



Seawater intrusion and pumping wells in coastal aquifers

Amir Nadjafzadeh Anvar and Monica Riva

Department of Civil and Environmental Engineering, Politecnico Milano, Milano (Italy)

Coastal aquifers are affected by seawater intrusion (SWI), this problem is exacerbated by groundwater extractions. In this work, we analyze key parameters affecting pumping wells contamination in coastal aquifers. The USGS SUTRA code is employed to solve numerically flow and transport and to characterize SWI under diverse groundwater withdrawal scenarios. We developed two- and three-dimensional variable-density flow and solute transport models, respectively representing the existence of a pumping well barrier and of a single pumping well. The impact of the joint extraction of fresh- and salt- water has also been considered. We then analyzed the effect of (i) the location and pumping rate of fresh- and salt- water pumping wells (ii) the permeability of the aquifer as well as (iii) the transverse and longitudinal dispersivity on the maximum pumping time, t_{max} . The latter is defined as the maximum freshwater pumping time preventing the well to be contaminated by salt water. Finally we derived empirical equations to be used in practical applications to evaluate t_{max} as a function of key parameters highlighted.