

FINALISTS 2005 STOCKHOLM JUNIOR WATER PRIZE



The Stockholm Junior Water Prize

Water and Young People – Linked to the Future



The international Stockholm Junior Water Prize contest aims to encourage young people's interest in issues concerning water and the environment.

The award is given annually for an outstanding water project by a young person or a small group of young people. With this, the competition seeks to inspire young people to a continued engagement in water and related subjects.

While the global water environment remains in peril, the future depends on our ability to manage this life-sustaining resource. Today's youth are indeed tomorrow's leaders and must be encouraged to pursue water-related careers or our scarce supply risk further erosion.

The finalists at the international Stockholm Junior Water Prize competition are the winners of national SJWP contests. The national and international competitions are open to pre-university young people up to the age of 20 who have conducted water-related projects focusing on local, regional, national or global topics of environmental, scientific, social or technological importance.

The international Stockholm Junior Water Prize winner receives a USD 5,000 award and a blue crystal sculpture in the shape of a water droplet. The national competitions have inspired young people around the world to become active in water issues.



HRH Crown Princess Victoria of Sweden is the Patron of the Stockholm Junior Water Prize.

Argentina

Alimentary Behaviour of *Belostoma elongatum* and Their Sanitary Importance

By Antonio de al Cruz Cáceres and Ricardo Martín Robledo

In the area around San Roque-Corrientes in North Eastern Argentina, diseases spread by mosquitoes and molluscs planorbidae (*Biomphalaria sp.*) are causing great problems. These species occur commonly in water bodies in and around the city and are therefore of sanitary interest.

The two students have investigated the importance of a water bug (*Belostoma elongatum*) as a bio control agent against these vectors of different illnesses in the area, as an alternative to chemical methods. The finalists have made experiments to test if *Belostoma elongatum* actually prefers to ingest different stages of larvae of both mosquitoes and molluscs when fed simultaneously with alternative food.

Their results imply that independent of the type and density of alternative food, *B. elongatum* ingested prey of medical importance. Therefore, this water bug would constitute an alternative to be considered in the population control of both disease spreading mosquitoes and molluscs, especially in temporary water bodies, where these organisms are considerably developed.

Australia

Multi-Tiered Wetlands – A Technique for Improving the Efficiency of Artificial Wetlands

By Andrew Stewart

Central to our survival on this planet is access to water that is clean and free from pollutants. Every year the sources that pollute our precious water supplies grow as wetlands are reduced. Wetlands play an essential role in the quality of water. They remove nutrients before they can give life to toxic blooms of algae. Some of these algal blooms can release substances that are up to 300 times the toxicity of cyanide and cannot be removed by the most modern of treatment facilities. Each year up to 80 percent of Australian waterways experience blooms of varying toxicity.

Andrew Stewart has investigated the ability of a common wetland sedge to reduce the nutrient concentration of effluents. His findings have led to the concept of using wetlands in multiple tiers that dramatically improve the nutrient removal compared to current practice. The multi-tiered wetland system could help reduce the frequency of toxic algal blooms and would be a cheap, efficient and ecologically beneficial water filtration system for developing countries where waterways are frequently polluted by agricultural run-off and sewage.



Benin

Let Us Make Available to the Rural Populations Surface Water Like Potable Drinkable Water

By Landry K. O. Chokpon, Ariane W. Eglo and A. Rodrigue Houngbo

According to a UNESCO report related to water issues, "50% of the population of developing countries are exposed to polluted water sources". The finalists from Benin have made a project aiming at improving the water quality for the local people and have also increased their awareness of illnesses related to the use of contaminated water around the Djetonou pond in Lokossa Municipality in Benin. The group have investigated the present habits of water use in the area and have also taken water samples, showing that the water in the pond contained a wide variety of pollutants including coliform micro organisms.

The finalists have created a "Drinking Water Station", by modifying a traditional jar. It contains a filter and an addition of chlorine, and is able to clean the water in an easy and cheap way. At the same time, the water station makes clean water available for the local community. Another part of the project has been to educate a team of five local women how to use the water station and why it is important.

Cameroon

Achieving the Millennium Development Goals (MDGs) for Water and Sanitation in Cameroon: What Does it Take?

By Raoul Andjongo, Elizabeth F. M. Atang and Mojoko Clara

The overall objective of this group's project was to illustrate the importance of water in achieving the Millennium Development Goals (MDGs) in Africa generally and Cameroon in particular, the efforts needed by government at all levels and key stakeholders to combat the country's most plaguing problems. The data used for their work was primarily based on the Water for African Cities (WAC) II Programme documents and the Rapid Gender Assessment Reports (RGA) for the cities of Douala – the economic capital and Yaoundé – the political and administrative capital of Cameroon.

The project aims to show how poverty, hunger, environmental problems and diseases would be directly combated and significantly scaled back if fought with water access as a primary goal, how child and maternal mortality rates would drop, and how other important issues including education and gender equality would indirectly benefit from achieving safe drinking water and basic sanitation targets within the MDGs and other international targets. The project concluded with the key objectives necessary to meet up with the international targets.

Finalists 2005

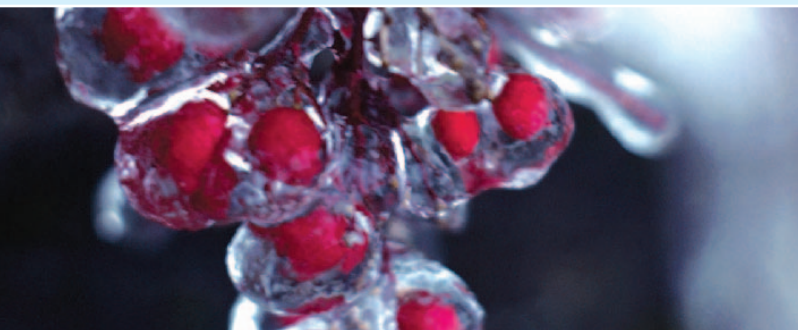
Canada

Macro-Invertebrate Sampling Technology (MIST)

By Patrick Danielson and Robin Miron

Eurasian zooplankton species alien to Canadian lakes, some of which are large macro-invertebrates such as the spiny water flea, are poised to potentially disrupt life in northern Ontarian lakes and create serious economic hardship. Due to their distribution and swimming abilities macro-invertebrates can be difficult to sample and survey, therefore Patrick Danielson and Robin Miron have evolved a new sampling technique to quantify abundance and to better understand the biology of these insects.

Their project involved the development of an innovative, flow-through sampler that can sample, in real time, macro-invertebrates such as *Mysis relicta* and *Bythotrephes longimanus*. The collected data can be used to create three-dimensional charts either in real time or under controlled lab conditions. Drawn diagonally, their sampler can scan the water column to determine macro-invertebrate organism location prior to sending down other quantitative samplers.



China

Preliminary Study on Utilizing Wastewater of Beverage Production for Heterotrophic Cultivation of *Chlorella* Which Can Be Used for Preparation of Liquid Bio-Fuel

By Lun Nian

Energy shortage and environmental pollution are the two largest constraints for economic development in China in the 21st century. To alleviate these two problems through modern biotechnology is an insightful and creative idea, which becomes feasible as modern biological science and technology quickly develops.

Beverages are commonly consumed, and the production processes use large volumes of water and generate large volumes of wastewater. Some of the wastewater contains sugar. The idea behind this project is to use sugar-containing wastewater from a beverage production line as a medium to cultivate *Chlorella* with high lipid content in the lab. The *Chlorella* cells can then be used to produce bio-fuel. Hence, it is possible to obtain renewable bio-fuel, reduce wastewater volumes and cost of beverage production, and at the same time improve the environment. Through this interdisciplinary research covering bio-technological, environmental, and energy sciences, the result of the project provided a new useful way to dispose wastewater and generate bio-energy.

Chile

Comparative Study of Toxicity in Sediment, Obtained of Coastal Places With Diverse Anthropogenic Activities, Evaluated by Bioassay with *Emerita analoga*

By Patricio Cuevas Neira and Claudio Opazo Fernandes

As a result of the inadequate practices of natural resources management and a rapid growth of cities, a deterioration of the environment which has taken place in Chile affects the quality of life. Talcahuano is considered one of the most contaminated places in the world, because of serious atmospheric and aquatic pollution problems. A commission of experts, led by the National Commission of the Environment (CONAMA), was created to study the problem and to propose solutions.

The toxicity of sediments from San Vicente, Talcahuano and Penco's bays was verified and compared by using a bioassay with the marine crustacean *Emerita analoga*, in Claudio Opazo Fernandes and Patricio Cuevas Neira's project. In the bioassay, ten specimens at natural condition and no food, were exposed to sediments from the different areas in triplicate for 96 hours at 13°C. Sediment from the bay where the organisms had been collected (Cocholgue Bay) was used as a control. Finally the number of dead organisms was counted. The results showed a mortality rate of 100% for the organisms with sediments from San Vicente and Talcahuano Bays, while the organisms from Cocholgue and Penco's Bays, showed low or no mortality at all.

Denmark

Dip-stick Test for Heavy Metals in Drinking Water

By Rasmus Buch Møller and Sebastian Ravn

Pollution of drinking water is a serious problem. If people could test their own drinking water they would not have to worry. This would also be useful when travelling or hiking and not knowing the quality of the drinking water. Therefore Sebastian Ravn and Rasmus Buch Møller came up with the idea to make a simple test for heavy metals in drinking water.

The group has developed a dip-stick test which can detect nickel or copper in drinking water. Due to chemical reactions, the stick will change colour (from colourless to blue or red) if one of the two heavy metals is present in the water. A stick like this can be used to test the water quality and thus it can reassure you that what you drink is not polluted with these heavy metals. Further development of these dip-sticks would allow them to detect several additional heavy metals, pesticides or bacteria such as salmonella. The environmental impact of the production of the sticks has also been investigated and evaluated to be minimal.

Estonia

Fluoride Content in Drinking Water of West Estonia

By Tiina Tusti

Groundwater is a main source of public water in Estonia, and fluoride is a natural element found in various concentrations in groundwater. Fluoride is a beneficial nutrient for humans in development of teeth and bones, but it has toxic effects in high doses (causing dental and skeletal fluorosis).

The aim of Tiina Tusti's study was to measure the fluoride content in drinking water in West Estonia and to assess the exposure to the local population. Public water supplies serving at least 100 inhabitants were included in the study, and in total 179 water samples were taken of tap water in 141 towns and villages. The fluoride concentration was measured colorimetrically using SPADNS method. In West Estonia 1/3 of the water samples contained more fluoride than the permissible limit of 1.5 mg/l. High fluoride content was mainly a problem for the small water supply systems. On the other hand, her study showed that 5.7 % of the population uses low-fluoride water, which increases its risk of getting dental cavities.

France

Precision Farming in the Champagne-Ardenne Region

By Mathieu Bruyen and Angèle Soria

Just like in many other regions in France, the land use in the north eastern region of Champagne-Ardenne mainly consists of animal farming and agriculture. Both of these activities may cause increased levels of nutrients, such as nitrates, in the ground water, making it unsuitable for drinking water purposes. The group has conducted interviews with farmers in the area to become more familiar with farming practices and to better understand the farmer's point of view when discussing environmental concerns.

The idea of precision farming is to study the yield from each individual field in detail, and then to calculate appropriate levels of fertilisers for different parts of each field – to obtain a maximum yield with a minimum input of fertilisers. By using a special harvester with a combined GPS receiver and a computer, a detailed yield map of each field could be drawn, and the amount of fertilisers used could then be adapted to the potential yield within each field. The students have designed the machines themselves as a part of this project.



Germany

H₂S-Problem of Wastewater

By Tobias Hahn

During warm summer days the smell from wastewater can become a real problem in many cities, and the cause of this problem is the content of hydrogen sulphate (H₂S) in the wastewater. The formation of H₂S is favoured through higher concentrations of compounds in wastewater, longer retention times in the closed systems (pressure pipes) and lower wastewater flow rate. This gives the sulphur bacteria a longer time to consume the dissolved oxygen and produce H₂S.

Tobias Hahn has developed a measuring device for direct analyses of H₂S in wastewater, based on coulometric titration of H₂S with iodine and an optical end point indicator as well as an easy-to-use method for reducing the levels of H₂S in water. To reduce the levels of H₂S, the water is passed through a long tube with many small holes, so that the water gets aerated when getting in contact with fresh air. Both the measuring device and the aeration method were tested on a large pond and showed good results after only 18 days of treatment.

India

Water: Yours or Mine? – Harvesting Water for All

By Saurabh Kumar

Residents of Usari village in Azamgarh district in North India faced severe water problems, when Saurabh Kumar first came there for a holiday with his parents. The people in the village had to depend on sources of water like bore wells or tankers. Due to reduced water pressure, people faced water problems, and sometimes they did not get water for several consecutive days. During the summers they had to depend on two or three external water tankers, bringing water to the village. There was some bore well water supply, but as the nearby areas also started using it, even that source was exhausted.

With the help of local people, Saurabh Kumar organised the residents to solve their water problems. He informed them about Rain Water Harvesting (RWH) techniques and their benefits. A technique like RWH on house roofs in the village managed to raise the ground water table. The water content under the ground could be maintained with this technique and thus helped in curbing the water problem.

Israel

Development of a Rapid, Accurate and Inexpensive Sedimentograph for the Characterization of Soil Suspensions in Water Conveyance System

By Nitzan Bustan

Flowing water, in nature or in artificial systems, contains solid particles, which take part in erosion processes and impact the environment and the way water is used. Characterising the composition of sediments and particle size distribution is important in trying to predict the processes of erosion and sedimentation, which may determine the fate of river transportation projects, reservoirs construction and irrigation. Drip irrigation technology, which makes a tremendous contribution to modern agriculture, is particularly sensitive to clogging caused by particles in the water. Particle characterisation in water resources is, therefore, of great importance in improving the design, adaptation and reliability of drip systems. The objective of the present work was to develop a fast, accurate and inexpensive sedimentograph instrument, to be used by field laboratories to predict problems in irrigation sites.

The instrument designed in this project successfully characterised the particle size distribution of soil suspension samples agreeing with independently accepted methods. At present, an improved instrument is being designed, which hopefully also will be able to aid in water desalination engineering, which shares similar problems.

Japan

Dragonflies are the Messengers of Water Environment (Making a pond "Home Pond" by collecting and researching dragonflies)

By Chihiro Sato and Keisuke Yamagami

Since 1990, the Science Research Club of Keisuke Yamagami and Chihiro Sato's high school has been collecting data on the changes of the water quality, vegetation and the dominant species of the dragonflies in and around the Tonneusu Marsh located near their school.

Analysing these important data collected by seniors – including the authors – they found that the number and diversity of dragonflies decreased, due to the deterioration of water quality and the progress of siltation and sedimentation. They also discovered that the number of dragonflies could increase and become more diverse with artificial operations such as dredging and removing emerging plants. The club members with local residents have been working hard to keep a high level of biodiversity, and to maintain a community marsh, a "Satonuma", where human and nature can co-exist.

Italy

Water's Diatom CSI – a New Methodological Approach for the Calculation, Study and Investigation of Superficial Waters Quality

By Mattia Zamaro

Traditional methods to analyse water quality are very limited, since they are restricted to an analytical approach. Following the recently implemented European legislation (Water Framework Directive, CE 2000/60), concerning the use of biological indices when determining water quality, alternative methods using an ecosystem approach are receiving more attention.

In his project, Mattia Zamaro has proposed the use of a method based on the identification of a class of algae; the diatoms. The survey method of water quality aims at detecting pollution in many different areas in the ecosystem – physical, chemical and microbiological – by analysing the diatom community according to the EPI-D (Eutrophication-Pollution Index with Diatoms) method.

The finalist has tested the method in the river Natisone, and compared the results with other conventional methods, and found that this relatively new method corresponded well and can serve as a complement to other methods, or replace them where, for example, data on macro invertebrates can be difficult to obtain.



Latvia

The Measurement of Water Hardness in Underground Waters of Marupe

By Zane Eglite

Water hardness is an actual problem in the village of Marupe, and in entire Latvia. It results from a rather high content of dolomite and rock gypsum in Latvian bedrock. Zane Eglite's research objectives were how hardness is created, how it can be prevented, and what the problems caused by water being hard exactly are.

Water hardness in the village of Marupe was measured, and its dependence on geological location was analyzed as well as the effectiveness of different filters in lowering water hardness. She concluded that hard water degrades the taste, causes more incrustation of pots, fades the colour of clothes, etc. The test results showed that there was quite hard water in Marupe, but that filters could decrease the water hardness, depending on the length of time they had been used and their quality.

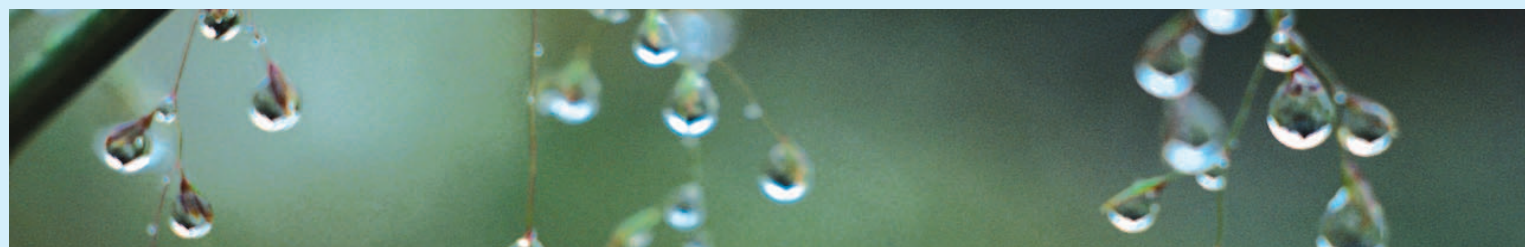
Lithuania

Hydro Chemical Analysis of the Lakes of Trakai: Assessment of the Present Situation and Search for New Analysis Methods

By Laurynas Pliuškyš

There are plenty of lakes in the surroundings of Trakai. Every year new negative effects of human activity are noticed. For example, fish were jumping out of the water because of lack of oxygen in the year 2002, and the following year, the pH rose up to 10,75.

The aims of Laurynas Pliuškyš' project were to measure the water quality of the lakes of Trakai and to compare it with former results, to determine the intensity of eutrophication and other processes, as well as to establish a rapid and simple heavy metals determination method. The author investigated water samples taken during all four seasons from different water layers in the lakes of Trakai. Compared with data from the two previous years, an obvious deterioration of the situation could be noticed. The concentration of biogenic materials, from which the intensity of plant vegetation depends, had increased. In addition, a new biosensor, based on the inhibition of the enzyme glucose dehydrogenase was established together with the scientists at a biochemistry institute.



Norway

Vigda – Can the Freshwater Pearl Mussel Live Here?

By Ida Christiansen, Hege Solfeldt and Kristin B. Svendsen

The Freshwater Pearl Mussel is an endangered species living in the River Vigda. However, its habitat is threatened by physical changes and water quality degradation. The Pearl Mussel needs water that is oxygen rich and low in nutrient content to live and breed successfully, but recently fertilizer runoff from surrounding agricultural activities has increased.

The Norwegian group's project was based on the questions: How do the water chemistry conditions in the River Vigda compare to conditions of good ecological status? Will the Freshwater Pearl Mussel be able to live in the river given the current and future environmental impacts and changes?

The finalists carried out a water analysis of nitrate and phosphate content, hardness, pH and turbidity in order to evaluate the conditions for the Freshwater Pearl Mussel in the River Vigda. They concluded that the mussel can only survive and reproduce successfully far upstream, since the water downstream is too high in nutrients and too turbulent to accommodate its needs. Therefore they support suggested actions, such as accumulation ponds in the contributing rivulets, to improve the conditions for the Freshwater Pearl Mussel.

Mexico

Calcite and Hematite: Hunters of Water Souls (the Radiative Cooling, a Promise for Obtaining Water)

By Liliana Vargas-Meneses and Itzel García-Silva

The objective of these finalists' work was to show that radiative cooling can be used as a method to collect water by increasing the condensation on glass windows or other surfaces. Two minerals, calcite and hematite, were deposited on glass slides to increase the infrared radiation to the range between 3–20 μm , also called the radiative cooling zone. When the radiative cooling zone increases, the cooling of the surface will increase, and the dew point (DP), also depending on the temperature (T) and the relative humidity (RH) in the surrounding air, will decrease, and more condensed water can be collected.

An experimental system was constructed with an array of different combinations: glass/calcite, glass without mineral, and glass/hematite. The system was called "the system of radiative plates". The results obtained indicated that the glass/hematite plate lowered the dew point most and collected 1.5 millilitres of water, while the glass/calcite plate only collected 0.75 millilitres. However, both plates performed better than the glass without mineral.

Poland

Report on Dzierzecinka River Water Quality in the Książ Pomorskich City Park in Koszalin

By Pavel Kogut, Agata Wawrzyniak and Marivsz Wojcik

As it flows through industrial and agricultural areas, as well as the city of Koszalin, the Dzierzecinka River becomes severely polluted.

The aim of this group's study was to conduct regular measurements to investigate the water quality of the Dzierzecinka River, which not only involved controls of possible sewage leakages, but also swift action to find the source of pollution and remove pollutants.

Therefore, they tested the water quality of the river every week for 18 months. In their tests they considered temperature, amount of dissolved oxygen, electrical conductivity, and alkalinity as well as amount of dissolved nitrogen substances, transparency and pH. In addition, they complemented the abiotic measurements with studies of the aquatic fauna. They concluded that although the river water was polluted it would not affect the quality of drinking water in the town.

Russian Federation

The Largest Siberian Water Reservoir – Protect Clean Water for People

By Natasha Baturina

The Novosibirsk water reservoir is the largest (1090 sq.m) artificial water body in Western Siberia, created in 1959 for electricity generation. Today it is an important source of drinking water supply to 1.7 million people.

The aim of Natasha Baturina's paper was to describe the present situation and forecast the environmental status of the reservoir. To achieve this, she analysed available scientific data to outline the importance of the Novosibirsk reservoir for continuous water supply. She also collected samples for sanitary and hygienic assays, investigated the hydrological and climatic conditions as well as evaluated the environmental status of the aquatic biosensors based on the self-purification capability of the reservoir. She found a broad diversity of macrozoobenthos species in rivulets and springs suggesting that it functions as a reserve replenishing the species composition in the Novosibirsk reservoir and facilitating the self-purification function. Natasha also took part in activities to increase public awareness of local population and several activities in order to clear and safeguard the shore.

Spain

Oil/Water Bottom Tar in the Mediterranean Sea. Oil in the *Foraminifera*

By Marc Campeny and Marc Oliva Bernal

Oil is a significant polluting element which affects beaches, organisms, and human beings. Its effects usually only appear on the news when an oil ship dumps oil into the water.

The authors have discovered that, apart from big tar layers, there exists a fine layer of micro tar particles at the bottom of the Mediterranean Sea, as deep down as 380 m. These particles are the result of continuous pollution from the continent. Small protozoa –*Foraminifera* – accumulates the tar in its shell overtures, which keeps it solid. As the contaminated *Foraminifera* eventually dies it is diluted in the sea, and consequently, only grains of tar remain. These micro tar particles affects humans through skin contact in reconstructed beaches, consumption of fish, or even through drinking processed sea water.

This is why these finalists propose more and stricter controls to estimate the real degree of danger for humans to be affected. Their research shows that polluting seawater, even if it is done most inconspicuously, can bring serious consequences.

South Africa

Nocturnal Hydro Minimiser

*By Pontso Moletsane, Motobele Motshodi
and Sechaba Ramabenyane*

South Africa has very low annual rainfalls combined with high evaporation levels which results in some communities experiencing water scarcity that adversely affects the everyday lives of people. Also, research has shown that 35% of the water of an average household is used for irrigating gardens, which affects the limited water resources.

Therefore the group have developed a revolutionary solution called the Nocturnal Hydro Minimiser. The electrically operated automatic watering system was designed to use water efficiently for irrigation by activating the water tap at night when evaporation levels were very low. The product ensured that gardens were only watered when the soil had lost the necessary moisture needed by plants, thereby saving the very limited water resources. The Nocturnal Hydro Minimiser was outfitted with four electrodes inserted in the ground in order to detect the moisture levels that determine when the water tap was activated.

The Nocturnal Hydro Minimiser has great potential to improve the lives of many rural communities in South Africa by ensuring that their gardens produce the much needed food while saving the very limited water resources.

Sweden

Wet Cotton = Cool Fish

By Wenny Poon

Selling fish is one of the most important means for poor women in the Lake Victoria area to sustain their families. They often have to transport the fish from the beaches or local markets over vast distances to sell it at larger fish markets. Due to insufficient possibilities to keep the fish cold during transport, it is often unfit for human consumption at arrival, which causes the women to forfeit their daily income. Conventional cooling methods, such as electrical refrigerators or ice, are not realistic or affordable alternatives for these women.

Wenny Poon has tested different methods to keep fish cold for as long as possible in a warm climate, using simple and inexpensive materials. The basic principle, on which she has based her experiments, is that when water evaporates, it creates a cooling effect. Using small polystyrene boxes, she tested an array of water saturated covering materials, such as cotton, wool, paper, and charcoal powder. Cotton proved to be the most effective of the tested materials, with respect to reducing the heating process.



Ukraine

Biological Monitoring and Sanitary Cleaning by Renewable Energy Sources of the Small Rivers and Reservoirs on an Example of Ukraine

By Anastasiya Bibel, Nadiya Kovalinska and Andriy Bilas

The objective of the Ukrainian project was to investigate and evaluate the possibility to use medical leeches of the species *Hirudo medicinalis* as a bio-indicator of water pollution. Another part of the project was focusing on the development of a new method for water purification through a simple “purifying water pump”.

The tests with the medical leech were carried out with water sampled from seven different stations in the river Hniza, surrounded by different activities such as industries, agriculture and a municipal wastewater plant. The results showed that the level of pollution was especially high in industrial and agricultural zones and, in spring, down stream from the water purifying station. The analyses confirmed the high level of sensitivity of leeches as a bio indicator, and the test of water quality based on leeches may be recommended as an inexpensive and sensitive method for express-analysis of water quality in small rivers, which are not controlled effectively by government or municipal institutions.

Vietnam

Using Clay and Paper Fibre to Treat Waste Water in the Bay Mau Lake in the Thong Nhat Park, Hanoi

By Nguyen Thi Thu Trang

The Bay Mau Lake serves not just as a catchment tank for rainwater, as a reservoir for intake of wastewater, as a wastewater treatment pond, but also as a recreation area. Currently the Bay Mau Lake is polluted at an alarming rate.

Nguyen Thi Thu Trang has carried out a study on the water pollution level and the sources of pollution. The study revealed that the lake was polluted mainly by domestic wastewater discharge from households in the area, with a total of about 800,000 inhabitants. The author proposed to use bio-treatment of the water discharge, to build a pumping station and to introduce fish farming in the bay as well as raising environmental awareness of the public. Clay-paper fibre mixture could be used for the biological treatment of wastewater at the inlets. Treatment of the water using a clay and paper fibre mixture for filtration and plantation of aquatic plants such as lotus and water lily would provide oxygen for the aquatic environment of the lake.

USA

Removal of Arsenic From Drinking Water by Water Hyacinths

By Kathryn VanderWeele Snyder

Arsenic poisoning is an important issue in Bangladesh, where at least thirty percent of the water wells have an arsenic level above the drinking water standard. Phytoremediation, the process of using plants to remove pollutants from soil or water, by water hyacinths (*Eichhornia crassipes*) represents a potential solution to the arsenic problem.

The purpose of the finalist’s project was to determine for how long the same water hyacinths could be used effectively, to reduce arsenic concentrations and to determine where these plants store the arsenic. These were important questions to be solved if this system would be implemented in Bangladesh because, at some point, the plants would have to be replaced due to efficiency loss. She visually assessed plant health, weighed the plants and tested the arsenic concentration of the water over multiple trials using a colorimetric test kit. Her results proved that water hyacinths are capable of substantially reducing arsenic levels, even to the Bangladeshi drinking water standard (50 ppb), for two treatment periods.



The SJWP International Nominating Committee

Dr. Magnus Enell (Chair), Sweden

Mr. Björn von Euler, USA

Dr. Nighisty Ghezze, Sweden

Prof. Petr Grau, Czech Republic

Prof. Nuhu Hatibu, Tanzania

Ms. Linda Kelly, USA

Prof. Saburo Matsui, Japan

Dr. Eeva-Liisa Poutanen, Finland

Associated Prof. Ines Restrepo-Tarquino, Colombia

Ms. Frida Lanshammar (Secretary), SIWI, Sweden

Stockholm Junior Water Prize Winners



2004 Finalists

2004

Tsutomu Kawahira, Daisuke Sunakawa and Kaori Yamaguti from Japan won the Prize for the development and application of an environmentally friendly organic fertiliser for the Miyako Island. The method is applicable to many places around the world.

2003

Claire Reid, South Africa, won the Prize for an innovative, practical, easily applicable technique for planting and successfully germinating seeds in water-scarce areas to improve rural and peri-urban livelihoods.

2002

Katherine Holt, USA, won the Prize for research that looked at how foreign species could be introduced to benefit the Chesapeake Bay while preserving the bay's native oyster species and meeting national environmental goals.

2001

Magnus Isacson, Johan Nilvebrant and Rasmus Öman from Sweden won the Prize for their innovative and relevant research on the use of natural materials to remove metals in leachate from landfills.

2000

Ashley Mulroy from the USA won the Prize for a contemporary project that investigated how inefficient wastewater treatment processes can lead not only to antibiotic contamination in American waterways, but also to progressive resistance among harmful bacteria to those same antibiotics that once controlled them.

1999

Rosa Lozano, Elisabeth Pozo and Rocío Ruiz from Spain won the Prize for an innovative project that used sea urchins, starfish and sea cucumbers to measure the effectiveness of an EU beach protection program on Spain's western Mediterranean coast.

1998

Robert Franke from Germany won the Prize for his design of the Aquakat, a solar-powered, flow-through reactor for the treatment of industrial wastewater.

1997

Stephen Tinnin from the USA became the first international Stockholm Junior Water Prize winner for research that investigated the correlation between the reproductive rate of sea urchins and water pollution.

Tsutomu Kawahira, Daisuke Sunakawa and Kaori Yamaguti from Japan won the 2004 Stockholm Junior Water Prize for the development and application of an environmentally friendly organic fertilizer that is applicable to many places around the world.

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The seeds of great discoveries are constantly floating around,
but they only take root in minds well prepared to receive them.
- Joseph Henry

Water is the “stuff of life” and history will show that all of the participants who take part in this important competition are part of something far bigger and more vital than we can now fathom.

The contestants who have challenged themselves, their peers and our society to consider the importance of water are contributing mightily to a better world for everything in our biosphere.

That’s why ITT Industries is the proud “Global Sponsor” of the International Stockholm Junior Water Prize since its inception in 1997.



National Organisers and Sponsors

Argentina: Asociacion Argentina de Ingeniería Sanitaria y Ciencias del Ambiente (AIDIS- Argentina), Sudamericana de Aguas S.A, Flygt Argentina S.A., ENOHS, Subsecretaría de Recursos Hídricos de la Nación, ETOSS – Ente Tripartito de Obras y Servicios Sanitarios

Australia: Australian Water Association (AWA), Melbourne Water, Australian Water Services Pty Ltd., ITT Flygt Limited

Benin: Kajola Centre, MEHU (Ministère de l'Environnement de l'Habitat et de l'Urbanisme), Swedish Institute, ADE YOUS AWAD International

Cameroon: Cameroon Vision Trust, The Water Environment Science and Technology (WEST) Fund, Swedish Institute

Canada: Western Canada Water Environment Association, Canadian Water and Wastewater Association, Water Environment Federation, ITT Flygt, British Columbia Water and Wastewater Association, Water Environment Association of Ontario, Réseau Environment Inc., Atlantic Canada Water Works Association

Chile: Dirección General de Aguas MOP, ANDESS, Aguas Andinas S.A., Diario El Mercurio, AIDIS Chile, Comité Chileno del PHI, SOCHID, Embajada de Suecia en Chile, Museo Nacional de Historia Natural, Escuela de Ingeniería de la U. de Chile, Escuela de Ingeniería de la U. de Católica, Facultad de Ingeniería de la U. de Concepción, Fanalozza, Metro S.A., ALHSUD Chile, Ministerio de Educación, Educar Chile.

China: The Center for Environmental Education & Communications of State Environmental Protection Administration (SEPA CEEC), ITT Industries

Denmark: Unge Forskere

Estonia: Estonian Institute for Sustainable Development, Tallinn Water Ltd, Tallinn City Government, Estonian Institute for Sustainable Development

Finland: Water Association Finland, The Land and Water Technology Foundation Finland, Kemira Chemicals Ltd., Uponor Finland Ltd., Ekokem Ltd., Helsinki Water Ltd.

France: Office Français de la Fondation pour l'éducation à l'environnement, Lyonnaise des Eaux France (groupe Suez Environnement), ITT Flygt SAS and Agence de l'Eau Seine Normandie

Germany: Stiftung Jugend Forscht e.V., Federal Department of Education and Science, The Ernst Sobotta Foundation, Bundesanstalt fuer Arbeitsschutz und Arbeitsmedizin

India: Centre for Environment Education

Israel: Faculty of Engineering at Tel Aviv University, The Iby & Aladar Fleischman Faculty of Engineering, The Manuel and Raquel Klachky Fund for the SJWP Competition in Israel, The Israel Water Commission

Italy: Federazione delle Associazioni Scientifiche e Tecniche (FAST), Intel, Fondazione Lombardia per l'Ambiente, Foist, MT Channel, Quark

Japan: Japan Water Prize Committee (JWPC), EBARA Corporation, Hitachi Ltd., KUBOTA Corporation

Latvia: Education, Youth and Sports Department of Riga City Council, Riga Water,

Lithuania: Ecological Club Žvejone, Klaipeda Water (UAB "Klaipėdos vanduo"), Ministry of environment of the Republic of Lithuania

Mexico: FEMISCA (Mexican Federation of Environmental Engineering), Swedish Embassy, the Mexico City Government, the Ministry of Education, the Ministry of the Environment and Natural Resources, The National Autonomous University of Mexico, the Mexican Academy of Sciences, the Mexican Federation of Sanitary Engineering and Environmental Sciences, the Mexican Association of Environmental Engineering, Swedish-Mexican Chamber of Commerce, Kemwater de Mexico, Alfa Laval, ITT Industries, Tetra Pak, Ericsson Telecom, Sandvik, Swedish Foreign Trade Association

Nigeria: National Environmental Watch and Service (NEWS), African Youth Movement on Environment, Nnamdi Azikiwe University, Aguata Local Government, Intercontinental Bank PLC, UBABIKE Oil Nig. LTD., Heritage Group of Companies, Caltec Nig. Ltd., Clerico Construction Nig. Ltd., Nigerian Mineral Waters Ltd, FUSE Nig. Ltd., The Federal Polytechnic, The Anambra State/UNICEF Joint Water Project Unit, Harmony Specialist Hospital and Maternity, Total Fina Elf, Federal Ministry of Water Resources

Norway: Norsk Hydrologiråd, Norsk Vannforening, VA-yngre, AnoxKaldnes, Kemira, Fujitsu-Siemens, Norges Vassdrags og Energidirektorat (NVE), Norsk Institutt for Vannforskning (NIVA)

Poland: Polish Foundation for the Protection of Water Resources, The Economic Chamber of "Polish Waterworks", The National Fund for Environmental Protection and Water Management

Russian Federation: Environmental Projects Consulting Institute, Federal Agency of Water Resources, Russian Regional Ecological Centre, NGO "Environmental Defence", Swedish Institute, Environmental Projects Consulting Institute

South Africa: Department of Water Affairs and Forestry, Department of Education, WRP Consulting Engineers (Pty) Ltd., University of Cape Town, University of Natal, Cape Technikon

Spain: AGBAR Foundation (Centre d'Estudis i Investigació del Medi Ambient), Kemira Iberica S. A.

Sweden: Stockholm International Water Institute (SIWI), ITT Flygt AB, Svenskt Vatten

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