

## **EFFECT OF REFORESTATION ON GROUNDWATER RESOURCES IN PUEBLA MEXICO**

### **Context and objectives**

In Mexico, water is now a resource by which mechanisms to address the increasing water demand of the population is established. This demand is directly related to population growth and pressure generated by related water use such as agricultural and industrial Development activities. But not only human effects bring affect the availability of water to supply the population, is the case of meteorological factors which are causing impacts as impairment of existing infrastructure (water and sewage systems) and geographic features of the area that lead to the settlement of the population, mainly in urban areas. Not only surface water is a source of drinking water for the population. Since water demand increases, it is necessary to increase the availability of water resources, and here gains relevance the availability of water from aquifers, as well as the development of projects for their artificial recharge, the management of evapotranspiration, collection and desalination. To tackle these problematics, many NGO and private international companies claim that reforestation will increase the aquifer protection and improve the recharge capacity of the aquifer: it will decrease the runoff and intensify the precipitation. Nestle Waters Mexico launched in 2017 a huge reforestation project with the collaboration of CONAFOR. In this context, the objectives of this thesis will be to explain the role of the reforestation in the groundwater recharge and in its protection in the specific case of the Puebla aquifer.

### **Research approach and methodology**

In the project, a wide range of hydrogeological field methods will be applied in combination with some modeling depending on the interest of the student. The student will develop the detailed research strategy. It might include the following: (a) A large scale pumping test (in Nestle well and if possible in other wells in the catchment area) combined with water quality measurements to characterize the productivity of the different pumping wells, interactions among pumping wells and the origin of the pumped water. (b) Bibliographic research on reforestation project versus aquifer quality and quantity (c) Complete understanding on the reforestation project lead by CONAFOR (d) Soil test and other tests in an area where Nestle already planted trees for more than 10 years (e) Continuous data logging and groundwater sampling to characterize the chemical/microbial quality of groundwater (interpretation of Nestle data) and how the historical precipitation data and other parameter influence it.

### **Partners and collaboration**

The project will be supervised by Prof. Ph. Brunner and D. Hunkeler. It will be carried out in close collaboration with the water resources manager of Nestle Waters Latin America (Jeremie Pralong), the responsible of CONAFOR project, the factory team and the national agency in charge of managing the water resources in the region. The student will be able to participate in project meetings with these partners (for this reason, it is necessary to be fluent in English and understand Spanish). Hence, in addition to the scientific aspects, the project provides a unique opportunity to become familiar with the various roles hydrogeologists play in a water stewardship strategy that are implemented by an international company worldwide.

**Contact for further information:** Philip Brunner, Daniel Hunkeler

