From early high school studies, I have always been very interested in Physics and earth science, fascinated by and wondering about natural secrets for me like earthquake, presence of water below the ground, volcano, mountains, resulted surface features and many more. So I always wanted to make my career in earth science. In my MSc (Geophysics) in IIT KGP, I found hydrogeology very attracting to me due to its vast and interesting applications and at the same time its close relation to society. Therefore, I want to pursue my research in this area to help people overcome their sufferings for fresh water. MSc provided me the fundamentals but in order to carry out research in my interest area I need to acquire more knowledge. So for being specialized in the area I want to pursue a PhD in the related subject matter.

IIT Kharagpur and university of Manchester are premier institutes with one of the best research facilities and here I would be able to learn under the guidance of esteemed faculties unique to its program. This degree from IIT Kharagpur-University of Manchester will prepare me for a better future career in which I can contribute to innovations in the field and the society.

Among easily available fresh water sources, Groundwater is the major one. There is hundred times more Groundwater than surface water on the earth. So it makes sense to exploit this important source of water. But the climate change and anthropogenic activities like agriculture, industrialization and urbanization particularly in India have led an intense stress on groundwater resources which has resulted in severe groundwater pollution and its extraction. India is the largest user of groundwater in the world. It uses an estimated volume of 235 cubic kilometers of groundwater per year over one fourth of the global use. According to a world bank report, if current trends continue, 60 percent of all Indian aquifers will be in critical condition. The Groundwater, in many parts of India, is not fit for specific use such as drinking due to various contaminations mainly geogenic reasons. Salinity in groundwater of coastal areas and arid areas along with the toxic presence of different elements in aquifers like Arsenic in aquifers in most parts of Bengal, Bihar and Orissa are of great concern. These all requires a detailed assessment of ground water quality and water security in India and Geophysical methods can really be helpful for the same.

Geophysical applications will lead to increased understanding of local and regional aquifers-their location, extension, distribution, interconnection, hydrogeological models in terms of layering, lateral and vertical inhomogeneity, water movements and analysis of aquifer pollution. Such key informations allow the formulation of sustainable groundwater exploitation and protection plans. I would like to use such geophysical applications for the assessment of ground water quality and water security in India. The above mentioned understanding of aquifers can be availed by analysing parameters like-aquifer geometry and overburden structure, groundwater level, groundwater chemistry, filtration characteristics, wetting front and transfer velocity, physical parameters of geological formations etc. For aquifer geometry and overburden structure electric and seismic methods may be of great use.

Resistivity, self-potential and induced polarization methods as well as electromagnetic methods is very helpful in mapping lithology, bedrock topography, and pollution transmission. The seismic refraction method may provide details of rock lithologic structure and lithologic zone definition. It is often used simultaneously with electrical method for example seismic for aquifer geometry and electrical resistivity for variations in lithology of the aquifer. Groundwater level may be determined using electrical sounding and seismic refraction method. Seismic refraction methods are often used because of contrasts in the elastic wave propogation velocities in a non-saturated and completely saturated medium. The different geophysical well logging methods- electric, radioactive, miscellaneous, caliper etc. will help in determining layer boundaries, the porous zones, flow direction, temperature and mineralization of water. Similarly, filteration characteristics, wetting front and transfer velocity may be well determined with judicious use of thermometric methods along with well-logging techniques and other geophysical methods.

Such informations derived using Geophysical methods will help us to define the hydrogeological model and dynamics of ground water in India. A little has been worked in this direction particularly in India and much of the groundwater dynamics is not yet known. This project will be definitely of great use in formulation of effective policy of groundwater management and protection for meeting the ever increasing demand of fresh water, draughts and flood controls.