Water eutrophication is among the most serious threats to the water environment in the conditions of changing climate. The process is to the greatest extent limited by the availability of phosphorus. A considerable intensification of the phenomenon has been observed in recent decades due to increased supply of phosphorus of household, municipal, industrial, and agricultural origin. In areas under agricultural use, the role of mineral and organic fertilization in the process of eutrophication of rivers and water bodies is particularly emphasized.

The effect of the geochemistry of the environment on water eutrophication, and particularly leaching of rocks containing phosphorus minerals is usually subject to estimates or neglected – assessed qualitatively or descriptively instead of quantitatively. Due to this, separating the level of concentrations resulting from the effect of natural factors from changes caused by man is an issue important in the assessment of water pollution. It is of particular importance in the case of Poland which is repeatedly reported to be the main areal supplier of phosphorus to the Baltic Sea. Identification of the origin of phosphates in surface waters is also of key importance for the development of best practices of environmental management aimed at control of eutrophication.

The primary study objective is the assessment of the effect of leaching of natural phosphorus minerals from the unsaturation and saturation zone on the content of orthophosphates in groundwaters and surface waters, and their effect on the eutrophication of surface waters. The study covered in the selected areas of the Vistula and Bug interfluve, where the presence of phosphate minerals in the zone of active water exchange is commonly documented, and almost ¾ of river runoff comes from groundwaters. The study will cover particular stages of hydrological circulation of water: precipitation, surface runoff, soil waters, groundwaters, river waters in areas with variable land management, and waste water. The identification of the origin of phosphorus in water and rocks will be based on geochemical, hydrochemical, and tracer methods.

The obtained results will be used for the development of a hydrogeochemical model of leaching of phosphorus from the bedrock. The research hypothesis assumes that the occurrence of natural phosphorus minerals in formations of the zone of active water exchange has a considerable effect on the eutrophication of surface waters.