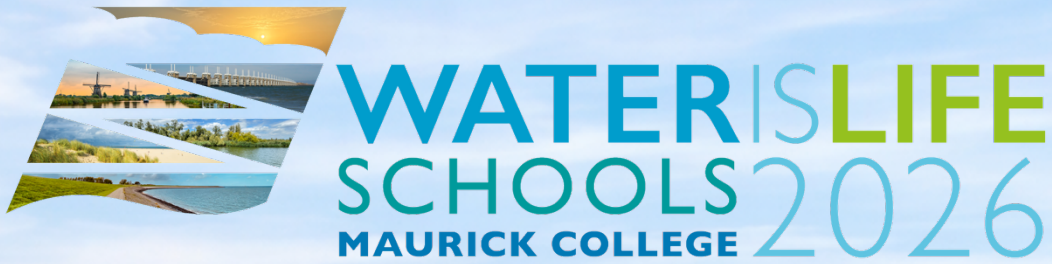


2026



# Water is Life Conference

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JOHN VAN HEESWIJK | MAURICK COLLEGE

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## Oak Bay High School – Canada

### **How does thermal heat stress affect Giant kelp growth?**

Kelp Group, Oak Bay High School, British Columbia, Canada

*Paisley Rodier, Isla Pilling, Ella Hostad and Finn Ostermann*

This paper examines the effect of climate change and thermal stress on the growth of Giant Kelp (*Macrocystis pyrifera*) on the coast of British Columbia, Canada. Climate change has resulted in a rapid decline of Giant kelp forests, which has drastically affected the ecosystem. Our experiment examines how different temperatures affect the growth of Giant Kelp gametophytes and sporophytes. We hypothesize that the growth of Giant Kelp will be reduced when thermal stressed at 15°C as compared to kelp grown at 10°C. The gametophytes were grown in an incubator supported by Blue Future Kelp for two weeks at the experimental temperatures. Then the light was switched from red to white to induce the growth of the sporophyte. We then transplanted the sporophytes to our school aquarium and measured their growth twice a week for an additional 4 weeks. We anticipate that the kelp growth at 10°C will have larger growth than the kelp grown at 15°C.

### **Assessment of Water Quality in Bowker Creek for Implementation of a Salmon Egg Box to Restore Salmon Populations**

Dog Salmon Group, Oak Bay High School, British Columbia, Canada

*Sophie Goodman, Mason Pite, Luc Hodgkinson, and Juliette Schmaltz*

Bowker Creek was once a diverse ecosystem, providing spawning grounds for salmon species. Now flowing through three municipalities before emptying into the ocean, the creek no longer harbors salmon due to rapid urbanization around Oak Bay and the Greater Victoria area in the past century. In hopes of reclaiming this urban waterway, we are continuing the work to reintroduce Chum salmon (*Oncorhynchus keta*) to Bowker Creek in support of the 'One Hundred-Year Plan' to revitalize the creek. Between the months of October 2025 and February 2026, we monitored two locations weekly to determine which site was the most suitable for a salmon egg box. We tested levels of dissolved oxygen, turbidity, stream flow, air and water temperatures, and pH. This project is in continuation of work done by *Friends of Bowker Creek*, an organization that previously added a salmon box in 2022. We expect our findings will tell us which site can provide the best environment to restore a Chum salmon run in the creek. We hope that the addition of a second box will strengthen the relationship between the Oak Bay community and Bowker Creek ecosystem.

**Trait Environment Relationships and Morphological Variation in the Endemic Andean Catfish**

***Trichomycterus bogotensis***

COLEGIO CLAUSTRO MODERNO, COLOMBIA

*Isabel Acosta Jiménez, Sara Aranzález De La Hoz, Tabatha Samantha Echevarreneta Goldar, Alegría Gutiérrez Perdomo, Luciana Rodríguez González, Esther Sofía Vargas Lombana*

Freshwater ecosystems are essential for sustaining biodiversity, particularly within the Andean highlands of Colombia. The water bodies of the Zaraus estate, located on the Cundiboyacense high plateau, support populations of *Trichomycterus bogotensis*, an endemic freshwater catfish locally known as the “Capitán de la Sabana.” Given its restricted geographic distribution and the limited scientific data available, this species may be particularly vulnerable to environmental shifts and habitat disturbances.

This study examines the relationship environment between the alimentary preferences, environment and the distribution biological traits of *T. bogotensis* to better understand its ecology and population status. We conducted environmental monitoring and collected biological data, using passive sampling methods, including morphometric measurements (standard length and weight), coloration patterns, and morphological features such as pelvic fin presence.

By exploring the interaction between the distribution and species traits, this research identifies optimal habitat conditions for the necessary study for its persistence. The inclusion of a trait- environment relationship provides a critical baseline for future ichthyological studies and conservation strategies for endemic freshwater biodiversity in the Colombian Andes.

**The impact of tourism on water and marine ecosystems in Curaçao**

*Valentina Antolin Vargas, Thiago Gougon, Damian Irausquin, Sam Kreling, Pryesh Punwasi.*

Tourism in Curaçao has grown significantly in recent years, resulting in increasing pressure on the island's water supply and marine environment. This study analyzes the consequences of this growth for both the availability of drinking water and the quality of coastal and marine ecosystems.

Curaçao naturally faces structural water scarcity due to its semi-arid climate, limited groundwater storage capacity, and the near absence of natural freshwater sources. As a result, the island is fully dependent on seawater desalination through reverse osmosis, an energy-intensive process that contributes to CO<sub>2</sub> emissions and can cause local environmental impacts through the discharge of saline residue (brine).

In addition, inadequate wastewater treatment represents a major environmental problem. A significant portion of wastewater is discharged untreated or insufficiently treated, leading to eutrophication, harmful algal blooms, oxygen depletion, and the spread of pathogens and toxic substances in coastal waters. These processes negatively affect marine ecosystems, including coral reefs and seagrass beds.

The health condition of green sea turtles, particularly the increasing occurrence of fibropapillomatosis, is used in this study as an ecological indicator of long-term environmental stress. The results indicate that the current growth of tourism is placing significant pressure on—and may be exceeding—the ecological carrying capacity of Curaçao. This highlights the urgent need for integrated and sustainable water and tourism policies to prevent further environmental degradation.

**Awareness of Estonian companies using marine raw materials regarding environmental impact assessment and data availability**

Tallinna Saksa Gümnaasium, Tallinn, Estonia

*Iiris Rebeka Saffre*

The European Commission is increasingly focusing on the sustainability of production, creating a need to assess the environmental impact of companies and their products. However, current environmental assessment methods often lack detailed parameters for products made from marine raw materials such as seaweed. Although these methods are being developed further, it remains unclear whether companies will be able to meet future requirements.

As part of the AlgaeProBanos project, this study explored the readiness of Estonian companies using marine raw materials to conduct environmental assessments. A survey was carried out among nine companies. The questionnaire examined the origin of their raw materials, their awareness and use of environmental assessment methods and their ability to provide the data required for such assessments. Respondents were also asked which types of assessment questions they would be able to answer and what support they would need to obtain the necessary data in the future.

The results showed that only a few companies hold environmental certifications and many highlighted the need for improved communication and cooperation between businesses, government institutions and scientists.

**Hygiene of Reusable Water Bottles in School Environment**

Tallinna Saksa Gümnaasium, Tallinn, Estonia

*Vanessa Espenberg, Betti Metsoja*

Reusable water bottles have become increasingly common in schools due to growing environmental awareness and the availability of water refill stations. They support daily hydration and reduce plastic waste, making them an environmentally friendly alternative to single-use bottles. However, their hygiene is often overlooked. If not cleaned regularly, reusable bottles can accumulate bacteria and other microorganisms that enter through the mouth, hands or air and multiply in warm, moist conditions.

Our research study examines how students' cleaning habits influence the hygiene of their reusable water bottles. The research question asks whether bottles that are cleaned regularly contain fewer microorganisms than those cleaned rarely or not at all. The hypothesis is that more frequently cleaned bottles will show lower microbial contamination.

To test this, microbiological analysis will be conducted on bottles used by students. Samples will be collected from the inner surfaces using sterile swabs and cultured on agar plates to measure microbial growth. The contamination levels of regularly cleaned bottles will be compared with those cleaned less often.

The results are expected to demonstrate the importance of proper bottle hygiene and encourage students to clean their reusable bottles more consistently to reduce potential health risks.

**Sponge City Strategies in Stuttgart: Identifying Opportunities for Improved Urban Rainwater Management**

Dillmann-Gymnasium Stuttgart, Germany

*Nick Xu Brüggmann, Julika Nerea Hofele*

Climate change is increasing the frequency and intensity of heavy rainfall events, creating new challenges for urban water management. Stuttgart represents a particularly relevant case because several risk factors coincide: dense urban development, extensive surface sealing, documented flood hazards, and a basin-like topography that limits natural drainage and intensifies runoff during heavy rainfall.

This project investigates the extent to which sponge city measures have been implemented in Stuttgart, and identify areas where additional interventions could improve local water management. We hypothesize that analyzing the spatial distribution of these measures will reveal opportunities for interventions that reduce surface runoff and improve rainwater retention.

The research will first identify and map existing sponge city measures across Stuttgart and classify them according to their function within the urban water cycle. Based on this spatial analysis, potential sites will be evaluated using qualitative criteria such as land use, surface sealing, and topography. One selected site will then be conceptually redesigned according to sponge city principles to demonstrate how targeted measures could enhance local rainwater management.

The expected outcomes are a spatial overview of existing measures in Stuttgart and a practical example showing how Sponge City strategies could be applied to improve local rainwater management.

**Effects of tourism on the wadden sea**

Watt's up, Waldschule Schwanewede, Germany

*Marie Keller, Sofie Scholten, Hinrich Langer*

The wadden sea attracts 20 millions of tourists annually, because of its wide beaches and unique tidal landscape. Tourism brings important income to the region, but this fragile ecosystem is struggling under the growing pressure of human activity. Therefore we wondered how big that impact on the environment really is and are going to consider factors such as littering or water pollution. We expect that busy tourist areas show greater signs of latter aspects and are going to analyze the relative correlation of tourism numbers to water quality and garbage quantity. In order to do the analysis we will conduct interviews with locals and look at informations from the city offices.

We hope to identify the main environmental problems connected to tourists and propose solutions to improve the welfare of the area, by raising awareness to the causes and finding possible spots for improvement.

**How Does Human Activity Influence the Cycle and Impacts of Microplastics in the Wadden Sea?**

*Mia Guzmann, Jule Haake, Jarek Pietsch*

Microplastic pollution is a growing threat to marine ecosystems worldwide. The Wadden Sea, a UNESCO World Heritage Site and important coastal habitat, is also affected. In our project, we focus less on the amount of microplastics and more on their cycle and their impacts on the ecosystem.

We examine how microplastics enter the Wadden Sea through human activities such as tourism and shipping, and how they are continuously transported, deposited, and resuspended by tides, currents, and wind. This allows them to remain in the ecosystem for a long time. We also analyze the consequences for marine organisms and the food chain, as many animals ingest microplastics. Our aim is to better understand the ecological effects and highlight the importance of environmental protection.

### **A Mangrove-Inspired Real-Time Water Quality Monitoring System**

Center for Young Scientists, Santa Laurensia Senior High School, Indonesia

*Alexandrea Eugenia Anthonius, Natania Christabelle*

Mangrove forest are a defining feature of Indonesia's coastal identity, supporting biodiversity, coastal protection and community livelihoods. Indonesia contains the largest mangrove area in the world, accounting for roughly 20–23% of global mangrove forests (Spalding et al., 2010). Despite their ecological importance, monitoring environmental conditions in mangrove ecosystems is still often conducted through manual observation and periodic sampling, which may delay the detection of sudden disturbances affecting water quality.

Delayed detection of water quality changes can slow environmental response and allow disturbances to escalate. This study investigates whether a real-time sensor-based monitoring system can improve early detection of water condition changes compared to conventional observation methods.

The research introduces an autonomous monitoring prototype that measures key water quality indicators including pH, Total Dissolved Solids (TDS), and turbidity using integrated sensors connected to a microcontroller. To enable long-term deployment in coastal environments, the device operates using solar energy with a rechargeable battery, is housed in a 3D-printed waterproof casing, and transmits measurements remotely through a radio communication module.

By continuously collecting environmental data, the prototype is expected to provide faster detection of water quality fluctuations and demonstrate how sensor-based monitoring can support more responsive management of vulnerable mangrove ecosystems.

*Keywords: Mangrove forest, Water quality monitoring, Autonomous monitoring prototype*

### **The Potential of Mangrove Forests as Anthropogenic Wastewater Treatment**

Center for Young Scientists, Santa Laurensia High School, Indonesia

*Carlissia Jovanna Tsai, Maria Angelica Susan Soetandio, Quinn Makayla Tan*

Indonesia's geographical conditions support rich marine biodiversity and coastal ecosystems such as seagrass beds, coral reefs, and mangrove forests, covering about 3.4 million hectares which represents about 23% of the world's mangroves, the largest in a country globally. However, mangrove forests are decreasing at an alarming rate of about 0.57% annually due to forest degradation and climate change. Rivers play a vital role in ecosystems by transporting water, sediments, and nutrients from upstream areas towards the ocean. Nonetheless, rivers also carry pollutants sourced from human activities that eventually accumulate in marine environments. This research is conducted in Tanjung Burung, the estuary of Cisadane River, and also Tanjung Pasir, a mangrove area located in Tangerang, Indonesia. These locations were selected because they display a cause-effect relationship between river discharge and the changes in water quality in coastal areas. Therefore, this study highlights the impact of mangrove rehabilitation on water quality and biodiversity in coastal ecosystems. To achieve this goal, temperature, salinity, pH, TDS, BOD, COD, ammonia, nitrate, and phosphate levels were tested. The results show that rehabilitated mangrove areas have better water quality and lower pollutant levels, ultimately strengthening the role of mangroves in sustainable coastal management.

*Keywords: water quality, anthropogenic pollution, mangrove forests*

## **Assessing Governance Model in Mangrove Management: A Case Study of State-Owned Enterprise and Community Collaboration in Tanjung Pasir, Indonesia**

Center for Young Scientists, Santa Laurensia Senior High School, Indonesia

*Angela Paquita Rafael, Marvella Beatricia Gunawan, Olivia Laetitia Irawan*

Mangroves play crucial roles for water protection, including filtering pollutants, reducing flood-risk, and supporting economic sustainability for local communities. Various parties have taken the initiative, and many research studies have been done, both aiming to preserve mangroves. However, less attention was directed to understanding the governance of these efforts, particularly whether mangrove management in Tangerang.

This research focuses on investigating mangrove management in Tanjung Pasir, a local mangrove area in Tangerang. The research aims to find out how the mangroves are governed and how the current management supports the long-term sustainability in Indonesia. Data from this research are obtained through in-depth interviews, field observations, and focus-group discussions with the local and non-local people involved in mangrove management. In addition, surveys are conducted with schools, universities, and other external communities to inquire about their involvement and positions in mangrove management. By identifying and assessing interactions among the government, NGOs, communities, and local residents, along with how authority is distributed, this research will provide insight into effective mangrove governance strategies that can strengthen mangrove's lifespan and sustainability, especially in Tangerang.

*Keywords: mangrove, mangrove management, conservation, natural resources*

**Understanding Local Resistance to Dam Construction in the Vanoi Valley**

*Ajsila Manushi, Chiara Bonfanti, Daniele Racila, Nicolò Giuliani, Gloria Zeni, Ayan Yusuf Moalin*

This paper explores the underlying reasons against the construction of a dam in the Vanoi Valley through a qualitative approach based on interviews with local stakeholders. The analysis draws on key theoretical perspectives from human geography, landscape anthropology, and environmental psychology. The words of the stakeholders reveal how perceptions of the territory are shaped by identity, emotions, and community-based values. These dimensions cannot be ignored when planning human infrastructure, especially when such interventions are highly intrusive, as in the case of a large dam. The study also reflects on the collective memory of the Vajont disaster, interpreted both as a historical trauma and as a form of cultural warning.

This perspective helps to explain how Italy's hydroelectric history continues to shape contemporary perceptions of risk and the level of trust in public institutions. The paper highlights how resistance to the dam is not merely technical opposition, but rather the expression of a vision of the future rooted in care for the place by way of cultural continuity and environmentally sustainable proposals. Within this perspective, eco-sustainable alternatives, such as the protection of resurgence springs (typical of northeastern Italy), emerge as key elements to be safeguarded within a framework of multilevel governance.

### **Utilizing Game Theory to Determine the Grounds for Cooperation Within Marine Ecology**

Team Mizumochi, Makuhari Senior High School

*SATO Hana, KOBAYASHI Ritsu, TOJO Kaito, KASHIHARA Hikaru*

Marine resource management is key in an age where climate change, increased global demand and fierce competition exacerbates habitat destruction. This issue becomes increasingly challenging under contested ocean territories, in which individuals prioritize self-interest and deplete limited resources—a concept known as the “tragedy of the commons.” A look into the specific elements that come into play in the signing of fishery agreements is essential for international cooperation and sustainable fishing. Even if territorial disputes persist, a shared agreement ensures continuous protection of the environment, economic viability of fishing, and diplomatic stability. Our research aims to clarify what circumstances, priorities, and relationships fishery agreements are established under. We will compound historical data from successful treaties, identifying the different variables that come into play. We will then test those variables through simulations based on game theory, and find the most impactful variables. These results could be generalized not only for fisheries, but for seabed mining and management for other resources. Through research in both historical and psychological fields, we can expect to find sufficient data to form a proposal on how to proceed with efforts in marine resource cooperation.

### **Detecting Newly Emerging Floating Vegetation Using Sentinel-2: The Novel Remote Sensing WARN For Monitoring Alligator Weed**

Team Sobalution

*ITO Karin, LIAO Jerry, SUGAWARA Kanon*

Invasive aquatic plants pose serious threats to uninvaded freshwater ecosystems. One such species, alligatorweed (*Alternanthera philoxeroides*), has rapidly expanded in Japanese water bodies, making early detection essential for effective management.

This study investigates whether satellite remote sensing can identify newly emerging floating vegetation patches that may indicate the spread of alligatorweed without need for fieldwork. We hypothesize that changes in vegetation indices derived from satellite imagery can reveal the early formation and expansion of these invasive plant colonies.

To test this, we analyze Sentinel-2 satellite imagery using Google Earth Engine. A water-constrained detection algorithm is then applied to identify floating vegetation patches, and interannual comparisons of seasonal median composites are used to detect newly appearing areas. NDVI analysis is also conducted to examine seasonal growth patterns.

We have already attained a working example of this approach in Lake Inba, and we expect this to successfully detect the emergence and expansion of floating vegetation colonies in other regions as well. The results will contribute to developing a scalable monitoring method that can then lead to early warning systems and efficient management of invasive aquatic plants.

## Shibuya Senior High School – Japan

### **Installation of Rain Gardens in Shibuya and Their Sustainable Maintenance System**

HARUSAME, Shibuya Senior High School, Japan, [ishihara@shibushibu.jp](mailto:ishihara@shibushibu.jp)

*Emily Sato, Kannu Ishikura, Towako Kurokawa, Yuna Kurihara*

Rain gardens are depressions that temporarily store rainwater runoff so it permeates underground slowly. Contrasting to “gray infrastructure” such as asphalt, rain gardens are a representative example of “green infrastructure,” prompting a healthy water cycle through groundwater recharge. Shibuya is located on the valley floor and thus has a high risk of pluvial flooding. The installation of rain gardens will alleviate the strain of inflow on the sewerage system, effectively suppressing flood damage.

This report will look into the implementation method of rain gardens that best matches Shibuya’s urban characteristics based on precedents in other places. Furthermore, to ensure sustainability after the installation of rain gardens, the most effective maintenance system model will be explored by comparing and evaluating the merits and demerits of each possible operating body.

Placing the right man in the right place is key to achieving a sustainable maintenance system of rain gardens. By building a system that realizes the ideal cooperation between the public and private through referencing developed cases from abroad, improvement of the urban flooding issue in Shibuya is expected. Ultimately, application of this model to other cities with characteristics similar to Shibuya could contribute to increased resilience to pluvial flooding worldwide.

*Keywords: rain garden, green infrastructure, pluvial flooding, sustainability, torrential rain*

**Water condition in our ponds**

Kristiāna Kokoreviča, Sabīne Mičule, Sintija Šīve, Kondričs Roberts, Madara Daugerte, Olita Priede

Water is a very important resource in our city - Gulbene, because it plays a big role for our environment, wildlife and humans.

There are many ponds here, but no swimming places, so it is important to examine some of the ponds in our area. It will be interesting to find out if the chemical quality of the water meets bathing water standards and if there are any signs of pollution or imbalance.

The ponds we will be researching are Dzirnavu pond, Emzes pond, pond in Sparites park, Asaru pond, pond in Skolas street courtyard. To know the pollution intensity and chemical factors, the methods we will be using are oxygen concentration determination with sensor and indicator, spectrophotometry as well as qualitative ion determination.

We predict that after this research we will find out if these ponds are suitable for swimming. If the research will confirm pollution, we might find out it's cause and possible solutions, thus raise awareness of the problem to the local community.

**Water is Life, Sustainability is Future: Green Photocatalyst from Rubberwood Biochar–TiO<sub>2</sub> for Wastewater Purification**

Bio-Bo-ai, Mahidol Wittayanusorn School, Thailand

*Mr.Kittithat Wihakhaphirom, Mr.Nuthawat Chantarat, Mr.Chavistee Pisuthvararom, Dr.Sorachai Sae-lim*

Water pollution from textile dyes is a serious environmental concern because many dyes are chemically stable, resistant to natural degradation, and harmful to aquatic life and human health. This study developed a sustainable photocatalyst by combining rubberwood biochar with titanium dioxide (TiO<sub>2</sub>) to degrade methylene blue under neon light irradiation. The biochar–TiO<sub>2</sub> composite was synthesized by loading TiO<sub>2</sub> onto biochar and tested under varying conditions, including catalyst dosage, pH, initial dye concentration, and contact time. Dye removal was monitored using spectroscopy. Under optimal conditions, the composite achieved approximately 90% dye removal with a marked reduction in organic content. The improved efficiency is attributed to synergistic effects between biochar adsorption and TiO<sub>2</sub> photocatalysis, which enhance the formation of reactive radical species. The proposed material offers a low-cost, environmentally friendly approach for dye-containing wastewater treatment while valorizing agricultural waste and supporting sustainable water management.

**Hydro Credit Project**

Kuai tiao namsai, Mahidol Wittayanusorn School, Salaya, Phutthamonthon, Nakhon Pathom, Thailand

*Kunchai Kiddee, Thanason Chiewcharnarcheewa, Pannawin Sarasinpithak, Patsavipich Rungrojtrakool*

Water quality degradation is a problem for households and the environment around them, making water sources unsafe and harming the environment nearby. Current solutions often deal with pollution after it happens and aren't sustainable for the community. This study suggests an approach called the Water Quality Trading (WQT) system in Thailand as a potentially more effective way to manage pollutants such as nitrogen, phosphorus, and biochemical oxygen demand (BOD). Drawing on the carbon credit model, the suggested framework allows polluters to purchase credits while those who mitigate pollution earn tradable credits. The system is designed to operate within a single watershed, thereby maintaining the local significance of both environmental and economic effects. Credit calculations will cover crucial elements, including flow rate, pollutant type, and proximity to discharge locations, while differentiating between point and non-point source pollution. This project aims to develop a pilot policy and visualisation related to Thailand's watershed quality using simulation models to demonstrate outcomes and the suggested policy from the WQT toolkits as a foundation. The project's expected outcome is a more effective, economically viable, and local method to improve water quality while supporting sustainable development.

## **Smart Water Monitoring: Automated Detection of Microplastics in Water Using Polarization Imaging and Machine Learning**

Micropuffs - Mahidol Wittayanusorn School - Thailand

*Aransarat Pangprasertgul, Pataratorn Intarapuk, Pimmada Sangthong*

Microplastic contamination in freshwater environments is an escalating concern, as microplastics accumulate in living organisms and enter the food chain, posing risks to both ecosystems and human health. While established techniques such as Fourier Transform Infrared Spectroscopy (FTIR) and Raman Spectroscopy offer high accuracy, they are limited by cost, complexity, and the requirement for expert supervision, making them unsuitable for field or community-level use. To address this, the project aims to develop an automated system for microplastic detection and classification in water using polarization-based optical imaging combined with deep learning. Samples are imaged under polarized light at angles of 0°, 45°, 90°, and 135° to highlight differences in the optical properties of microplastics, before being fed into a YOLOv11 model for detection and classification of polyethylene terephthalate (PET) and polypropylene (PP) microplastics. Experimental results showed that the system achieved an overall classification accuracy of 77.2% in distinguishing PET and PP microplastics. However, the model still shows limitations in separating background objects from microplastics, which affects overall precision. These findings suggest that polarization-based imaging combined with YOLOv11 has potential as a low-cost, user-friendly automated system for water quality monitoring at the field or community level.

**Water Waste in Agricultural Practices**

WaterWise, Yaşar Fen Lisesi, Türkiye

*Nehir Kadifeci, Zeliha Uludağ, Elif Ela Ezer, Zeynep Sultan Tunç, Defne Karakaya, Kağan Emre Sarıyıldız, Taylan Duran Çakmak, Kuzey Işık, Recep Şener Çiçekli*

Water shortage is becoming an increasingly important problem due to climate change, population growth, and rising water demand. In Türkiye, false irrigation methods and uneven dispersion are the main reasons. For this reason, understanding the reasons behind water waste in agricultural areas is essential for sustainable water management.

The study aims to examine how traditional irrigation methods, unsustainable crop selection, and lack of awareness increase water consumption in rustic areas. The project's goal is to focus on the solutions that can be useful for water waste in agriculture in Türkiye. The working hypothesis is that poor irrigation practices are the major factors to water waste.

The research will be conducted through data analysis based on experiments and the systems designed by our team. Collected data will be conducted to determine the most beneficial solutions to prevent water waste in agriculture.

The expected outcome is to raise awareness and provide a clear understanding of the scale causes of water waste in agriculture, contributing to feature sustainable water policies and strategies.

### **Rainwater infiltration in city centres of Dutch cities**

*Joep Hagens and Daan Koopman, Gymnasium Beekvliet, The Netherlands*

A recurring problem in Dutch cities caused by climate change is water nuisance; this is also the case in the historical city centre of 's-Hertogenbosch. The city is located at the confluence of two rivers, De Dommel and De Aa, where they join to form the Dieze, which discharges into the Maas. When heavy rainfall occurs, almost all of it is redirected into these rivers via drainpipes, which causes high water levels and creates problems for the Maas.

Measures must be taken to move part of the water volume from the rivers to the soil through infiltration. Our hypothesis is that by taking these measures, we will help prevent problems such as overflowing while helping maintain a high groundwater level.

We will try to achieve this by turning stone squares, playgrounds, and other non-permeable structures into more eco-friendly alternatives that allow for greater infiltration in the city centre. By doing this, we expect to achieve higher groundwater levels while putting less load on the Dommel, Aa, Dieze, and eventually the Maas.

### **Political participation in regional water management**

*Doah Scholten, Gymnasium Beekvliet, The Netherlands*

This paper examines the development of water governance and management policy in the 's-Hertogenbosch region since the flooding of the A2 highway in 1995. The research analyses how regional and, where relevant, national water policies have evolved in response to recurring flood risks, and increasing climate change related influences.

Attention is paid to the role of political parties in shaping water policy. The main research question is: how has the water policy in the 's-Hertogenbosch region developed in the last 35 years?

The hypothesis is that the 1995 flooding acted as a turning point, leading to a shift towards more foreseen and climate-adaptive water management policies over time. It is expected that the results will show a focus on climate-adaptive water management, because of the growing concern of climate change and flood risks. This paper is based on the analysis of policy documents, governmental reports, party programs, and includes opinions from local residents and relevant information from credible online sources. All these things help illustrate how water governance has changed over time in the 's-Hertogenbosch region and how political participation in water management works.

**Water Contamination by Industrial and Pharmaceutical Compounds: Analysis and Filtration Approaches**

*Paolo Giralt, Marta Otaegui, Maia Alexandra Russo*

This research project focuses on the study of water pollution caused by industrial activities, with particular attention to the presence of pharmaceutical and metallic compounds. The growth of the pharmaceutical industry and other industrial sectors has increased the release of contaminant substances into the environment, many of which can persist for long periods of time and affect both aquatic organisms and human health.

In this context, the project analyses the issue of residual compounds that can reach rivers, lakes, and groundwater mainly through wastewater, as well as the presence of heavy metals or pharmaceutical metabolites from industrial processes, pharmaceutical manufacturing and waste after human/animal/plant consumption and metabolism.

The practical part of the work will review and analyze the presence of metabolites (post-metabolism active principles), and propose a sustainable filtration system capable of ensuring their filtration by carrying out a small-scale test of this.

**Potential measures for tackling a drought in Catalonia in 2040**

*Eric Garcia, Carrie Hochadel, Lucía Sindreu*  
*Virolai School, Spain*

Although Catalonia has been declared drought-free in 2025, water scarcity is still an ongoing concern for the future, affecting all of its population. This research Project analyses the effectiveness of the Catalan government's handling of the 2021-2024 drought. It will also examine how other droughtprone regions, particularly California, have managed theirs. Furthermore, it proposes a new drought plan designed for a possible drought in 2040, based on insights from interviews with experts from institutions like the ACA (Catalan Water Agency). It will look at both infrastructure measures and recommendations for the general public so as to be able to adapt more quickly to future water crisis.

**The effect of dehydration of the human body due to vaping**

*Pim Veldhoen en Jippe van Mackelenbergh*

In this profile research project, we investigate how substances found in vapes, particularly propylene glycol (PG), interact with water and moist biological environments. The aim is to better understand the potential role these compounds may play in the body's water balance, especially in tissues such as the mouth, throat and lungs. We analyze the physicochemical properties of PG, with a specific focus on its hygroscopic behavior and the possible implications for moisture regulation in biological models. To deepen our perspective, we consulted a pulmonary pathologist and attended a national conference on smoking and vaping in healthcare, integrating current medical and societal insights into our approach. Additionally, we conducted a model experiment in which PG was exposed to various moist materials to study the dynamics of water uptake and release. This approach provides a broader understanding of how components of vape liquid may behave in a humid biological context.