

Geophysical Methods for Groundwater Study

Are geophysical methods available in Nepal?

- **Yes, but limited**

What do we mean by availability of geophysical methods?

- **Availability of the equipment**
- **Availability of the expert, data processing software**
- **Availability of the financial and moral support to geophysical methods**

What are the geophysical methods available in Nepal?

- **Ground penetrating radar (GPR)**
 - maps the water table, underground voids (karsts), fractures in the bedrock
 - sediments sequence, river bed sediment study, bedrock topography
 - contaminated land, contaminated water
 - Limited depth of investigation

- **Vertical electrical sounding**
 - **Best suited to explore aquifer in layered system**
 - **Separates permeable layer from impermeable layer**
 - **Depth to water table and bedrock**
 - **Not suitable in an area of high lateral heterogeneity**

- **Electrical Resistivity Tomography (ERT)**
- **Provides detail and continuous coverage of the subsurface**
- **Very good to map in an area of high heterogeneity**
- **Provides in much more detail the subsurface information than VES**
- **Has high resolution than conventional VES**

- **Mise-a-la-masse method**
 - **Useful to measure the velocity of groundwater, groundwater flow path**
 - **Water leakage from reservoir**

- **Seismic refraction (P-wave)**
 - **Water table, bedrock depth, consolidation**
- **Seismic reflection (P-wave)**
 - **Water table, sediment sequence, structures in the sediment**
- **Spontaneous potential (SP)**
 - **Groundwater movement**

- **Borehole methods**
 - **Electrical resistivity, resistivity tomography, Spontaneous potential**
 - **GPR tomography (salinity of the water, total porosity)**
 - **Seismic Shear-wave techniques (useful to estimate the consolidation)**

- **Miscellaneous**

Electro-magnetic ground conductivity

Useful in the study of the contaminated sites, quickly evaluates shallow subsurface

Very low frequency method (VLF)

Highly mobile method. Useful to delineate fracture zones in hard rock terrain