

Basics and Hands-on training Using
**Non-invasive Electrical geophysical
Exploration for groundwater Research**

(भू-नीर 2025)

(A CSIR-Integrated Skill Initiative)

March 21-28, 2025



CSIR- NATIONAL GEOPHYSICAL RESEARCH INSTITUTE
Uppal Road, Hyderabad - 500007



सीएसआईआर
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भारत का नवाचार इंजन
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WHY SHOULD ONE JOIN THE TRAINING ?

Groundwater plays a crucial role in India's socio-economic development and sustenance, making it a vital resource for various sectors such as Agriculture, Drinking Water Supply, Industrial and Commercial Use, Ecosystem Support, Drought Resilience, Groundwater Recharge, Livelihood Support. Given its multifaceted importance, sustainable management and conservation of groundwater resources are imperative to ensure their availability for future generations and to address emerging challenges such as overexploitation, groundwater depletion, pollution, and climate change impacts. In view of this, an effective groundwater management requires a multidisciplinary approach that combines scientific knowledge, technological innovation, policy interventions, and community engagement. The following are the key scientific remedial measures for groundwater management in India.

- Aquifer Mapping and Monitoring
- Groundwater Modeling
- Managed Aquifer Recharge (MAR)
- Water Conservation and Demand Management:
- Rainwater Harvesting
- Artificial Intelligence (AI) and Data Analytics
- Community Participation and Stakeholder Engagement
- Policy and Regulatory Frameworks

Of the above, the first and foremost step to characterize the aquifers in different geological terrain is **non-invasive geophysical methods**. Among the geophysical techniques, electrical resistivity methods are widely used in groundwater exploration and characterization due to their ability to provide high resolution and valuable subsurface information without the need for extensive drilling. The following are the most popular electrical resistivity methods used in groundwater applications.

- Vertical Electrical Sounding (VES)
- Electrical Resistivity Tomography (ERT)
- Induced Polarization (IP) method
- Self-Potential (SP) method
- Electric field vector resistivity imaging (EVRI)

These methods are often used in combination with other geophysical techniques and hydrogeological data to obtain a comprehensive understanding of groundwater resources and aid in groundwater management and remediation efforts.

The training contents compose the fundamentals of electrical resistivity methods including **theory, forward simulation & inversion, hands on softwares, and field demonstrations** to unravel the hydrogeological complexities in different geological terrains. The field data collections and interpretation will be on 1D, 2D, 3D, and times lapse electrical method (4D). The detailed discussion and hands on the applications are oriented to enhance the knowledge on the following aspects.

- Groundwater exploration
- Lithological characterization
- Managed aquifer recharge
- Groundwater contamination studies
- Aquifer dynamics

This Skill India training is capable to transform the participants into learned expertise in the effective use of techniques, optimized resource management, cost-effectiveness, quality assurance, Environmental considerations, adaptation to technological advancements, and capacity building and knowledge transfer.

The training will broadly cover the fundamentals of electrical resistivity methods, including:

1 Theory:

- Basic principle of electrical resistivity
 - The relationship between resistivity and various geological and hydrogeological properties.

2 Forward Simulation & Inversion:

- Forward simulation to predict resistivity measurements.
- Inversion methods to interpret field data and generate subsurface resistivity models.

3 Hands-on Software Training:

- Practical sessions using specific software/open source codes for data resistivity inversion and analysis.

4 Field Demonstrations:

- Field data collection techniques and procedure
- Applications of discussed methods in different geological terrains to address hydrogeological complexities.
- One day field visit to experimental hydrogeological park to experience managed aquifer recharge site at NGRI campus, Choutuppal, Nalgonda

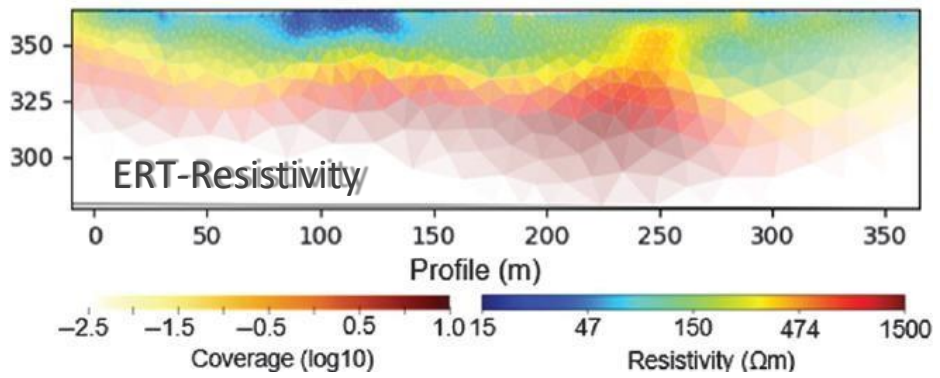
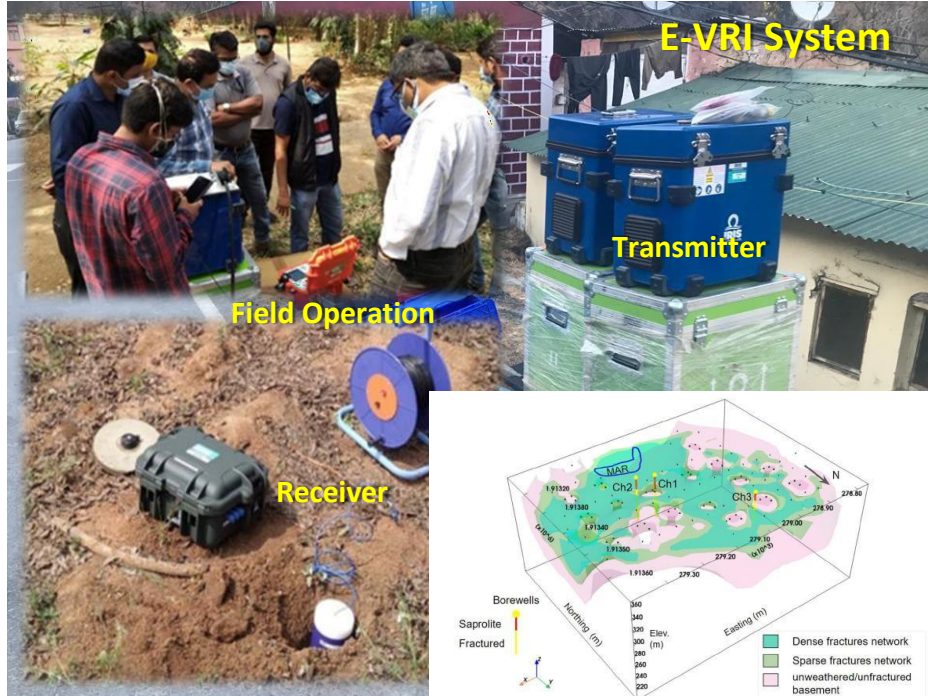


Figure: ERT and EVRI systems and 2/3 dimensional resistivity images

CERTIFICATION

Upon successful completion of the course, participants will get a certificate.

Education Qualification	A Master Degree in Geophysics / Geology / Hydrology or any relevant or allied field or students of the final year of respective courses.
Nationality	Indian Nationals
Duration	March 21-28, 2025
Venue	CSIR- National Geophysical Research Institute, Uppal Road, Hyderabad - 500007
Last Date for Applying	February 23, 2025, 05:00 PM
Number of Seats	30
Course Fee*	Rs. 2,500/- + 18% GST = 2950/- (for Master, Diploma/Degree students) Rs. 5,000/- + 18% GST = 5900/- (for Ph.D. Students) Rs. 10,000/- + 18% GST = 11800/- (for Faculty and Industry sponsored)
Food	Breakfast and Dinner will be available at nominal rates at the CSIR- NGRI Campus payable by the participants.
Accommodation Charges	CSIR-NGRI guest house on twin sharing basis at the rate of Rs. 300/- per head per day for the first 6 days and 7 th day onward Rs. 600/- per day per head. Skills Development quarters (Rs. 100/- per head per day) and staff quarters/research scholars' hostel (Rs. 50/- per head per day) on twin sharing basis
Course Coordinators	Dr. Subash Chandra , Chief Scientist (e-mail: schandra75@ngri.res.in) Dr. Sahebrao Sonkamble , Principal Scientist (e-mail: sahebrao@ngri.res.in)

* Course fee includes training fee, course material, working Lunch, Tea, and Snacks. It should be paid online by the shortlisted participant