Workshop on the
"Application of Remote Sensing and GIS along with Practical Exposure"

The **School of Earth and Environmental Sciences** in collaboration with the **Society of Environmental Science**, Central University of Himachal Pradesh, organized a **five-day Skill Development Training Workshop on Remote Sensing and GIS** at the Shahpur Campus from **September 23 to 27, 2024**. The program brought together distinguished experts in the field of remote sensing, who delivered lectures on its diverse industrial applications and provided practical demonstrations, enabling participants to gain both theoretical knowledge and hands-on experience. The workshop was inaugurated by the **Department of Environmental Science**, Central University of Himachal Pradesh, in the esteemed presence of **Professor A.K. Mahajan**, **Dr. Manoj Kumar** (Senior Consultant, CoE–SLM, ICFRE), and **Dr. Ram Kumar Singh** (CoE–SLM, ICFRE, Dehradun). The inaugural session commenced with the lighting of the ceremonial lamp, the recitation of *Saraswati Vandana*, and the rendition of the University *Kulgeet*, setting a solemn and scholarly tone for the event.

Professor Deepak Pant, Head of the Department, delivered the welcome address, underscoring the applications of remote sensing and GIS, and encouraging participants to implement their learning in future careers. The Hon'ble Vice-Chancellor, joining virtually, highlighted the industrial relevance of remote sensing and announced the introduction of a certified course and diploma program in the field from the upcoming academic year.

The opening lecture by **Professor A.K. Mahajan** outlined the principles of remote sensing, including the use of active and passive sensors, key satellites such as *Landsat TM* and *Cartosat*, and various orbital types. He also discussed data correction processes essential for accurate analysis. **Dr. Ram Kumar Singh** followed with insights into GIS fundamentals and additional remote sensing applications.

The afternoon session featured a hands-on demonstration by **Dr. Ram Kumar Singh** and **Dr. Manoj Kumar** on downloading remote sensing and GIS datasets from online sources, accompanied by an interactive Q&A session

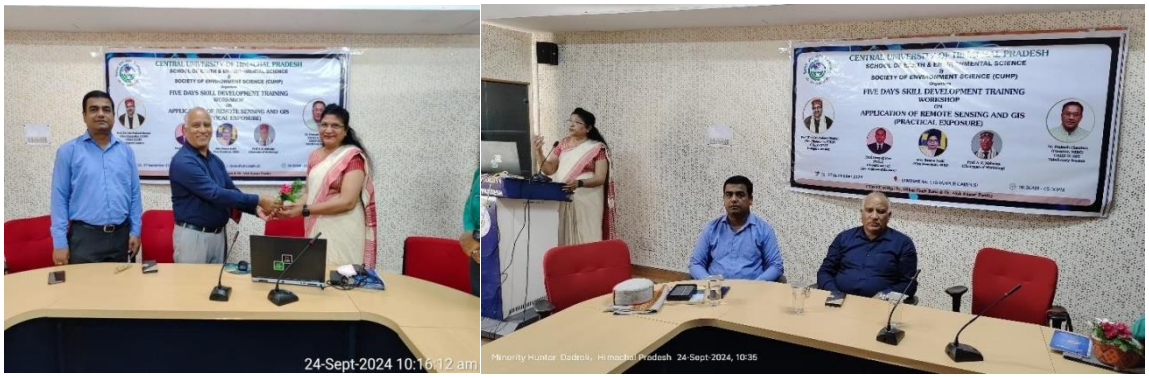
Day 2:Geospatial Technology

On **September 24**, the second day of the workshop featured **Dr. Seema Joshi**, Vice President of Presales at Esri India and a renowned expert with over three decades of experience in implementing Enterprise GIS solutions across sectors such as disaster management, urban planning, smart cities, health, education, environment, and climate change. The session began with a ceremonial welcome, where Dr. Joshi was presented with a *Himachali Topi*, shawl, memento, and geological hammer.

Dr. Joshi's lecture provided an insightful overview of **GIS principles, functions, and applications**, supported by real-world case studies. Examples included the use of GIS in **education** for interactive learning and resource planning; in **community health** for improving Anganwadi service accessibility and monitoring child immunization in rural Maharashtra; in **disaster management** for modeling the **Uttar Pradesh floods** along the Yamuna River; and in **tsunami preparedness** through predictive wave modeling and real-time monitoring.

She elaborated on various GIS implementation models, from **desktop and Web GIS** to **enterprise, cloud, and mobile GIS**, highlighting their advantages for different organizational needs. Dr. Joshi also demonstrated the **ESRI Living Atlas**, showcasing how it provides access to extensive live and historical datasets for research, planning, disaster response, and environmental monitoring.

The afternoon session featured **hands-on training** on installing ArcGIS software and accessing datasets through online mapping portals, allowing participants to practice data retrieval and visualization techniques.



On **September 25**, the third day of the workshop featured two eminent scientists from the **Indian Institute of Remote Sensing (IIRS), ISRO, Dehradun**—**Dr. Anil Kumar** and **Dr. Hitendar Padalia**—who joined the sessions virtually.

The first lecture, delivered by **Dr. Anil Kumar**, Scientist/Engineer "SG" and Head of the Photogrammetry and Remote Sensing Department at IIRS, focused on **advances in remote sensing technology for crop monitoring**. With extensive experience in digital photogrammetry, GPS/GNSS, LiDAR, and soft computing-based algorithms, Dr. Kumar shared research on **single-class mapping** using the in-house developed *SMIC tool* and the *Class-Based Sensor-Independent (CBSI) Indices* technique.
He illustrated applications through multiple case studies, including:

- Harvested and burned paddy field detection using contextual fuzzy models
- Sugarcane mapping with PlanetScope temporal data
- Field-level monitoring of psyllium husk, pearl millet, groundnut, pigeon pea, taramira, and mustard crops using multi-sensor temporal datasets

He concluded by introducing his books, *Fuzzy Machine Learning Algorithms for Remote Sensing Image Classification* and *Multi-Sensor and Multi-Temporal Remote Sensing*.

The second lecture by **Dr. Hitendar Padalia** explored **geospatial technology in forestry, ecology, and environmental sustainability**. He highlighted its role in forest working plans,

the Green India Mission, biodiversity monitoring, and climate studies. Key technologies and examples included:

- **Terrestrial Laser Scanning (TLS)** for high-precision 3D modeling of vegetation and landscapes
- **Microwave remote sensing** using radar for all-weather monitoring (case study: biomass variability in Doon Valley)
- Upcoming **NISAR satellite** for climate and environment observation
- **ESA's Biomass satellite** for global forest biomass assessment and carbon storage estimation
- **Carbon flux towers** for ecosystem CO_2 exchange monitoring
- Remote sensing in detecting invasive species and performing chemical analyses of forests
- **Satellite telemetry** for real-time environmental and disaster monitoring
- **Thermal remote sensing** for vegetation health assessment, land surface temperature mapping, and wildfire detection
- **Forest fire reporting apps** for real-time alerts, GPS-based incident reporting, and evacuation planning

Dr. Padalia emphasized that integrating AI algorithms like the *U-Net deep learning model* with satellite data can significantly improve environmental monitoring and management.

On **September 26**, the workshop featured two expert lectures followed by a hands-on training session.

The first lecture, delivered virtually by **Dr. Irfan Rashid**, Assistant Professor at the University of Kashmir, was on *Geoinformatics for Characterizing Cryosphere-Related Hazards in the Himalayas*. Using case studies such as the 2014 Kashmir floods, Kolahoi Glacier retreat, proglacial lake expansion, Srinagar urbanization, and the 2022 Amarnath tragedy, he demonstrated how remote sensing and GIS can monitor environmental changes. Dr. Rashid discussed the economic importance of cryospheric reserves for irrigation, hydropower, and tourism, and the threats posed by climate change, including glacier melting, aerosol deposition, and permafrost destabilization. He showcased research on winter tourism sustainability, air quality in Kashmir, and glacier detachments, along with field data collection using drones, GPS, and robotic boats.

The second lecture, by **Dr. Sanjay Pandey**, Senior Scientist, Central Groundwater Board, Ministry of Jal Shakti, focused on the *Application of Remote Sensing and GIS in Groundwater Prospecting and Site Selection*. He explained groundwater fundamentals, aquifer properties, and how remote sensing identifies groundwater using first-order indicators (e.g., vegetation, soil moisture, recharge/discharge areas) and second-order indicators (e.g.,

topography, lithology, landforms, drainage patterns). He demonstrated the use of ArcGIS to prepare thematic maps—such as drainage, slope, rainfall, and groundwater potential zones—and explained DEM (Digital Elevation Model) acquisition.

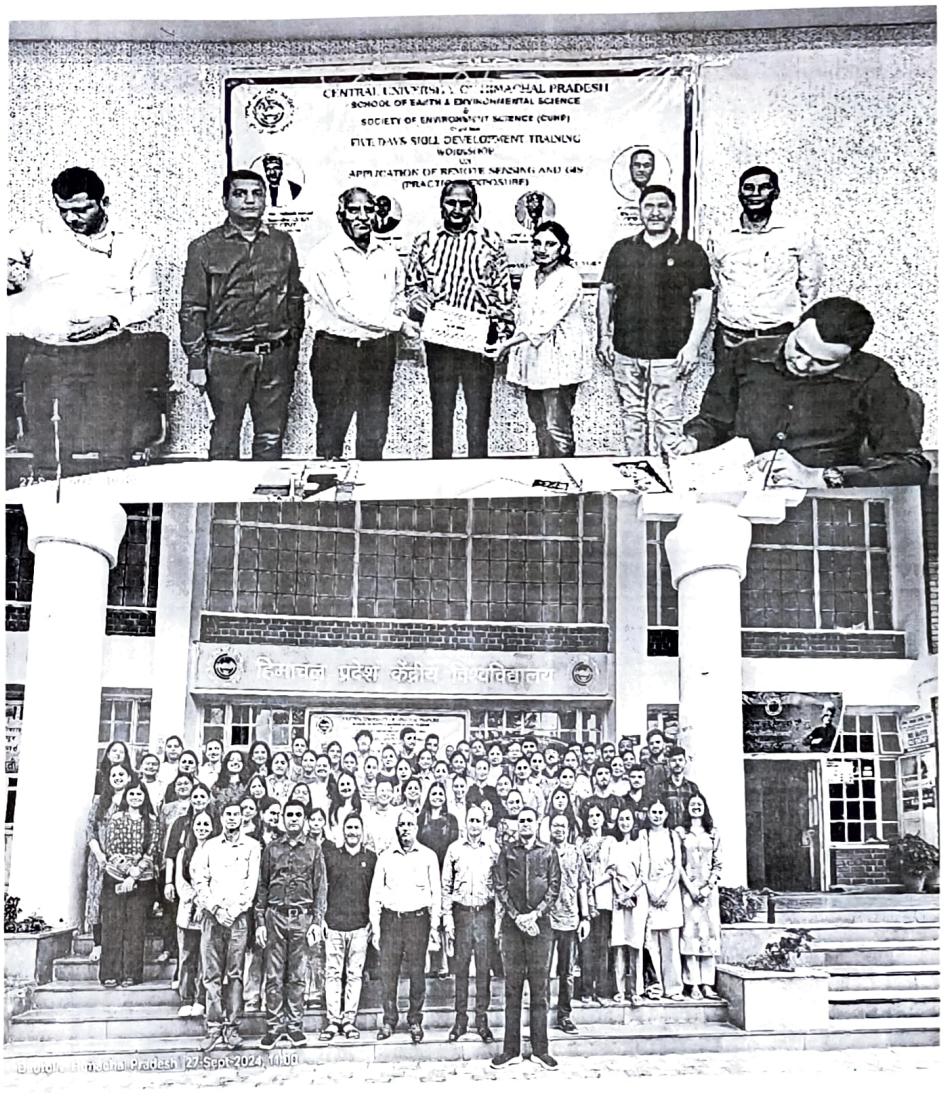
In the afternoon session, **Dr. Ram** and **Dr. Manoj** provided hands-on training on using GNSS software and creating maps in QGIS.

On the last day of the workshop, **September 27th**, a **valedictory function** was held to bring the event to a close. The function began with **Dr. Deepak Pant**, the head of the department, delivering a heartfelt message of gratitude to all the experts, conveners, and participants, while also congratulating everyone on the event's success.

Dr. Ram and **Dr. Manoj** expressed their appreciation to the attendees, offering them valuable advice. They encouraged the students to connect with experts in the fields of **Remote Sensing and GIS**, suggesting they not only practice the tools but also focus on related projects to deepen their expertise. Both speakers motivated the students to continue advancing in their knowledge.

Professor A.K. Mahajan, the chairman of the workshop, then took the stage to commend the hard work and dedication of the conveners, **Dr. Alok Pandey** and **Dr. Dilbagh Rana**, as well as the resource persons, **Dr. Ram Kumar Singh** and **Dr. Manoj Kumar**. In his concluding remarks, Professor Mahajan inspired the students to apply the knowledge they gained during the workshop in their future careers.

The function concluded with the distribution of certificates to the workshop attendees, followed by a group photograph with all the guests and professors.



विभागाध्यक्ष/पर्यावरण विज्ञान विभाग
Head, Department of Environmental Sciences
हिमाचल प्रदेश केन्द्रीय विश्वविद्यालय
Central University of Himachal Pradesh
अस्थायी शैक्षणिक खण्ड/Temporary Academic Block
शाहपुर, कांगड़ा/हि.प्र./Shahpur, Kangra (H.P.)-176206


CENTRAL UNIVERSITY OF HIMACHAL PRADESH
SCHOOL OF EARTH & ENVIRONMENTAL SCIENCE
&
SOCIETY OF ENVIRONMENT SCIENCE (CUHP)
FIVE DAYS SKILL DEVELOPMENT TRAINING
WORKSHOP
ON
APPLICATION OF REMOTE SENSING AND GIS
27-Sept-2024, 10:39


हिमाचल प्रदेश केंद्रीय विश्वविद्यालय
Dadroli, Himachal Pradesh 27-Sept-2024, 11:00