



Stockholm *Junior* Water Prize

HUNGARY

2022



ABOUT THE STOCKHOLM JUNIOR WATER PRIZE



The Stockholm Junior Water Prize (SJWP) was established in 1997 and is an annual competition open to young people between ages 15 and 20, who have conducted water-related projects focusing on local, regional, national or global topics of environmental, scientific, social or technological importance. The Stockholm International Water Institute administers the Stockholm Junior Water Prize and it serves as its secretariat (www.siiwi.org/prizes/stockholmjuniorwaterprize/).

The Stockholm Junior Water Prize consists of two parts: the National Competition and the International Final. All participating countries organize their own National Competition. The winner proceeds to the International Final in Stockholm. As a result of the competitions, thousands of young people around the world develop personal interests, undertake academic studies and often pursue careers in water or environment-related fields.

The International Final takes place during the World Water Week in Stockholm, an ample event where water people from all over the world meet. This generates many opportunities for networking and exposure. The efforts of the participating countries are highlighted globally. The winner of the Stockholm Junior Water Prize receives a 15,000 USD award, a crystal prize sculpture, a diploma, as well as the stay in Stockholm. Nevertheless, the participation is what genuinely matters. H.R.H. Crown Princess Victoria of Sweden is the Patron of the Stockholm Junior Water Prize.

HUNGARY AND THE SJWP

Hungary joined the SJWP in 2013. Mr. János Áder, the President of the Republic, has been the patron of the competition since 2014. The national organizer of the SJWP is the GWP Hungary Foundation in agreement with the Stockholm International Water Institute. Details of the competition are available at www.ifvizdij.hu.

Previous winners of the national competition

2013: Dézi Kakas, János Béri and Péter Polák Jr. (Fényi Gyula Jezsuita Gimnázium és Kollégium, Miskolc) – Project title: The Importance of the Szinva Stream: Biological and Chemical-Physical Examinations

2014: Claudia Li, Livia Mayer and Nikolett Sebestyén (Eötvös József Gimnázium és Kollégium, Tata) – Project title: Our Water is Our Future

2015: Márton Czikkely, Tamás Gergely Iványi and Tamás Márkus (Városmajori Gimnázium, Budapest) – Project title: The Secrets of Drinking Water – How to Combat Polyethylene Terephthalate

2016: Dávid Kovács and Ákos Iván Szűcs (Kecskeméti SZC Kada Elek Technikum, Kecskemét) – Project title: What Can We Gain by Using Grey Water?

2017: Anna Tari, Kristóf Stefán and Nikolett Szabó (Kőbányai Szent László Gimnázium, Budapest) – Project title: „Tanks of Water”

2018: Bence Zsolt Rappay (I. Béla Gimnázium, Szekszárd) – Project title: „Hillside water management and possibilities of melioration in the Csatári-valley”

2019: Eszter Kun (Móricz Zsigmond Gimnázium, Szentendre) – Project title: „Growing plants, growing minds with educational aquaponics system”

2020: Dóra Alexandra Gyémánt and László Török (Radnóti Miklós Kísérleti Gimnázium, Szeged) – Project title: „Detecting the toxin production of the Microcystis species in hungarian lakes”

2021: Emília Kovács (Kisvárdai Bessenyei György Gimnázium, Kisvárd) – Project title: „Fermentation of alfalfa brown juice and its environmental friendly reusing”

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Finalists and jury members of the national contest

THE HUNGARIAN NATIONAL FINAL



The jury during the national final

Nine entries were received for the 2022 Hungarian National Competition. Altogether, there were fourteen secondary school students involved, participating either as individual contestants, or as teams of two members. The projects were written in English, according to the requirements of the call and dealt with different topics, such as water reuse, the quality of drinking water and of surface waters, environmental awareness, eutrophication, wastewater treatment. Six projects were selected by the jury for the national final on the basis of the SJWP judging criteria. The Hungarian National Final was organised at the Hungarian Water Utility Association (MaVíz) in Budapest on the 28th of May 2022. The finalists were requested to prepare a Power Point presentation displaying the results of their project.

During the final, the contestants presented their main findings and answered the jury's questions. Approximately 15 minutes per team were allocated. The presentations and the interviews were conducted in English.

THE JURY OF THE SJWP – HUNGARY 2022

Chair:

- *András Szöllősi-Nagy*, professor, National University of Public Service

Members:

- *Sándor Baranya*, associate professor, Budapest University of Technology and Economics
- *Anna Bérczi-Siket*, consultant
- *Adrienne Clement*, associate professor, Budapest University of Technology and Economics
- *Tamás Gampel*, business development director, Xylem Water Solution Hungary
- *Veronika Major*, director, VTK Innosystem Plc.
- *Edit Nagy*, secretary general, Hungarian Water Utility Association
- *Szilvia Szalóki*, vice president, Hungarian Energy and Public Utility Regulatory Authority
- *Danka Thalmeinerova*, consultant

Secretary:

- *Monika Jetzin*, GWP Hungary Foundation

SUMMARY OF THE FINALISTS' PROJECTS

SUSTAINABLE WATER SUPPLY SYSTEM FOR ORGANIC FARMS

Kinga Méhesi-Melis – Széchényi Ferenc Secondary Grammar School, Barcs

“Nowadays, being green and sustainable is inevitable and a lot of research is conducted in this field. Within the broad spectrum of sustainability, water has received an exceptionally huge emphasis and has become one of the hottest topics of green and sustainable research.

It is well known that humans will soon experience drinking water shortages as water supplies are becoming more and more limited due to the renowned climate change including global warming. Therefore, my project focuses on creating a sustainable circular domestic water system, which is specifically designed for organic farms. This project helps to establish a renewable water supply system that helps organic farms primarily not to use running water thus saving money for the farmer. In the future, the ideal goal would be to apply this system in every household in order to maintain the quality of our lifestyle.”



SUMMARY OF THE FINALISTS' PROJECTS

THE TREASURE OF THE DEEP DRAIN?

Balázs Barna Botond, Begovác Barna – Nagy Lajos High School of the Cistercian Order

„Throughout Hungary there are numerous regions with natural hot springs. Elevated geothermal gradient throughout the country makes this possible. The spent thermal water retains high concentration of various salts and eventually gets discharged into the regional watershed.

The geothermal water waste includes high concentrations of ammonium, nitrite and also thermal pollution. The objective of our study is to measure the negative environmental impact of the discharged geothermal water with two targets: Define the size of the dilution field required to mitigate the negative environmental impact. We defined the isolation distance in our project and we were looking for possible solutions depending on microbiological, physical, chemical parameters.”

HOUSEHOLD MICROPLASTIC POLLUTION

Bence Ferencz – Miskolci Herman Ottó Gimnázium, Miskolc

“In general, household pollution still remains fairly unsolved, due to the fact that the solutions provided depend too much on human willingness. This phenomenon consists of: pollution and lavishment of air, light, soil; as well as regarding fresh and wastewaters. These are generally referred to as periferic problems, although the quality of these factors show a significantly

increasing tendency. More and more people do it because there are really no consequences, and the fact that the bills would get a bit more expensive leaves the vast majority unbothered. But if we look at the effects of this neglective behavior, the problems caused are by far the highest in the case of household water pollution. That is why I looked more into this phenomenon and tried to figure out a solution to the following questions:

- What type of pollutions are there
- Where do they occur
- Solution?”



SUMMARY OF THE FINALISTS' PROJECTS

EFFECTS OF THE AJKA ALUMINA PLANT ACCIDENT 12 YEARS LATER

Jácint Szarvas, Máté Wittich – Szent István Gimnázium, Budapest

„Our project is about examining the effects of the Ajka Alumina Plant accident 12 years later. The catastrophe, which occurred on the 4th of October in 2010, caused immeasurable ecological damage. Our objective was to detect any trace of the

red mud left behind in the Torna River and its surroundings.

We took measurements of and conducted experiments on the water and soil samples taken from the river and near to the reservoir. The mud contained compounds that decomposed many years ago or are not able to react with substances in our reach. Therefore, we measured the pH levels of the samples and the presence or absence of iron(III) oxide.”



DEVELOPMENT OF A PROTECTION METHOD AGAINST SOIL EROSION AND WATER CONSERVATION IN SZEKSZÁRD

Balázs Andócsi, Olivér Herceg – Béla I. Grammar School, Szekszárd

„In our dissertation we investigate the soil erosion effects of wind and rainfalls. With the change of these climate elements their destructive power to the soil becomes even greater, and we have developed a mulching method as a potential solution. Our investigations took place in the Parásztai-Séd's sub-basin in the Szekszárd Hills. Here, the composition of the soil is loess. We have investigated the precipitation trends, the wind, and temperature,

whilst noting the change in the occurrence of drought years. With the determination of soil texture and its maximum water holding capacity, we have come to a conclusion regarding the Hills's erosion sensitivity. We have measured the creek's discharges and the carriage of sediment, which runs down through the hill. Our goal was to investigate the erosion effects of extreme rainfalls. After that, we have estimated the average soil erosion using the general soil loss equation. This research's goal was to prove the upcoming change of water management in the area, to show its effects on the environment, and to allow us to provide a potential solution against the given problem.”



SUMMARY OF THE FINALISTS' PROJECTS

DETERMINATION OF THE CHEMICAL COMPOSITION OF ALFALFA BROWN JUICE AND APPROACHES FOR ITS TREATMENT AND ENVIRONMENTALLY-SAFE REUTILIZATION

Emília Kovács – Kisvárdai Bessenyei György High-school, Kisvárdá

„The human population is constantly growing. As protein sources are crucial, protein deficiency could become a significant problem in the future. Because of this, alternative protein sources will likely play a major role in the human nutrition. Nearly 33% of the alfalfa (*Medicago sativa* L.) is protein, making it an excellent alternative protein source. The

isolation of leaf protein resulted in four products, green juice, fibre, leaf protein concentrate (LPC), and deproteinized juice which is also referred to as brown juice (BJ). The fractionation of one-kilogram fresh biomass results in 450–550 mL brown juice (liquid bio-industrial wastewater) which can be harmful for the environment without treatment. Deproteinized juices are handled as effluents worldwide. They are produced in a very huge amount and are difficult to store at room temperature. Nevertheless, this paper will present several advantages for recycling and cleaning. If brown juice enters the sewage system, it can cause numerous environmental issues, because of its high element content. Therefore, this paper will outline a preservation procedure, cleaning theories as well as the effect of biofertilizer.”



THE RESULT OF THE NATIONAL FINAL

The jury decided on the winner in a closed session and announced the result on the spot. The decision was based on the same judging criteria used during the international final (Relevance, Creativity, Methodology, Subject Knowledge, Practical Skills, Report and Presentation), considering both the written project and the presentation, including the interview. The winner of the Stockholm Junior Water Prize – Hungarian competition 2022 is:

Balázs Andócsi and Olivér Herceg (Béla I. Grammar School, Szekszárd) with the project: “Development of a Protection Method Against Soil Erosion and Water Conservation in Szekszárd”



THE INTERNATIONAL FINAL

The Stockholm Junior Water Prize 2022 edition is held in person and online too. This year, representatives from 36 countries competed for the SJWP: Argentina, Australia, Bangladesh, Benin, Bolivia, Brazil, Canada, Chile, Cyprus, Czech Republic, Denmark, Ecuador, Germany, Hungary, Israel, Italy, Japan, Kazakhstan, Kenya, Malaysia, Mexico, Netherlands, Nigeria, Norway, Republic of Korea, Singapore, South Africa, Spain, Sweden, Switzerland, Thailand, Turkey, Ukraine, United Arab

The 2022 Stockholm Junior Water Prize was awarded to a student from Canada, Annabelle M. Rayson. H.R.H. Crown Princess Victoria of Sweden announced the winner during a ceremony at World Water Week in Stockholm on 30th August.

Plankton Wars: An Innovative Analysis of Daphnia Genotype Biomanipulations for Algae Bloom Prevention

Annabelle M. Rayson
Canada

Harmful algae blooms plague aquatic ecosystems around the world. They impact water quality and ecosystem diversity, cause dead zones, and cost the fishing and tourism industries millions of dollars. In this project, different genotypes of *Daphnia magna* were compared for algae consumption. The most effective genotype was then tested under different environmental conditions to see which factors helped or hindered their success at harmful algae bloom treatment and prevention. It was discovered that genotype 4 is the ideal genotype of *D. magna* to biomanipulate to treat and prevent harmful algae blooms, can effectively do this in nutrient and plastic polluted environments, and can have their health and success improved through calcium carbonate and naturally occurring aquatic microbes.

Emirates, United Kingdom and the United States of America.

Hungary was represented by the two-member team formed of Balázs Andócsi and Olivér Herceg (Béla I. Grammar School, Szekszárd) with the project "Development of a Protection Method Against Soil Erosion and Water Conservation in Szekszárd".



The winner of SJWP 2022 receiving the prize from H.R.H Crown Princess Victoria

The Diploma of Excellence was awarded to Laura Nedel Drebes and Camilly Pereira dos Santos from Brazil for the project: "SustainPads: Sustainable and affordable sanitary pads from industrial by-products". The project was: "Basic sanitation is a human right. It's what the 6th of the 17 SDGs created by the UN foresees. However, plenty of women face Period Poverty, which consists of the inaccessibility to sanitary pads, bringing irreversible social consequences and a lack of dignity in their lives. Moreover, synthetic pads negatively impact the environment since most of their materials come from non-renewable sources and require tons of liters of water to be manufactured. So, by-products from the South Coast of Brazil were used as raw materials to develop an eco-friendly sanitary pad. The final prototype was able to absorb 645%, while the disposable pads were 582% and it has a cost 2 cents."



This was the third year the new prize, the People's Choice Award was given to a 15 years old girl from the United Arab Emirates: Mishal Faraz for the project: "My Water Bottle Project".



Crown Princess with the Hungarian finalists



Stockholm Junior Water Prize 2022 finalists with H.R.H Crown Princess Victoria of Sweden

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National Organiser



1119 Budapest, Etele út 59-61.

Phone: +36 1 37 11 333

Fax: +36 1 37 11 334

Email: gwpmo@gwpmo.hu

Web: www.gwpmo.hu

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Edited by Réka Molnár

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