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Aquatic plants in the Danube are turned into packaging and biogas

Author(s): Растителна защита
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Over the past year, 2,600 tons of submerged plants have been removed from the Danube within the territory of the city of Vienna, in that part of the river which is used for recreation during the summer months. Researchers from the University of Natural Resources and Life Sciences (BOKU) Vienna are working on producing packaging material from the plants and using them as feedstock for biogas.

Submerged plants *(aquatic macrophytes)* form their own microcosm in the water. They provide shelter for numerous small aquatic organisms and fish, such as pike, for example. Macrophytes stabilize the waterbed, constitute an important food reserve and contribute to the filtration and good quality of the riverbed. They are in direct competition with planktonic algae, which float freely on the water surface and are responsible for the

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quality of the river water. After a decline in macrophyte populations, a significant increase has been observed since 2014 in the Danube area of the Austrian capital. The increased number of plants is influenced by the availability of nutrients, as well as temperature and light conditions.

For various reasons, the growth rate of aquatic plants has increased significantly not only in the Danube region but worldwide. These plants must be harvested regularly in order to prevent the silting of banks and to ensure that the waters remain usable. In the Old Danube in Vienna alone, around 4,000 tons are harvested annually over an area of 170 hectares. Until now, this biomass has been used primarily as compost. However, scientists have concluded that the plants are also suitable for the production of packaging materials and for energy use in biogas installations.

Packaging and biogas

Under the leadership of Thomas Rosenau and Wolfgang Gindl-Altmutter, researchers from the Institute of Wood Technology and Renewable Materials and the Institute of Chemistry of Renewable Resources at the University of Natural Resources and Life Sciences (BOKU), a team of scientists is working on a project to exploit the great potential of macrophytes. “Our goal is to develop a concept for an urban biorefinery in order to ensure sustainable added value for this raw material in the vicinity of the city in the future,” explained project team members Armin Winter and Marco Beaumont. The first prototypes have already been produced – fruit packaging and disposable cutlery, which are “very promising” according to the researchers. The team is currently developing appropriate methods for separating and processing the plant fibres. However, aquatic plants also contain other valuable components of interest for material use, such as starch and lignin-like biopolymers. Macrophytes have a high protein content, which is separated during the production of packaging. In the future, by-products separated in the packaging production process may be used as agricultural fertiliser. Fermentation for the production of biogas is also possible and is already being tested. The BOKU project has been awarded the Energy Globe Award Lower Austria, the university reported. For further exploration of the potential of macrophytes and the technical implementation of the biorefinery concept, the university is seeking cooperation partners.