

STATEMENT OF PURPOSE

Dear Members of the Selection Committee,

This is to apply for the position of PhD scholar under the guidance of Dr Abhijit Mukherjee and Dr David Polya to work on the project “Groundwater Quality and Water Security in India”. I am a graduate of Politecnico di Milano from the department of civil and environmental engineering in Environmental and Land planning engineering.

As a graduate student, I developed a fascination with “Water and Groundwater Quality”. It is a perfect addition to the knowledge I obtained in undergraduate school, I also acquired strong principles about measuring and treating technologies of different environmental compartments. I got a broad overview of pollution phenomena and decontamination and remediation technologies. Despite this interest, I have studied on best accuracy measurement methods of chlorine dioxide self-decay (CPR & DPD) and literature review on the factors affecting and reducing the formation of byproducts in chlorine dioxide disinfection using decay kinetics. Solving problems in an active research environment and deriving a valuable research output has given me immense satisfaction as a person. My thesis journey has exposed me to a first-hand research environment and the journey was a steep learning curve. I now find myself ready to embark on a journey to the next step of academic research.

As we work towards a sustainable society on a global scale. Best examples are COP 26 agreements, EU climate change goals framework 2030, etc. we also face a multitude of challenges in our environment that need resilient & long-term solutions. I wish to take up one such challenge which can make a valuable impact and help in creating a sustainable future. One such challenge that appealed to me was your project, which aims to assess the Groundwater quality and water security in India.

India is the largest groundwater user in the world and it is highly relying on groundwater for agricultural and domestic purposes because of unreliable and inadequate municipal water supplies. Despite the resource's importance, 29% of groundwater zones are semi-critical, critical, or overexploited and the situation is progressively deteriorating (2004 national assessment). Therefore, It is required to

study Indian groundwater quality and security. The transmissivity and hydraulic conductivity should be estimated using well dimensions and the pumping rate through AQTESOLV software. Then a numerical flow model has to be developed to assess water balance and preferential flow directions in the aquifers using GW vista MODFLOW software. Consequently, to study the contamination problem that affects the aquifer zones, It has to be performed a particle tracking analysis starting from the previously constructed flow field, to deal with the groundwater contamination problem through GW vista MODPATH. It is important to know the properties of the components of the aquifer that are involved in different processes that occur inside it, transport parameters such as dispersion coefficient and dispersivity become relevant. For this, it is needed to conduct continuous injection and pulse injection tests. To quantify the retention of contaminants in solution on soil in the single-component system or multi-component system one have to estimate parameters of equilibrium isotherm models.

The current project is a great opportunity to explore and investigate the Indian Aquifer basins. This project can be used as a basis in future research to model the Integrated Indian aquifers. This is also used to understand the spatiotemporal variation of aquatic zones and the contaminants flow in the ground. Giving unpolluted groundwater to the environment is saving the lives of many living species. This research is an aquatic life-saving project which has driven my interest.

I have always been fascinated by assignments on Groundwater quality modelling done in my master's second semester on Selby aquifers in the UK. I am eager to use my skills in this project to develop and implement positive environmental improvements as well as innovations in the field. Considering my academic performance, I am confident that I will be an excellent addition to the project.

I appreciate the time and efforts you invested in assessing my application, and I am hoping for your prompt response.

Sincerely,

Siva Teja Sowrya Yannana.

