

2021 Finalists



SIWI STOCKHOLM
JUNIOR
WATER PRIZE

25
YEARS

Stockholm Junior Water Prize

Each year, the Stockholm Junior Water Prize celebrates young scientists from all around the world who have designed new innovative solutions to the Earth's increasing water challenges. Each of the national finalists competing for the ultimate title are the champions of their national competitions and have been selected as winners from thousands of entries for their outstanding work.



“*Stockholm Junior Water Prize celebrates young people's determination to be part of a better future. The passion and ingenuity that all participants show is truly inspiring and an important contribution to the global water world.*”

Torgny Holmgren, Executive Director,
Stockholm International Water Institute.

About Stockholm Junior Water Prize

The 2021 edition was held entirely online and in spite of the Covid-19 pandemic, 32 countries succeeded in organizing national competitions. The winners of these national events then competed for the title Stockholm Junior Water Prize champion 2021.

This year we were proud to host the 25th annual competition and celebrate the winners of national competitions from the following countries: Argentina, Australia, Bangladesh, Belarus, Benin, Bolivia, Brazil, Cyprus, Ecuador, Germany, Hungary, Israel, Italy, Japan, Kazakhstan, Laos, Malaysia, Mexico, Netherlands, Nigeria, Republic of Korea, Russian Federation, Singapore, Spain, Sri Lanka, Sweden, Switzerland, Thailand, Turkey, Ukraine, United Kingdom and United States of America.

The Stockholm Junior Water Prize competition proved once again that given the opportunity, exceptional young minds can come up with outstanding and original solutions to our planet's water related issues. Despite the ongoing crisis caused by Covid-19, these bright students have looked beyond problems and created projects with potential for long-term benefits. In this catalogue, you can learn more about the innovative research and inventions that earned each of the finalists a place to compete for the internationally recognized Stockholm Junior Water Prize Award.

You can learn more about all of the amazing projects from the finalists, watch their videos and read all about them on the participants' own web page [WaterTank](#).

You can find more information about the award and previous laureates on the [Stockholm Junior Water Prize website](#).

Cover Photo:

The online Stockholm Junior Water Prize ceremony,
August 2021.



“These winners are part of a global movement. We’re so inspired by them – and all 125,000 entrants in 25 years of the Stockholm Junior Water Prize. A generation of young people, motivated to solve society’s biggest water challenges, can and are changing the world. We’re so proud to champion their innovation by sponsoring this great Prize.”

Patrick Decker, CEO
Xylem

Index

Argentina, Australia, Bangladesh, Belarus	3
Benin, Bolivia, Brazil, Cyprus	4
Ecuador, Germany, Hungary, Israel	5
Italy, Japan, Kazakhstan, Laos	6
Malaysia, Mexico, Netherlands, Nigeria	7
Republic of Korea, Russian Federation, Singapore, Spain	8
Sri Lanka, Sweden, Switzerland, Thailand	9
Turkey, Ukraine, United Kingdom, United States of America	10
Stockholm Junior Water Prize Winners, 1997-2020	11 - 12
WaterTank	13 - 14

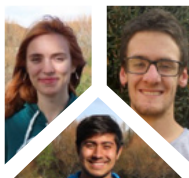
The international jury

The international jury includes experts within the field of water who appoint the winner of the international final by committee consensus. The decision is based on the finalists’ written reports and a short interview with the jury, during which the students make a short presentation of their project. The jury members are appointed by Stockholm International Water Institute Board.

All members of the jury have extensive experience and represent a wide range of disciplines from natural to social sciences in order to ensure all projects are equally reviewed and judged.

The 2021 International Jury Members:

- Dr Victoria Dyring (Chair), Sweden
- Ms Fabienne Bertrand, Haiti
- Dr Paula Owen, UK
- Prof. Krishna R. Pagilla, USA
- Prof. Yoshihisa Shimizu, Japan
- Mr Johan Bratthäll, Sweden
- Mr Manuel Fulchiron, France



Argentina

Characterization of the larval habitat of mosquitoes in Northern Patagonia, Argentina

Lucio Daniel Martinez, Marianela Pepe & Juan Francisco Wehinger

National Organizer
Argentine Association of Sanitary Engineering & Environmental Sciences (AIDIS)

Sponsors
Xylem; AySA; Ecopreneur; Aerolineas Argentinas

Patagonia has a cold climate with a dry season during the mosquito breeding period. Little is known about the reproductive habitats in Patagonia and *Aedes aegypti* was found in Neuquén. Climate change could encourage mosquito migration to cold areas. Objective: to characterize the reproductive habitats of mosquitoes and identify the genera in Junín de los Andes. Methodology: hydrosphere and biosphere protocols of the GLOBE Program were applied. Results: Only the genus *Culex* sp. was found. The puddles are protected by trees and herbs, the water quality between the puddles is similar, with little oxygen, high turbidity and alkalinity. The diversity of macroinvertebrates is low compared to the river. Knowing the breeding habitats allows to design prevention and control systems.



Bangladesh

An Integrated Smart Water Management System using IoT

Muhammad Abrar Zawad
Tanjim Zaman Khan

National Organizer
House of Volunteers Foundation Bangladesh

Sponsors
Nestlé Bangladesh Limited; WaterAid Bangladesh; ESTex

The water crisis in megacities like Dhaka intensifies as we don't realize how much water we use or how much we waste. The primary purpose of our work is to reduce water wastage so that we can conserve water resources. We tried to develop an integrated system, which will help people track and predict their water usage habits to suggest more efficient behaviors which will be easy to implement as well so that it can be popularised in megacities. Moreover, the system includes an option to reuse greywater by recycling it to reduce unnecessary water usage and prevent wastage. As a result, the proposed system will help us to improve our water usage behaviors and conserve our limited resources.

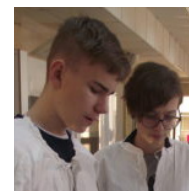


Australia

Bioflocculation Annabelle Strachan

National Organizer
Australian Water Association
Sponsors
Xylem

My study investigated the feasibility of a bio-flocculant as an accessible, safe, affordable and environmentally friendly option to reduce turbidity. Using a combination of dried lemon peel and chitosan, I tested different concentrations to find the optimal dosages to reduce turbidity. The bio-flocculant identified offered an affordable treatment option for those with limited access to clean water while being environmentally friendly and offering no adverse health effects sometimes associated with flocculation.



Belarus

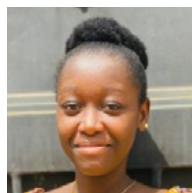
The Use of Plant Materials As Sorbents of Petroleum Products

Anna Tikhonovich
Yegor Kasyanik

National Organizer
Republican Center of Ecology and Tourism
Sponsors
Coca-Cola Beverages Belarus

Accidental spills of oil products and the release of oil products into water bodies can also lead to deterioration of health and life of the population. Are there effective, affordable, environmentally friendly ways to eliminate oil pollution? What natural materials are the most effective for removing oil and gasoline from water surfaces? The search for answers to these questions became the main reason of our research. Hypothesis: plant fibrous materials can be used for the sorption of petroleum products when they enter water bodies. Thus, the hypothesis that it is possible to find available plant materials with the help of which it is possible to collect effectively oil and oil products from the surface of the water has been confirmed.





Benin

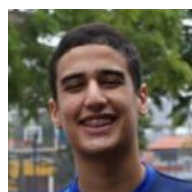
Realization of a Household Water Treatment System in the Lakeside Villages of Benin

Inès Octavie Sèssi Sogbossi

National Organizer
HTC CETIP

Sponsors
Partenariat National de l'Eau (PNE)

This project is part of the fight against water-borne diseases in Africa and particularly in Benin. The objective is to have a domestic water treatment system that will allow local residents to reduce the rate of water-related mortality and morbidity. This involves using a technique known as the treatment and secure storage of domestic water, but with a modern approach in order to allow the population of the lake areas of Benin to have access to drinking water in good quantity.



Brazil

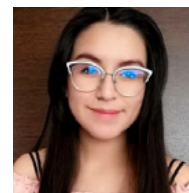
Development of a microplastic retention mechanism in water treatment plants (WTPs)

Gabriel Fernandes Mello Ferreira

National Organizer
Brazilian Association of Sanitary and Environmental Engineering (ABES), Young Water Professionals (JPS)

Sponsors
SABESP - Basic Sanitation Company of the State of São Paulo; Xylem

Microplastic contamination is growing in the environment, given the ubiquity of plastic materials in our society's daily lives. Studies have found these microparticles in water treatment plants that do not have a specific mechanism for removing this pollutant, which results in their presence in the Water Distribution System, therefore, distributing to consumers. The purpose of this project is a solution to this demand, as developed of microplastics filtration mechanism, easy to use and accessible because of the low-priced materials, to apply in the WTPs. The system was built and tested to simulate the conditions of this environment. The simulations demonstrated the effectiveness of the designed filter, the filter achieved 80% of efficiency, and it retracts particles even smaller than 300µm.



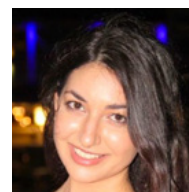
Bolivia

Eqomuros. Water filter made of Quinoa Saponin

Andrea Peredo Villarrubia

National Organizer
Embassy of Sweden, La Paz

This project presents a rainwater collection system that reuses PET bottles, which interconnected with other bottles form a vertical, compact and pressure-resistant water tank, which occupies a reduced space. The objective of the project is to satisfy the water saving needs of the Guillermo Frías Elementary School, located in Mecapaca (City of La Paz); This area presents constant problems related to the water supply. The system has a similar function with Ekomuros, but unlike them, it has a filtration system based on the use of quinoa peel, which contains saponin. Saponin is an antifungal; it kills fungi and bacteria, it also makes foam, so the collected water can be used in the toilets of elementary school children.



Cyprus

A novel advanced treatment process for the removal of antibiotics from wastewater

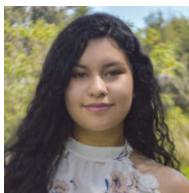
Ioanna Karaiskaki

National Organizer
Water Board of Lemesos

Sponsors
PWC Cyprus; Bank of Cyprus; The Sewerage Board of Lemesos-Amathus; KIOS Research and Innovation Center of Excellence of the University of Cyprus; Nireas International Water Research Center of the University of Cyprus; Eratosthenis Research Center of the Cyprus University of Technology; Phileleftheros Newspaper

Antibiotic consumption in the latest years has increased rapidly, especially in my country. Cyprus records the second highest antibiotic consumption in the EU. Antibiotic over-consumption can result to bacteria being resistant to antibiotics, therefore posing them as ineffective and creating a tremendous problem when managing bacterial infections. My project aims to eliminate antibiotic residues from wastewater, using biochar, a charcoal-based material from sludge and manure, as an antibiotic absorbent. The biochar prepared was examined on four different antibiotic substances, with significance absorption rate. Finally, my project suggests a possible small scale proposal of implementation of biochar.





Ecuador

ConCiencia Verde “Ecobardas: an ally of nature”
Andrea Pinto

National Organizer
SR3 Invent

Sponsors
Fondo de Agua para la Protección de la Cuenca del Río Paute – FONAPA; Produbanco Grupo Promérica

Rivers in residential areas, seas, and oceans have been affected by inadequate solid waste management and disposal. As result, huge islands of plastic waste have been formed in the oceans. To counteract and reduce plastics volume in water bodies, we developed an artisanal system for collecting floating waste. We called this system Ecobardas, for our case of study in the Capelo river - Ecuador. The second phase of this project involved the design and manufacture of eco-blocks with triturated recycled waste material (plastic). Eco-blocks are cheap and can be used for any type of buildings. Their lower cost will be beneficial to people of scarce resources or who are in vulnerable situation.



Hungary

Fermentation of Alfalfa Brown Juice and Its Environmental Friendly Reusing
Emilia Kovács

National Organizer
Global Water Partnership Hungary

Sponsors
Hungarian Energy & Public Regulatory Authority; Kék Bolygó Foundation; Xylem; Hungarian Water Utility Association; Budapest Water Works

Protein deficiency could be appearing in the future, because of the population growth, so the alternative protein sources will play main role in the nutrition of human population. In our research we used alfalfa (Medicago sativa) as alternative protein source, from which we could create a leaf protein concentrate. The isolation of leaf protein resulted a very large amount of brown juice and it has a harmful effect on the environment. For example it can cause eutrophication.



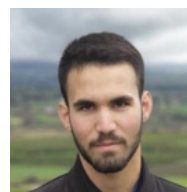
Germany

Silphium perfoliatum – a newcomer for an ecologically sustainable energy agriculture
Melina Reckermann
Isabell Seibel

National Organizer
Stiftung Jugend forscht e.V.

Sponsors
Federal Ministry for Education and Research, Germany

The importance of soils for the environment and for humans is often underestimated. Soils are an integral component of nutrient and water cycles and ultimately constitute our basis of life. In our project, we have comparatively analyzed the two energy crops corn and cup plant, an agricultural newcomer, with regard to water retention, nitrate filtration capacity, influence on humus formation and potential for reintegration of depleted soils. After numerous laboratory and field trials the cultivation of the cup plant can be recommended especially in the context of climate change and in areas where erosion is prominent and water protection is needed.



Israel

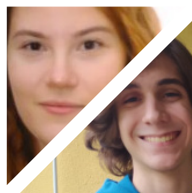
Feasibility of Integrated Fish and Algae Offshore Farms
Imri Ketzev

National Organizer
Tel Aviv University - Ms. Helen Tenenbaum

Sponsors
Faculty of Engineering, Tel Aviv University; Raquel & Manuel Klachky Fund; JNF USA; Water Authority; Water Research Center, Tel Aviv University

In my research I examined the potential of algae cultivation in close proximity to marine offshore fish cages, creating an integrated farm model, which produces animal and plant protein, using negligible quantities of freshwater resources. The results proved Ulva algae to be suitable for use as a biofilter, which reduces the environmental negative impact of offshore fish cages by assimilating excess nutrients and nitrogenous compounds emitted from fish production. Cultivation of algae and fish in an integrated system may reduce inland beef, poultry, and vegetable agriculture, thus significantly reducing the use of fresh water, potentially saving hundreds trillions of liters of water annually.





Italy

SAP2 (Sustainability Analysis of Purification with SAPonite)

Giorgia Ludovica Mazza
Stefano Merlo

National Organizer

FAST Federation of Scientific and Technical Associations

Sponsors

Xylem; AICA; CoRePla; FOIST; Fondazione Salvetti; SIF; Silvio Lutteri; Ministero dell'Istruzione, Aim-Associazione italiana di metallurgia, RSE-Ricerca sistema energetico, SIF-Società italiana di fisica, SCI-Società chimica italiana sezione Lombardia, Society for Science

The goal of our project was to develop an experimental solution to environmental pollution and to analyze the sustainability of the process. We used a synthetic clay named Na-SAP-20, a mineral which possesses ion exchange properties which allow it to recover heavy metals and other pollutants from bodies of water. The method we developed was tested on Co²⁺, a material recognized as 'critical' due to its uses in a range of industrial, sustainable and technological applications, and on Cr³⁺ which is a common polluting agent found in freshwater. The material absorption capacities have been analyzed by spectrophotometry UV-VIS, ICP-MS and NMR-relaxometry; we compared the results obtained with these analytical techniques focusing on the advantages and disadvantages of each one.



Kazakhstan

Water saving in oil bioremediation technique

Tomiris Smoglova

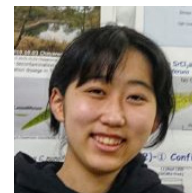
National Organizer

Nursultan Nazarbayev Educational Foundation and Miras International School, Almaty

Sponsors

Kazphosphate LLP

Protein deficiency could be appearing in the future, because of the population growth, so the alternative protein sources will play main role in the nutrition of human population. In our research we used alfalfa (Medicago sativa) as alternative protein source, from which we could create a leaf protein concentrate. The isolation of leaf protein resulted a very large amount of brown juice and it has a harmful effect on the environment. For example it can cause eutrophication.



Japan

Future Treatment System of Radioactive Wastewater in Fukushima using Indigenous Algae — For Protecting our Oceans from the Pollution —

Miki Kamimura

National Organizer

Japan Water Prize Committee (Japan River Association)
日本水大賞委員会 (日本河川協会)

Sponsors

CTI Engineering Co., Ltd.; Nippon Koei Co., Ltd.; TOKEN C. E. E. Consultants Co., Ltd.; PACIFIC CONSULTANTS CO., LTD.; IDEA Consultants, Inc.; Yachiyo Engineering Co., Ltd.; Kyowa Concrete Industry CO., LTD.

The radioactive materials in contaminated water at the Fukushima Daiichi Nuclear Power Plant are currently treated by physico-chemical treatment processes. In this study, as a potential alternative option to the current approach, I proposed future treatment system using three types of indigenous algae found near our high school: Chara braunii, Closterium moniliferum, and Nostoc commune. In the first and second steps, C. braunii and C. moniliferum are used to remove Sr. The remaining Sr and Cs are then further removed by N. commune in the final step respectively. Tritium could also be removed in the final step.



Laos

Coffee Clay Water Filter

Ashraf Ravindarnath
Vannikone Doungsy

National Organizer

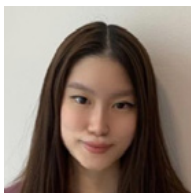
Sirena Technologies Laos

Sponsors

SIA

This project is a simple solution that can help people who are in need of good water quality while only using natural ingredients. Our Coffee-Clay Water Filter can remove dirt particles from the water and make it drinkable. The water we have successfully cleaned so far is from the Mekong River, rain water, municipality water, and underground water. This is a project that we believe has great potential in addressing the issues of contaminated and dirty water by using a filter which is only made from readily available and low-cost ingredients such as coffee and clay.





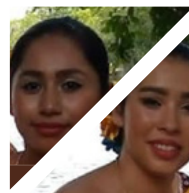
Malaysia

Deep Convolutional Neural Networks as a Novel Approach to Real-Time Freshwater Quality Monitoring and the Prevention of Waterborne Disease Outbreaks

Mae Chew

National Organizer
Talent
Developing
Society

The discharge of sewage and industrial waste into the world's freshwater bodies has become an increasingly alarming issue with highly pervasive implications: waterborne diseases contracted by exposure to contaminated water result in 3.4 million deaths each year. This project thus aims to establish an accurate and cost-effective method of real-time water impurity detection, and to design an early-warning system for waterborne disease outbreaks in rural and low-resource settings. A novel software application that applies deep convolutional neural networks and sensing technology to the bacteriological and chemical evaluation of freshwater sources was developed. When synergized with IoT, the application can facilitate communication with individual households, local governments, and health authorities, streamlining environmental support and increasing the efficacy of purification efforts.



Mexico

Biofita, A Life-Giving Weed

Sofía Tress González
Lisania Karina Monzón Fernández

National Organizer
Instituto
Tecnológico y de
Estudios Superiores
de Monterrey

Sponsors
Atlas Copco,
Embajada
de Suecia en
México, Comisión
Nacional del
Agua, Instituto
Mexicano de
la Juventud,
Servicios de Agua
y Drenaje de
Monterrey, I.P.D.

The San Pedro River, located in the border of Mexico and Guatemala, is of great importance to the Mayan culture, connects a wide wetland network, and is a revenue source to local communities, but is being affected by pollution and the growth of aquatic weeds. The rural border communities also face the scarcity of commercial fertilizers, which hinders their participation in productive programs. Here, we studied the potential use of aquatic weeds to produce a biofertilizer. After performing physicochemical analysis, germination, and growth tests, we scientifically confirmed that the Biophyte fertilizer is safe and adequate for use by farmers. Finally, we also worked along the community to create know-how and awareness.



Netherlands

Why Size Matters

Stijn Wiersma

National Organizer
Dutch Junior
Water Prize

Sponsors
Wetsus,
European
centre of
excellence for
sustainable
water
technology

As the world's population grows, the demand for food is growing as well. Therefore we need to handle our agricultural grounds with all love and care it needs. Fertilizers are essential in the optimization of the soils. In this project the effect of particle size in fertilizers was researched, especially in dried organic compounds like hay. Firstly the concentration of soluble content out of dead organic material in various particle sizes was looked at. After the first experiment the influence of particle size on water absorption and retainment was researched. In this manner water can be used as efficiently as possible, which leads to less water needs and higher yields. This shows why size matters.



Nigeria

Purification of Water Polluted by Petroleum Product Using Locally Sourced Materials

Ajasa Kehinde Timilehin
Obikoya Ayomide

National Organizer
Hope for
Africa through
Sustainable
Development
Nigeria

Sponsors
Embassy of
Sweden in
Nigeria; Atlas
Copco Nigeria
Ltd

NATRIFIER DISPENSER is a natural purification system that helps to purify water polluted with petroleum product using locally sourced materials such as Moringa Oleifera seed and granulated activated charcoal. This project also entails development of "Natrifier" a sustainable mobile water purification flask for families living in affected communities to purify polluted water themselves.





Republic of Korea



Development of Project AqUs for the Civic Participation on Water Conservation Using Water Footprint Concept Seunghyeon Kim

National Organizer

Korea Water Forum

Sponsors

Ministry of Environment; Korea Water Forum; Ministry of Education; Embassy of Sweden in Korea; K-water; Korea Foundation for the Advancement of Science and Creativity

The final goal of this research is to promote civic participation on resolving the water issue. For this, the research was fragmented into following three steps: 1. civil recognition and promotion to participate on water problems by AqUs, an educational game app, 2. spreading the sustainable-self development system through GitHub and Facebook promotion, 3. propagating the movement to a global scale.



Singapore



Synthesis of an Eco-friendly and Reusable Magnetic Ferrofluid using Orange Peel Extract for Oil Spill Cleanup Kiefer Ong Xian Yao Pierre Yeap Yu Song

National Organizer

Lien Foundation, Sembcorp Industries & Ngee Ann Polytechnic

Sponsors

Lien Foundation; Sembcorp Industries

Oil spills are environmental disasters, but current methods like in-situ burning are harmful to the marine ecosystem. This study proposes an innovative, low-cost ferrofluid developed using orange peel (OP) extract as the surfactant, instead of the conventional oleic acid which is expensive to purify. OP-ferrofluid has a higher oil removal capacity than commercial sorbents such as polypropylene and can be reused for at least 5 cycles without a significant drop in effectiveness. A novel prototype was constructed to easily retrieve used OP-ferrofluid via a magnet for regeneration, facilitating the use of OP-ferrofluid to clean up oil spills in the ocean.



Russian Federation



Practical Implementation of the Magneto hydrodynamic Effect in the Tidal Currents of the Barents Sea: a Feasibility Study Gleb Telegin

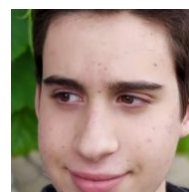
National Organizer

Environmental Projects Consulting Institute (EPCI)

Sponsors

Ministry of Natural Resources and Ecology of the Russian Federation; Federal Agency of Water Resources; TVEL Fuel Company of Rosatom

Utilization of pollution-free and renewable energy sources, including tidal energy was in a focus of the study aimed at assessing feasibility of electricity generation from the kinetic energy of the tidal waves and the kinetic energy of the charged particles (seawater ions) moving in the magnetic field. The developed model generator of the system of acting Kislogubskaya tidal power station in Murmansk region with implementation of MHD channel demonstrated economic viability of solution. A full-scale utilization of Kislogubskaya station would help to redistribute electricity surplus for residential heating purposes and increase the level of environmental safety. The environmental benefit of the proposed solution is associated with CO₂ emission reductions, which can bring additional income to the regional budget



Spain



Design and construction of an irrigation system powered by renewable energy Andreu Pujol Baulenas

National Organizer

Fundacion Aquae

Sponsors

Fundacion Aquae

The principal objective was to design, develop, and make an automatic irrigation system that works from renewable energies. To accomplish this, energy would be provided by a solar panel. The project is divided into three parts: 1. Developing a study of the land and drawing up a map of the orchard. 2. Calculating the size of equipment needed. 3. Building the irrigation system, from the data obtained from the first and the second part. With these objectives, this project aims to design and construct an irrigation system that collects rainwater and has a submerged pump, for a vegetable patch. To construct this system, which is the final objective of the work, it must be taken into account that the installation is affordable.





Sri Lanka

Investigating the Efficiency of Saline Water Irrigation Using Solar Evaporation Techniques

Sajimithan Pathmanathan

National Organizer
DreamSpace Foundation

Sponsors
Sagacious Youth Lead Consortium

Efficient use of good quality water is crucial. This study was conducted to explore the possibility of using saline water using solar evaporation techniques as a new method to improve the soil moisture content at the root zone. Utilizing a novel watering device made from the waste plastic water bottles installed by the side of the plants adapting the drip irrigation system to irrigate to the root zone. The research proved that seawater irrigation with solar evaporation techniques can also be used in modern agriculture especially for low water-required crops. Farmers will be able to not only conserve water, but also reduce operational cost of cultivation, and when practiced at a large scale to bring salt as a by-product.



Switzerland

Evidence of Neonicotinoid Contamination in Aquatic Invertebrates: An analysis of the current state of the river Seyon in Switzerland

Jeanne Käser

National Organizer
Swiss Toilet Organisation

Sponsors
Swiss Water Partnership; Skat Foundation; Xylem; Seecon

Neonicotinoids are widely used pesticides whose harmful effects on biodiversity have been long recognized. This work analyzes the incidence and prevalence of five neonicotinoids in four different taxa of aquatic invertebrates in three sites of the Seyon River, in Switzerland. All samples analyzed were contaminated with at least one neonicotinoid, and two neonicotinoids found in the samples had been banned from use nine months prior to sampling; these facts highlight the substances' ubiquity and high persistence in natural environments. The concentrations indicated a chronic exposure to neonicotinoids, except for one value which was tenfold higher than the others. These alarming results encourage further studies on the subject, in which the experimental methods developed for this work could be exploited.



Sweden

Marine and weather research in a cost-effective and democratic way with independently received weather satellite images

Vidar Petersson

National Organizer
Swedish Federation of Young Scientists)

Sponsors
Xylem

Satellites have become an essential part of our everyday modern life. Especially weather satellites as they provide a basis for weather forecasts from a unique perspective. However, did you know that anyone, anywhere, can receive images and data directly from weather satellites with low-cost equipment? The objectives of this study revolve around the UN's Global Goals for sustainable development and how to introduce more accessible and democratic ways of conducting water and climate research. This study, therefore, examines if it is possible to conduct a scientific study with images directly from these weather satellites. The study presents a novel way of analyzing sea surface temperature (SST) in the Baltic Sea region and its development during the fall of 2020.



Thailand

Bio-Moisture-Nutrient Absorbing Belt for Promoting the Sugarcane Seedlings Growth from the Local Waste

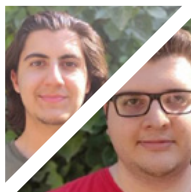
**Thanawit Namjaidee
Future Kongchu**

National Organizer
The Institute for the Promotion of Teaching Science and Technology (IPST)

Sponsors
The Institute for the Promotion of Teaching Science and Technology (IPST)

The problem of drought, limited water resources and pest infestation is a major problem for sugarcane seedling growth. The researchers developed an innovative Bio-Moisture-Nutrient (BMN) Absorbing Belt for promoting sugarcane seedlings growth from local waste; bagasse and fish scales to maintain soil moisture, provide plant nutrients and prevent pests. The innovation solves problems in water management and agriculture, whilst aligning with the SDGs and Thailand's Bio-Circular-Green agriculture model. The innovation maintains soil moisture two times better than a control, reduces water usage by 50%, and saves production costs by 52.93%, from traditional cultivation. Furthermore, the belt can reduce pests by upto 93.12 %, and has a low production cost; about 0.06 USD per unit.





Turkey

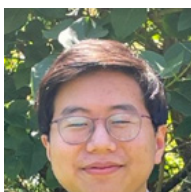
Monitoring of Household Water Usage & Control of Pressure with the Internet of Things & Cloud Database

Ali Semih Ural
Kaan Uz

National Organizer
General
Directorate of
State Hydraulic
Works

Sponsors
DSI Foundation

Water resources in the world are used in 3 areas: agriculture, industry and households. This project targets household consumption that has been the least studied. In this project, a model was created that will contribute to increasing the awareness and control on water consumption. In this model; there are smart water meters that create usage data, a mobile application integrated with the internet of things and cloud database that provides a detailed display of this usage and a pressure reducing system which works under the control of this mobile application and supports the household to limit water use. It is thought that if the model is put into widespread use, it will increase awareness and decrease in water use.



United Kingdom

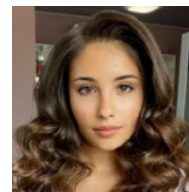
Selection of Water-Purifying Bacteria and Development of a Dissemination System Using Vessels to Improve Water Quality of Rivers

Junghong Huh

National Organizer
Chartered
Institution of Water and
Environmental
Management

Sponsors
Jacobs;
Environment
Agency

The problem of river water pollution is becoming increasingly alarming due to the increase in use of resources such as heavy metals and oil. The aim of this project is to determine the most effective microorganisms capable of purifying water, and to develop a model to disseminate the selected microorganisms into rivers. Yeasts and bacteria, isolated from streamwater, were classified and their survivability in a contaminated water environment was confirmed. Having analysed the effectiveness of such river microorganisms in oil and heavy metal removal, *Phytobacter diazotrophicus* was identified as the most effective bacteria. Finally, I designed a water purification system to allow bioremediating microorganisms to be constantly disseminated from vessels into rivers, which would prevent pollutant accumulation in rivers.



Ukraine

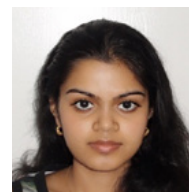
The Assessment of Toxicity of Lake Water in Boryspil According to the "Growth Test"

Daria Yerofeieva

National Organizer
Ukrainian
Water Society
WaterNet

Sponsors
SPC LLC
Ecosoft;
NTUU "Igor
Sikorsky Kyiv
Polytechnic
Institute"

Research project is dedicated to studying the question of stabilizing and improving the ecological condition of the lake water in Boryspil. The toxicity of the lake water samples of the territory has been explored, investigated and evaluated, the dependence between the anthropogenic load and natural water quality of lakes in Boryspil has been studied. The method of germination of test cultures on "floating disks" has been applied. As a result of the research, it has been proven that the growth processes of plants germinated on the samples of the testing water from various lakes of Boryspil is different significantly. As well as the indicator of phytotoxic effect and Student's criterion gives a reliable integrated characteristic of the sanitary condition of lake water, which allows to determine the ecological status of reservoirs by their level of anthropogenic transformation.



USA

Thiol Functionalized and Manganese Dioxide Doped Biochar for the Removal of Toxic Organic and Inorganic Contaminants from Water

Eshani Jha

National Organizer
Water
Environment
Federation

Sponsors
Xylem Inc;
Water Research
Foundation

Less than one percent of the earth's water is easily accessible to us as freshwater and nearly half of this water is heavily polluted with pesticides, emerging contaminants, and heavy metals due to waste from industry, human establishments, and agriculture. This research aimed to remove these key classes of contaminants by manipulating biochar surface area, controlling chemical composition and catalytic properties for oxidative breakdown, adding surface complexing agents, and modifying intrinsic pore size.



Stockholm Junior Water Prize Winners, 1997-2021

2021 | Eshani Jha, USA

"Thiol Functionalized and Manganese Dioxide Doped Biochar for the Removal of Toxic Organic and Inorganic Contaminants from Water"



With water contamination being a growing global problem, Eshani Jha's research using easily produced biochar, has real potential to save lives around the world, by cheaply and effectively filtering water.

"I thought that if biochar could purify soil, why not water too? Biochar's advantage is that it is much more affordable than active carbon, with added benefits such as the possibility of local production". Jha has further enhanced biochar's filtration ability to enable it to act like a 'super-sponge' for contaminants such as pesticides, heavy metals and emerging contaminants. The invention is already patented and Jha hopes to be able to commercialize it within a couple of years.

"I am honoured and humbled, and I would like to thank everyone involved for the amazing experience that Stockholm Junior water Prize provides. I have got to know many of the other participants along the way and we are determined to find ways to work together. As young scientists we are the future of the water world," Jha said.

In its quotation, the Stockholm Junior Water Prize jury acknowledged the potential of Jha's work: "water contamination is a growing problem around the world, with new contaminants being discovered and increasing concentrations of existing pollutants being recorded. The simplicity of this solution is that it addresses multiple, varied contaminants with a single device, which is potentially scalable to global use, with the added benefit of localized manufacture."

Diploma of Excellence

2021 | Thanawit Namjaidee & Future Kongchu, Thailand
"Bio-Moisture-Nutrient Absorbing Belt for Promoting the Sugarcane Seedlings Growth from the Local Waste"

People's Choice Award

2021 | Gabriel Fernandes Mello Ferreira, Brazil
"Development of a microplastic retention mechanism in water treatment plants (WTPs)"

2020 | Hiroki Matsushashi and Takuma Miyaki, Japan
"Controlling soil runoff and increasing food production by the functional water collection system using traditional Japanese soil solidification technology: Ta-Ta-Ki"

2019 | Macinley Butson, Australia
"The SODIS Sticker"

2018 | Caleb Liow Jia Le and Johnny Xiao Hong Yu, Singapore
"A new method to produce reduced graphene oxide (rGO), a material that has huge potential to purify water"

2017 | Rachel Chang and Ryan Thorpe, USA
"A novel approach to rapidly & sensitively detect & purify water contaminated with shigella, e.coli salmonella, and cholera"

2016 | Sureeporn Triphetprapa, Thidarat Phianchat and Kanjana Komkla, Thailand
"Natural innovative water retention Mimicry Bromeliad (Aechmea aculeatosepala)"

2015 | Perry Alagappan, USA
"Novel renewable filter for heavy metal removal"

2014 | Hayley Todesco, Canada
"Waste to water: Biodegrading naphthenic acids using novel sand filters"

2013 | Naomi Estay and Omayra Toro, Chile
"Psychiobacter: Antarctic co-operation on bioremediation of oil-contaminated waters"

2012 | Luigi Marshall Cham, Jun Yong Nicholas Lim, and Tian Ting Carrie-Anne Ng, Singapore
"Investigation of the use of sodium-activated bentonite clay in the removal and recovery of non-ionic surfactants from wastewater"

2011 | Alison Bick, USA
"Development and evaluation of a microfluidic co-flow device to determine water quality"

2010 | Alexandre Allard and Danny Luong, Canada
"Research on biodegradation of he plastic polysterene"

2009 | Ceren Burçak Dag, Turkey
"A solution to energy-based water contamination: Rain as an alternative environmentally friendly energy source"

2008 | Joyce Chai, USA
“Modelling the toxic effects of silver nanoparticles under varying environmental conditions”

2007 | Adriana Alcántara Ruiz, Dalia Graciela Díaz Gómez and Carlos Hernández Mejía, Mexico
“Elimination of Pb(II) from water via bio-adsorption using eggshells”

2006 | Wang Hao, Xiao Yi and Weng Jie, China
“Application research and practice of a comprehensive technology for restoring urban river channels ecologically”

2005 | Pontso Moletsane, Motebele Moshodi and Sechaba Ramabenyane, South Africa
“Nocturnal hydro minimiser”

2004 | Tsutomu Kawahira, Daisuke Sunakawa and Kaori Yamaguti, Japan
“The organic fertilizer – An alternative to commercial fertilizers”

2003 | Claire Reid, South Africa
“Water wise reel gardening”

2002 | Katherine Holt, USA
“Cleaning the Chesapeake Bay with oysters”

2001 | Magnus Isacson, Johan Nilvebrant and Rasmus Öman, Sweden
“Removal of metal ions from leachate”

2000 | Ashley Mulroy, USA
“Correlating residual antibiotic contamination in public water to the drug resistance of Escherichia Coli”

1999 | Rosa Lozano, Elisabeth Pozo and Rocío Ruiz, Spain
“Echinoderms as biological indicators of water quality in the Alborán Sea coast”

1998 | Robert Franke, Germany
“The Aquakat – A solar-driven reactor for the decontamination of industrial wastewater”

1997 | Stephen Tinnin, USA
“Changes in development, sperm activity and reproduction across a 105 exposure range in *Lytechinus Variegatus* Gametes exposed to pesticides in marine media”

Stockholm Junior Water Prize gathers innovative young minds from all over the world. In 2019, 56 finalists from 35 countries came to World Water Week to participate in the international final of Stockholm Junior Water Prize and to discuss their projects with a wide range of conference attendees including researchers, politicians and media.



WaterTank

WWW.WATERTANK.SE

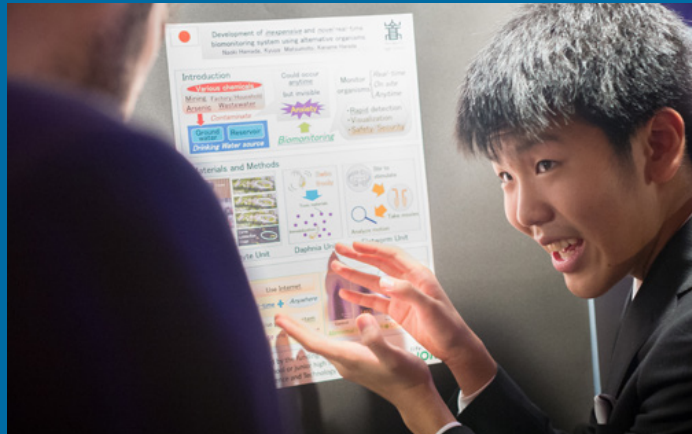
The world's best young water minds,
their water projects, and the global
community that supports them.





WaterTank is a community for the finalists of the Stockholm Junior Water Prize competition. It allows participants to keep in touch, seek advice and advance their careers and projects in water. Would you like to join WaterTank? Participation is open to finalists of Stockholm Junior Water Prize as well as mentorship opportunities for senior professionals. We also welcome organizations to join us as partners.

Get involved!
Contact Ania Andersch at ania.andersch@siwi.org





OPPORTUNITY OF A LIFETIME

Water challenges are escalating around the globe, placing people and communities, our environment, and our future at risk. By 2025, 1.8 billion people will be living in countries or regions with absolute water scarcity. We are a Fortune 1000 global water technology provider with one mission: to solve water through the power of technology and expertise so we can help make water more accessible and affordable, and communities more resilient. Let's create a world that is more water-secure and sustainable for all. We have the opportunity of a lifetime to solve water. Let's work together and lead the way.

#LetsSolveWater



Do you want to be part of the Stockholm Junior Water Prize?

For more information about leading a national competition in your country or opportunities on how you can contribute, please contact **ania.andersch@siwi.org**

If you are interested in taking part in a national competition, please contact your [national organizer](#). You can also meet previous participants and learn more on the SJWP online community, [WaterTank](#).

FOUNDING GLOBAL SPONSOR



Stockholm International Water Institute
Box 101 87 | SE-100 55, Stockholm, Sweden
Visiting address: Linnégatan 87a
phone: +46 8 121 360 00
e: siwi@siwi.org | w: www.siw.org

