500 volunteers needed to give Lake Geneva a check-up

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EPFL has teamed up with three organizations – the Swiss Federal Institute of Aquatic Science and Technology (Eawag), the University of Lausanne (UNIL) and the Association for the Safeguard of Lake Geneva (ASL) – to develop Lémanscope, a citizen-science initiative to monitor the health of Lake Geneva. Today the researchers are calling on volunteers to help collect essential data.

Every lake is a world unto itself. Each has its own ecosystem, dynamics, external factors influencing those dynamics, and complex processes striving for an often fragile equilibrium. Given all this, how is Lake Geneva faring? The truth is, our lake is facing a number of unpredictable threats, yet scientists are struggling to establish a detailed diagnosis because they simply don't have enough data. That's where Lémanscope comes in. Spearheaded by EPFL, this initiative is the first of its kind and will call on members of the local community to collect data between now and fall 2025 in a large-scale effort to evaluate the condition of the largest Alpine lake.

While Lake Geneva is in better shape now than in the 1970s, when its ecosystem was suffocating under phosphate-induced eutrophication, it's still highly vulnerable to the effects of climate change, pollution and invasive species – all of which stand to alter its water quality. For instance, there's been a proliferation of quagga mussels – tiny animals that filter the lake water as they feed – whose long-term impact is unknown. And the full cycle of deepwater renewal, whereby deep lake water rises to the surface and pushes the surface water underneath, carrying oxygen and nutrients with it, hasn't occurred for 12 years as a result of climate change. There was a glimmer of hope the process would pick back up in early January of this year, but temperatures soon returned to well above their 30-year averages, putting those hopes to rest. "If the lake doesn't experience complete deepwater renewal for

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several years, water at the bottom becomes depleted of oxygen and its temperature rises," says Laurence Glass-Haller, a scientist at EPFL's Limnology Center. "But we don't yet know what the long-term consequences will be."

Color and clarity

Amid so much uncertainty, scientists need concrete facts and real-world measurements they can use to understand and then predict the processes under way. In 2019, a team of local scientists set up the LéXPLORE floating research platform on Lake Geneva, near the Pully shore. There, they're collecting physical, chemical and optical data at high frequencies, which they'll subsequently use to develop computer models. "Today, satellites can take optical measurements of the light reflected off a lake as a way of determining water quality," says Daniel Odermatt, an Eawag scientist and member of the Lémanscope team. "But there's a lot of uncertainty in these measurements and few surface-level comparative measurements have been taken simultaneously alongside the satellite observations." This is the gap that Lémanscope's human researchers will fill, using basic instruments developed back in the 19th century. For example, they'll use the Forel-Ule color scale to classify the color of the lake water according to 21 hues ranging from deep blue to brown and shades of green (that said, their observations will be recorded using the decidedly more modern EyeOnWater application). And they'll use what's known as a Secchi disk to measure water clarity; this is a black-and-white disk that's lowered into the water until it's no longer visible, and then the corresponding depth is recorded as a measure of water clarity.

To collect all these data, the Lémanscope team is looking for around 500 "co-researchers" who own a boat (even a small one) to pitch in. They'll be given a Secchi disk and asked to download the EyeOnWater app. "These volunteers will enable us to build up a large dataset of comparative measurements, which we'll then use to evaluate and improve the accuracy of satellite data," says Odermatt. "That should allow scientists to make better use of satellite-image archives spanning several years, providing key insight into long-term processes like global warming and quagga mussel proliferation."

Building a community

Lémanscope has received funding from the Swiss National Science Foundation through its Agora program. Agora is designed to foster dialogue between scientists and the general public through direct interaction – and joint research – with volunteers. Through Lémanscope, the local community will be able to not only help scientists collect important data, but also share their own impressions of the changes affecting Lake Geneva through interactive talks and events facilitated by lake experts. This kind of citizen science approach paves the way to a better understanding of the issues impacting the lake's health and enables the design of practical measures to preserve this ecosystem over the long-term.

For more information or to sign up, visit www.lemanscope.org (in French).

Cover picture: Lémanscope is a citizen-science initiative to monitor the health of Lake Geneva (Photo, 2024 EPFL/Jamani Caillet - CC-BY-SA 4.0)

Cooperations

Eawag EPFL Schweizerischer Nationalfonds, Agora

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Project «Lémanscope un projet de science participative»

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