted watersheds.
  - ✓ Strengthened governance and institutional capacity for integrated watershed management.
  - ✓ Greater community participation and ownership of watershed initiatives, leading to improved livelihoods and resilience.

- **Conclusion:**

The convergence of relevant schemes offers a significant opportunity to enhance the effectiveness of sustainable watershed management in India. By leveraging the strengths of various programs, fostering inter-departmental coordination, and engaging communities, convergence can address the multifaceted challenges of watershed degradation. This research provides a framework for stakeholders to implement convergence in practice, ensuring the holistic and sustainable development of watersheds across the country.