

Three ways to preserve a Neolithic site

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The Sutz-Lattrigen archaeological site, on the shores of Lake Biel. Credit: Arch. Service BE

An EPFL study commissioned by the Canton of Bern has come up with three possible ways of protecting the Sutz-Lattrigen archaeological site, which offers a rare insight into the lives of pile dwellers. Sutz-Lattrigen was listed as a UNESCO World Heritage site in 2011.

EPFL experts have offered the Canton of Bern three solutions to preserve the Sutz-Lattrigen archaeological [site](#) on the shores of Lake Biel: a submerged dike, a breakwater or a protective flexible concrete mat. All three options are intended to prevent waves from eroding the objects, stilts and other remains of a civilization that dates back to the Neolithic period. The experts were commissioned by the Canton of Bern in 2015 and will present their final report to various representatives of the cantonal government on 31 October.

"Our task was to look at ways of protecting the lake bed and shoreline in the most discreet way possible," explains Azin Amini, a specialist in coastal projects and director of the study conducted by the Laboratory of Hydraulic Constructions (LCH). With this in mind, the members of the laboratory organized several meetings with those concerned, including environmental, forest and landscape conservationists, representatives from the cantonal archaeological service, and engineering firms already involved in other projects on Lake Biel. These meetings helped the experts to set criteria regarding the extent to which the site and the shoreline should be protected, how sustainable the solution needed to be, and the desired impact on the landscape and the environment, both during the construction phase and afterwards.

During big windstorms, the archaeological remains, which include wooden stilts, weapons, jewelry and other household objects, get washed away by the waves. Once this happens, the items are considered to be lost. The LCH lab came up with three ways of ensuring that the site would be protected in the event of very strong winds and looked at the impact each solution would have for events, which have a return period of 50 years. They had to create a numerical model to examine how the waves propagate and dissipate.

Three options

The three options put forward by Amini's team were designed specifically for Lake Biel. The first option involves constructing a submerged dike, surrounding the archeological site, a few hundred meters from the shoreline in order to tame the current. In the inner part of the dike gravel-based material would be spread over the underwater site, forming a protective layer. The advantage of this option is that the dike would be 20 centimeters below the low-water level, which means it would be barely visible. The shore line would then be further stabilized using biological engineering techniques involving plants. The second option consists of building a breakwater all the way around the site so that almost no current or waves can pass the barrier and erode the site. The barrier would be 340 meters long and visible from the shore.

The lab's third and final proposal tackles the erosion directly by installing a protective mat over the site. A geotextile or stainless steel net would be held down with blocks of concrete, making the whole structure look like a flexible bar of chocolate. The covering could be removed if needed. biological engineering techniques would also be used to protect the shoreline.

Traces of the pile dwellers

The site near Bern provides rare insight into how our first sedentary ancestors lived on the shores of our lakes more than 5,000 years ago. Pile-dwelling remains were initially discovered when the levels of the three lakes in Jura Canton were lowered at the end of the 19th century. These prehistoric pile dwellings are found in only six European countries – France, Switzerland, Italy, Germany, Austria and Slovenia. Sixteen Swiss cantons appear on UNESCO's World Heritage list, with the entire Sutz-Lattrigen site added in 2011.

In 2014, a protective covering held down with gravel and a supple geotextile was placed over the underwater village. But the strength of the lake's waves meant that this was not a viable long-term solution. "In recent years, the erosion observed at Sutz-Lattrigen has been much greater than that seen at other UNESCO pile-dwelling sites, so an in-depth study was needed. The EPFL report is very important because it helps us to understand exactly what's happening," says Marianne Ramstein, archaeologist and deputy head of the Canton of Bern's underwater and prehistoric archaeology unit. "The next step will be to find the most realistic solution and do the costing."

Provided by Ecole Polytechnique Federale de Lausanne

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