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## **Sinkhole collapse and hydrogeological hazard assessment in covered karst terrains: Case study of a bridge project across the Loire River (Orleans, France)**

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The floodplain of the Loire River around Orleans is a sinkhole-prone area due to the highly karstified calcareous Beauce Formation overlying by few meters of weathered materials and alluvial deposits. Such layout makes it necessary to carry out detailed geotechnical and hydrogeological investigations for any important building project.

This paper presents the first results of a study carried out by the French Geological Survey for a bridge project across the Loire River. The geological setting indicates that the study area is near the front door of a supposed-major cave system in which water, coming from the Loire River, not only provides drinking water for an important part of the region, but also supplies the main spring of the Loiret River, located a few kilometers further. The overview of past sinkhole collapses confirms that the study area is regularly concerned by ground collapses of several meters of diameter. Field investigations include microgravimetry (26 hectares), two electrical resistivity profiles (720 m and 470 m long), 149 cone penetration tests (around 15 m deep), a first sequence of 11 drillings (40 m deep) and videos, gamma-ray and sonar logs. A first sinkhole hazard assessment is now quite complete: very weak layers (possibly caves) of several decimeters to a few meters thick need specific mitigation measures to secure the construction project. Other investigations are still being analysed (a second sequence of drillings, dye tracing, injection of salt brine with resistivity profiling) and should help specify the area hydrogeological hazard.