

Assessment

"Stabilisation project snowmaking ponds Hauser Kaibling"

1. Subject

Hauser Kaibling Seilbahn und Liftges.m.b.H. & Co KG is the operator of several snowmaking ponds with the purpose of providing mechanically produced snow when required. Some of these systems have been in operation for decades and experience has shown that problems can arise due to the growth of filamentous algae and macrophytes, e.g. pumps becoming clogged, etc.

In spring 2019, Mr. Daniel Bader, Bader Group, Marburgerstraße 94, 8435 Wagna, approached us with the question of what, from a water ecology point of view, is causally responsible for this plant growth in the ponds and what possibilities there are in principle to inhibit or completely prevent this development.

Mr. Bader has been involved in the development of "alternative methods" for decades, for example in the treatment of bathing water in pools, etc. Subsequently, he also developed an "alternative" approach to reducing the amount of plant material in snowmaking ponds and implemented it on a trial basis in ponds at Hause Kaibling Seilbahn und Liftges.m.b.H..

The purpose of this report is to present the result of this trial. The assessment is provided on an impartial basis; Umweltanalysen Baumgartner & Partner GmbH & Co KG itself was only involved in an advisory capacity in the run-up, but not directly in the implementation of the trial.

2. Fundamentals

2.1 Short description of the project area

The following storage ponds were considered as possible test sites:

Pond 1: Storage pond "Schwarze Lacke"; 70,000 m², 13 m depth ing Kerschbaun Stangl has rohbergei Кı ze-Lack Inerteich



Pond 2: Storage pond "Ennslingalm", 45,000 m², 10 m depth



Pond 3: Storage pond "Kaiblingalm", 64,000 m², 11 m depth

The reservoirs mentioned are located at 1262 m (Schwarze Lacke), 1727 m (Ennslingalm) and 1748 m (Kaiblingalm) above sea level. The feed is mainly from the Enns River.

2.2 Snowmaking ponds - Water typology

A snowmaking pond is usually an artificially created reservoir that is filled from a flowing watercourse. The water is temporarily stored here throughout the year and used for snowmaking on the ski slopes in winter when temperatures are suitable.

Limnologically, ponds are defined as artificial standing waters that can normally be drained. Snowmaking ponds thus clearly fall into the category of "pond". How these ponds develop in ecological terms depends primarily on factors such as the nature of the incoming water, solar radiation, nutrient input from the surrounding area, etc. Due to the processing of water for snowmaking, a snowmaking pond is characterised by significant water level differences or it can also become completely dry.

Like any surface accumulation of water, a storage pond is also colonised by organisms. In this context, the emergence of a self-sustaining animal population in the pond is dependent on bacteria and plants first emerging to form a food base. It is therefore a natural process that freshly filled reservoirs are the first to show a strong algal bloom. However, this usually collapses again once the nutrients are used up.

The extent of algal or plant growth in general in a snowmaking pond thus depends on the quantity of plant nutrients are introduced via the incoming water, how many nutrients enter the water body via other pathways (air, erosion, etc.), how much light enters the water body and which herbivores have made it into the reservoir.

In principle, therefore, care should be taken to ensure that as few nutrients as possible enter the storage pond. The main factor here is the phosphorus content, which is usually present in a water body in very low concentrations and therefore limits plant growth.

3. Setup of trial

The attempt to limit plant development in the snowmaking ponds was built on two components:

- Placement of the dodecahedron (Bader Group)
- Biomanipulation by fish (polyculture stocking)

"LiveGreen Algae Prevention System":

The inserted modules are sealed containers filled with substances and suspended in the water body. Which substance or substances are involved is a trade secret of "Bader Group". With the dodecahedrons, no substances are released from the containers into the water, which means that the ingredients cannot mix with the water, i.e. they cannot directly change the water quality through material interaction. Therefore, an accompanying chemical analysis of the water in the ponds could be dispensed with for the time being.

Targeted use of fish (polyculture stocking)

The type of fish stocking used can specifically interfere with the development of a water body. Such measures fall under the term biomanipulation.

The use of foreign species in natural water systems for example was not always appropriate and is therefore no longer practised. In the preliminary discussions, however, there was nothing to be said against spreading in artificial waters, such as the storage ponds in question, which is why this approach was pursued further.

For the stabilisation test, the following deployment was therefore carried out:

- Pond 1: 4 Dodecahedrons "LiveGreen Algae Prevention System" additional polyculture stocking
- Pond 2: 4 Dodecahedrons "LiveGreen Algae Prevention System"
- Pond 3: 4 Dodecahedrons "LiveGreen Algae Prevention System"

4. Result

The initial situation in 2019 was as follows:



Photo 1: Pond 2 Ennslingalm: massive population of stoneworts



Photo 2: Stoneworts (Chara sp.), detail

The trial was started in July 2019:

15.07.2021: Placement of dodecahedron (LiveGreen Algae Prevention System)

18.07.2021: Fish stocking (polyculture stocking)

After the melting of snow and ice, the three ponds were accessed by foot in their drained state on 20.5.2021:



Photo 3: Pond 1 Schwarze Lacke, largely free of algal stands or algal remains



Photo 4: Pond 1 Schwarze Lacke, area of suction point, no algae remains present



Photo 5: Pond 1 Schwarze Lacke, no algae on equipment and gratings

The findings are the same for the three ponds: no evidence of massive algal growth could be found at the bottom of the basin. There was no difference between the ponds stocked with fish and those without.

In an initial assessment, it can therefore be said that the trial showed that the instruments used - "LiveGreen Algae Prevention System" dodecahedron and polyculture stocking - have definitely had an effect compared to the situation in previous years. Surprisingly, it made no difference whether a pond was stocked with fish or not. However, it is not possible to say what the effect of the "LiveGreen Algae Prevention System" is based on.

5. Summary

After years of problems caused by algae formation in snowmaking ponds, the possibilities of reducing plant growth were evaluated in a trial. The use of different fish species (polyculture stocking) was tested, a procedure that is not fundamentally new. Furthermore, an "alternative method" was used, where substances were introduced into the water body in a sealed container. The substances involved are not known to the report writer, as they are the trade secret of the developer of this system. An effect involving the release of toxic substances can be excluded with a high degree of certainty however.

The trial was implemented in three snowmaking ponds, in each of which the alternative "LiveGreen Algae Prevention System" was used and in one of which polyculture stocking was also carried out. So only the Bader Group stabilisation system was used in two ponds.

The result of the trial, which ran for over a year, shows that plant growth could be effectively reduced in each of the three ponds. In this series of trials, an effect was thus also evident in those ponds in which no polyculture stocking took place.

In an initial assessment, it can therefore be stated that the "LiveGreen Algae Prevention System" used has an undeniable stabilising effect on the storage pond in question by restricting plant growth. However, it cannot be said according to which principle this effect takes place. To what extent this result can be transferred to other reservoirs or other types of water bodies can not yet be stated clearly on the basis of this initial test. However, there is no reason not to test the use of this system in other localities.

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