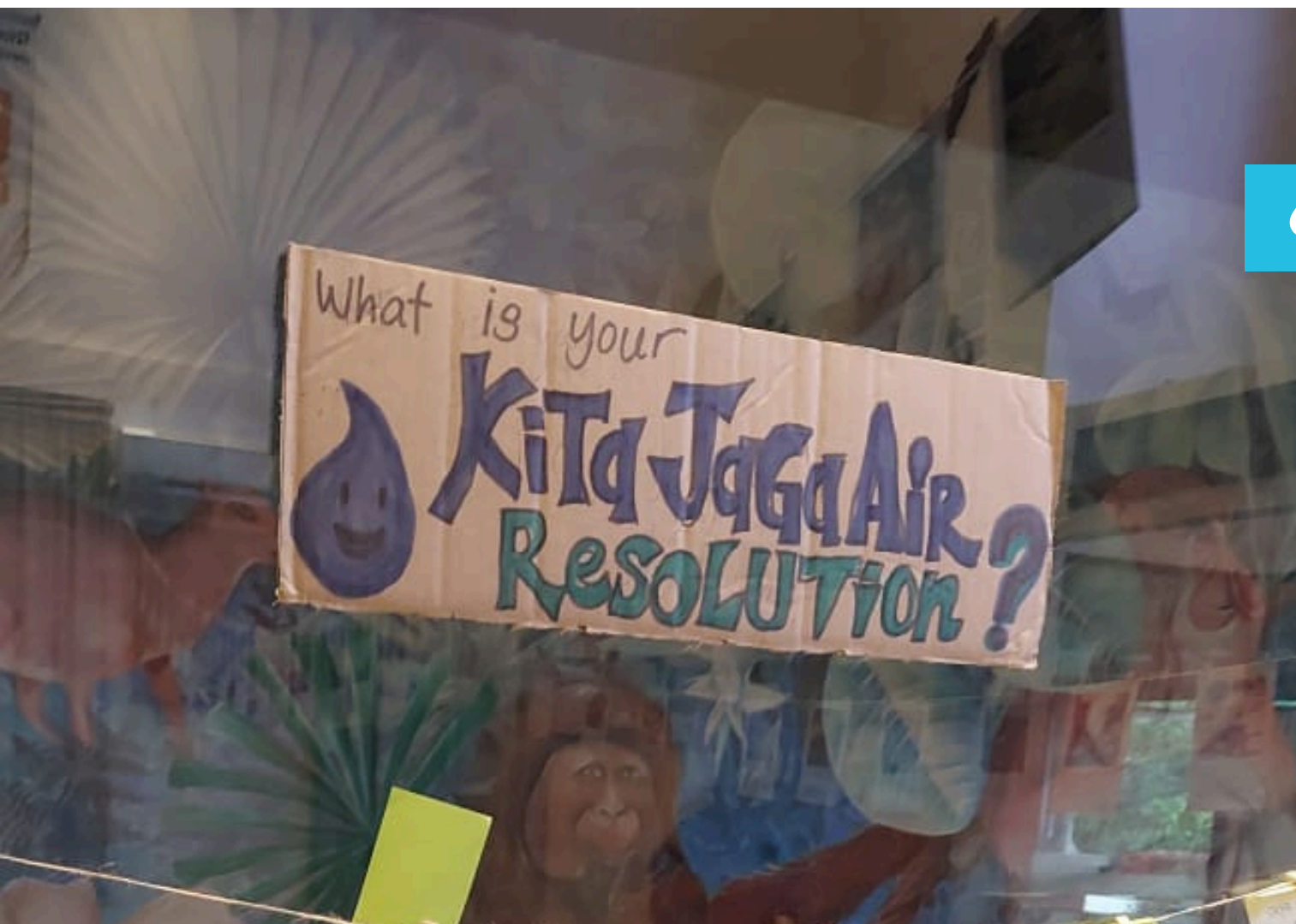




## Clean Water and Sanitation

Ensure availability and sustainable management of water and sanitation for all.



### Universiti Malaya's Commitment to Clean Water and Sanitation

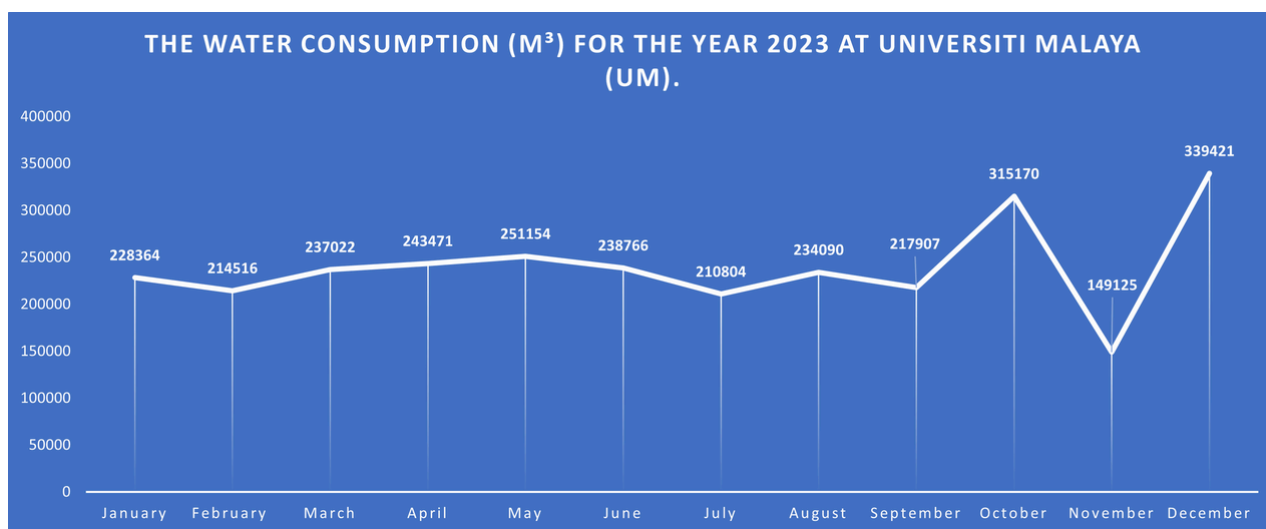
Universiti Malaya (UM) has embedded the concept of lifelong learning into its operations as part of its commitment to Sustainable Development Goal (SDG) 6: Clean Water and Sanitation. This commitment is reflected in the inclusion of water management and conservation as key objectives under UM's broader sustainability policies.

The university's initiatives in this area include the introduction of water-efficient infrastructure, the promotion of water-conscious behaviour, and the implementation of educational outreach programs designed to foster a deeper understanding of water sustainability among students, staff, and the wider community.

## Monitoring Water Consumption at Universiti Malaya

Universiti Malaya (UM) has embedded the concept of lifelong learning into its operations as part of its commitment to SDG 6. This commitment is reflected in the inclusion of water management and conservation as key objectives under UM's broader sustainability policies.

The university's initiatives in this area include the introduction of water-efficient infrastructure, the promotion of water-conscious behaviour, and the implementation of educational outreach programs designed to foster a deeper understanding of water sustainability among students, staff, and the wider community.



**Above:** Graph showing water consumption (m<sup>3</sup>) at UM for the year 2023. Additional graphs can be viewed here: <https://jhb.um.edu.my/utilities> (Source: UM Estates Department)

**Below:** The main water meter for Universiti Malaya's campus is located at Jalan Dato Abu Bakar



## Understanding Water Use: Per Capita Consumption at UM

In 2023, Universiti Malaya had a total population of 34,775, contributing to the overall demand for campus resources, including water. The university's total water consumption for the year reached 2,879,810 cubic meters, averaging around 7,889.89 cubic meters per day. When this figure is divided by the total population, the daily water consumption per person comes to 0.23 cubic meters, or 230 liters. This highlights the significant water usage required to sustain daily activities for each individual on campus, emphasising the need for ongoing efforts in water conservation.

According to Air Selangor's Sustainability Report 2023, the average daily water consumption per capita in Kuala Lumpur, Selangor, and Putrajaya was 241 liters. In contrast, the University community's water consumption is lower, averaging 230 liters per person per day. This difference, while modest, reflects the ongoing efforts within the University to promote water conservation through sustainable practices, efficient water management systems, and awareness campaigns.

## Environmental Stewardship: How UM Manages Wastewater with IWK

Universiti Malaya (UM)'s wastewater treatment is managed by Indah Water Konsortium (IWK), Malaysia's national sewerage company, at the Pantai 2 Regional Sewage Treatment Plant (RSTP) in Pantai Dalam, Kuala Lumpur. The plant is designed to meet Standard A effluent discharge quality, as prescribed by the Environmental Quality (Sewage) Regulations 2009. The typical process at an IWK-operated sewage treatment plant (STP) involves several key steps: filtering out large debris, removing sand and grease, treating the wastewater in a biological tank, separating clean water from solids in a clarifier, and managing sludge either onsite or offsite.

Most STPs use an activated sludge system, which accelerates the natural breakdown of pollutants through microorganisms in the biological tank. After biological treatment, the clear liquid is separated from the solids in the clarifier, and the treated water, known as bio effluent, is discharged into nearby water bodies. Some of the sediment, containing both live and dead microorganisms, is recycled back into the biological system, while the excess sludge is further processed and treated before being safely disposed of in a landfill.

IWK website: <https://www.iwk.com.my/>

IWK Sustainability Report 2023:  
[https://www.iwk.com.my/cms/upload\\_files/sustainabilityreport/SR%20Report%202023/index.html](https://www.iwk.com.my/cms/upload_files/sustainabilityreport/SR%20Report%202023/index.html)



**Above (left):** UM's Indah Water Konsortium (IWK) wastewater bill for 2023 (Source: UM Estates Department)  
**Above (right):** Brochure detailing the Pantai 2 Regional Sewage Treatment Plant (RSTP), which processes wastewater for Universiti Malaya. Read further: [https://www.iwk.com.my/cms/upload\\_files/files/English%20Brochure-Pantai%202.pdf](https://www.iwk.com.my/cms/upload_files/files/English%20Brochure-Pantai%202.pdf) (Source: Indah Water Konsortium)

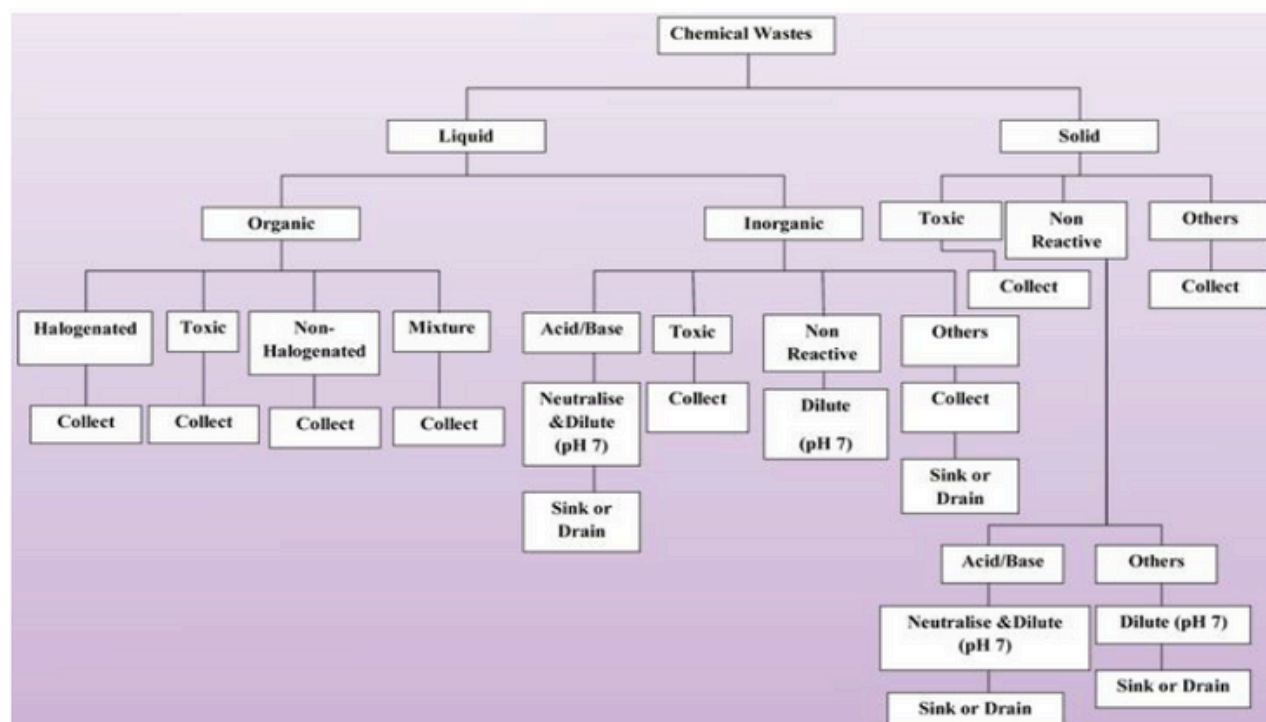


## Strategies for Preventing Water Pollution: Scheduled Waste Management, Recycling, Composting and Wastewater Treatment

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To prevent polluted water from entering the water system, the university is committed to responsibly disposing of chemical and clinical waste through licensed contractors. The collection and disposal of scheduled waste are conducted on a monthly basis, adhering strictly to both national and university policies and guidelines. These include the Environmental Quality (Scheduled Waste) Regulations 2005, Guidelines for Packaging, Labelling, and Storage of Scheduled Waste in Malaysia, Garis Panduan Pematuhan Akta dan Peraturan Keselamatan dan Kesihatan Pekerjaan dan Alam Sekitar (KKPAS), and the UM Laboratory Safety Guidelines.

In the Laboratory Safety Guidelines under the topic of Lab Waste Management (pages 102–112), published in 2022 by the Occupational Safety, Health, and Environment Centre (OSHEC) at Universiti Malaya, it is stated that research and laboratory activities require proper waste management for various types of waste, which may involve a combination of chemical, biological, and radioactive hazards. The key strategies for managing laboratory waste include maximising safety, minimising environmental impact, and optimising disposal costs. The types of chemical wastes generally generated in laboratories and the suggested methods for their disposal were shown in the Figure below. The Laboratory Chemical Wastes Management (LCWM) Committee, led by a senior officer of the laboratory, was recommended to be established. The committee was to comprise researchers, lab managers/supervisors, and senior laboratory personnel.

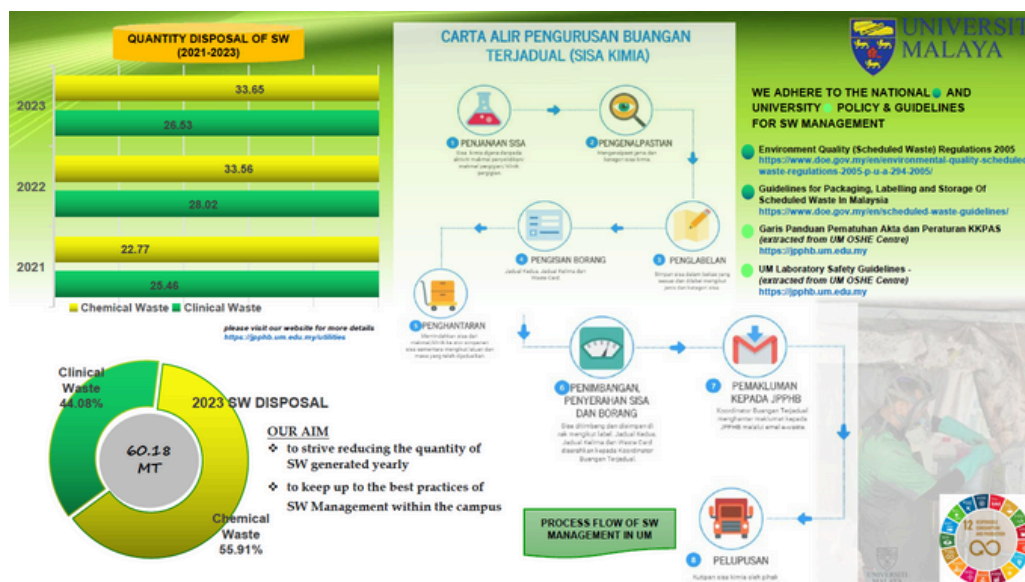


**Above:** The recommended method for disposing of chemical wastes from laboratories, as outlined in the Laboratory Safety Guidelines. The guideline can be downloaded here: <https://umresearch.um.edu.my/osheumresearch/> (Source: UM Occupational Safety and Health & Environment Centre)

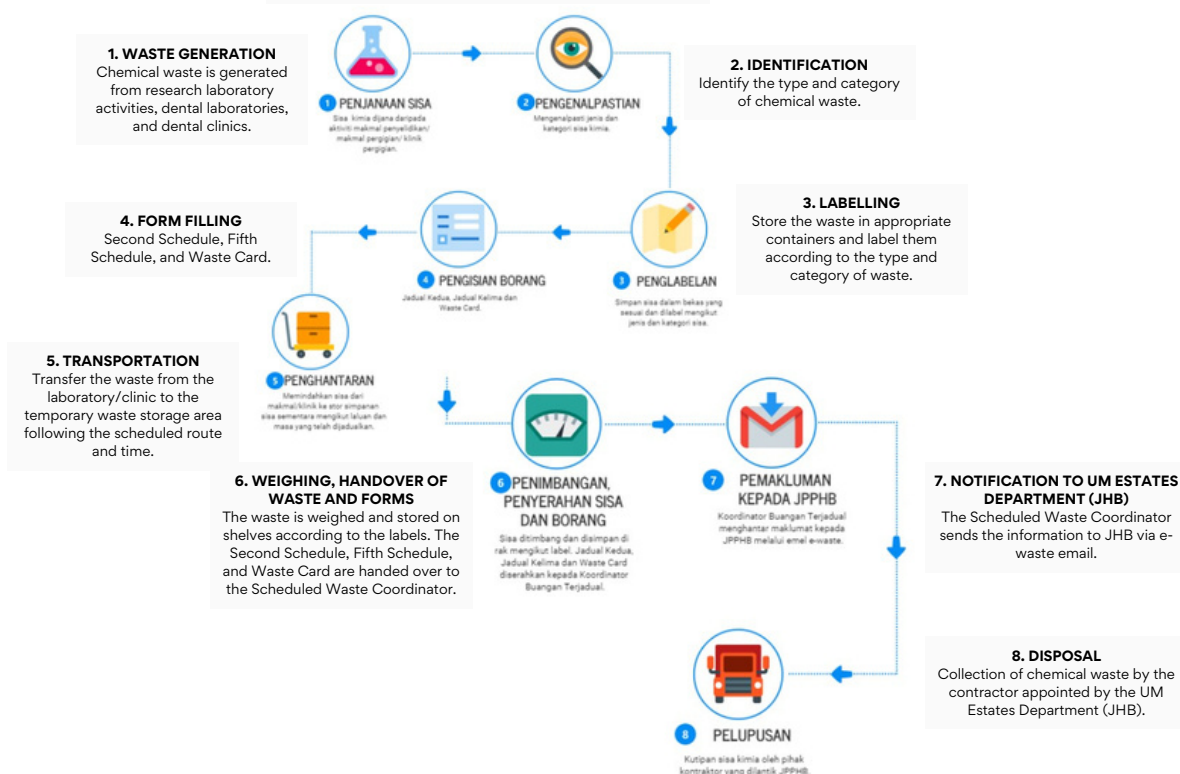


In 2023, based on the data collected by UM Estates Department, the university disposed of 60.18 metric tons of scheduled waste, of which 44.08% was clinical waste and 55.91% was chemical waste. The chemical waste safely managed and prevented from entering the water system included substances such as acid waste, mercury waste, paint waste, tar waste, and others.

Additionally, the “Waste Card” for scheduled waste management, developed by the Facility Division of the UM Estates Department, specifies on its first page that, in the event of an accidental spill or release of scheduled waste, immediate actions should be taken to block water flow from the spill area to prevent contamination of nearby rivers.

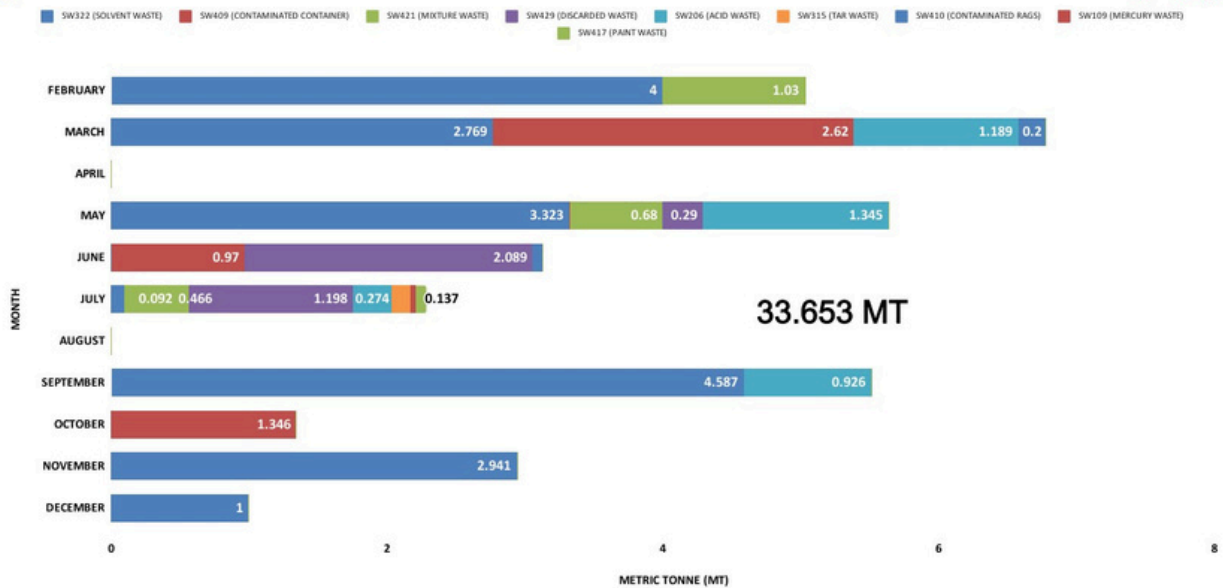


### Scheduled Waste Management Flowchart (Chemical Waste)



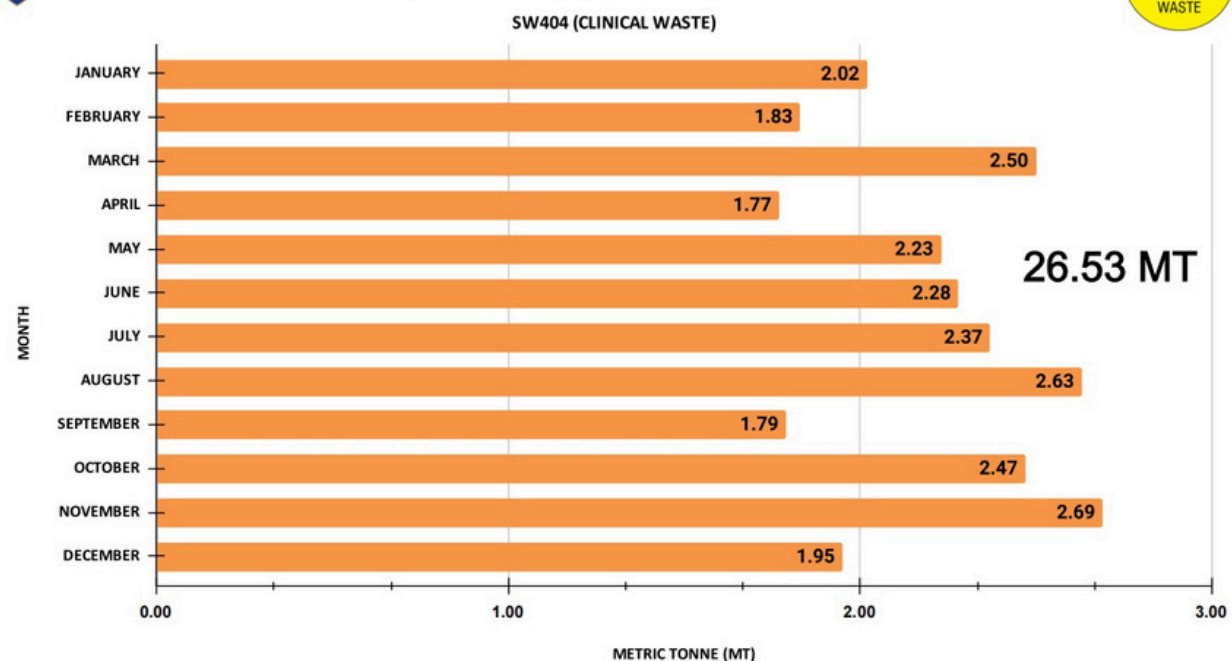
**Above:** A report on UM’s scheduled waste management practices for chemical and clinical waste from 2021 to 2023. It highlights the eight steps in the Scheduled Waste Management Flowchart (Chemical Waste), which include waste generation, identification, labelling, form filling, transportation, weighing, handover of waste and forms, notification to the UM Estates Department, and disposal. (Source: Facility Division, UM Estates Department)

### CHEMICAL WASTE DISPOSAL JANUARY - DECEMBER 2023



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### CLINICAL WASTE DISPOSAL JANUARY - DECEMBER 2023



**Above:** The disposal of clinical and chemical waste is also tracked monthly in 2023. Full graphs can be viewed here: <https://jhb.um.edu.my/utilities> (Source: Facility Division, UM Estates Department)

Composting and recycling play a crucial role in preventing water pollution by reducing the amount of waste sent to landfills, where harmful leachate - liquid that can carry toxins - may seep into water systems. These practices also decrease reliance on toxic chemicals, synthetic fertilisers, and raw material extraction, all of which contribute to water pollution through runoff, industrial discharge, and contamination. By minimising these risks, composting and recycling contribute to a healthier and more sustainable environment for our water resources.

At Universiti Malaya (UM), the Zero Waste Centre team actively organises a monthly recycling and buyback program to significantly reduce the volume of waste that ends up in landfills. Additionally, food waste and green waste generated from campus cafeterias and events are placed in designated special bins and collected by the UM Estates Department. These organic materials are then sent to the university's in-house composting center, part of the UM Zero Waste Centre, where they are processed into natural compost and biogas.

In 2023 alone, UM successfully diverted 133.12 metric tons of recyclables, green waste, and food waste from landfills through these sustainable practices. This initiative not only helps reduce potential water system contamination but also contributes to the university's broader environmental goals by transforming waste into valuable resources such as compost for soil enrichment and biogas for energy production.



**Above:** A compost pile at the UM Zero Waste Centre  
**Below:** A poster for the monthly recycling and buyback program at UM  
 (Source: UM Zero Waste Centre)



**WASTE TO LANDFILL VS WASTE RECYCLED 2023**



**Above:** The graph for waste to landfill vs waste recycled in UM for 2023. Full graphs can be viewed here: <https://jpphb.um.edu.my/utilities> (Source: Facility Division, UM Estates Department)



To prevent water pollution at its source, the university has implemented a proactive system to manage wastewater from its cafeterias. Wastewater, which often contains oils, fats, and food residues, is diverted through an oil and grease trap before being discharged into the sewage system for further treatment. The trap effectively captures and separates oil, grease, and other harmful substances, preventing them from entering the water system and reducing the risk of clogged pipes and environmental contamination. This process ensures that cleaner water reaches sewage treatment facilities, contributing to the protection of local water resources and supporting sustainable wastewater management on campus.

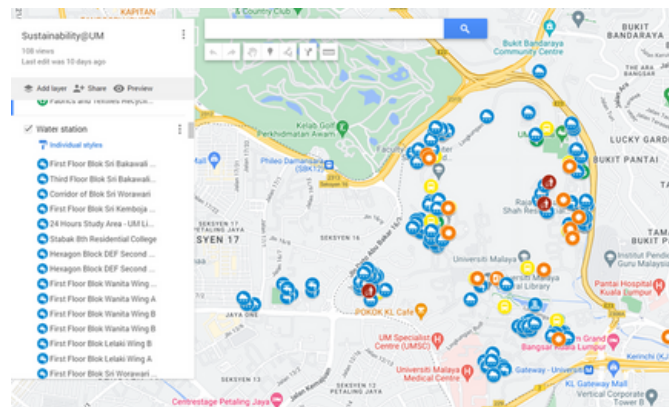
**Right:** A photo taken at the cafeteria of the 7th Residential College, showcasing the system that diverts greywater from the river through an oil and grease trap. This greywater is then channelled into the sewage system for effective treatment.



## Accessible Hydration: Free Drinking Water Stations Across UM Campus

Free drinking water stations are conveniently located throughout the Universiti Malaya (UM) campus, ensuring that students, staff, and visitors have easy access to clean and refreshing water. These stations are strategically placed in various areas, including residential colleges, faculties, and selected cafeterias, promoting a culture of sustainability and encouraging the reduction of single-use plastic bottles.

The Sustainability@UM Map highlights the locations of these water stations, making it simple for everyone on campus to find the nearest one. By providing accessible hydration options, UM aims to foster healthy habits and contribute to environmental conservation efforts while ensuring the well-being of its community.



**Above:** The Sustainability@UM Map highlighting free water stations across UM.

**Right:** UM students refilling their water bottles at a free water station.



## Water-Efficient Building Standards at Universiti Malaya

Under the **UM Sustainability Policy 2021-2030** (page 16) and the **UM Eco-Campus Blueprint** (pages 21-24), water management is emphasised as a key focus area. To minimise water use, the university mandates that all new buildings, renovations, toilet fittings, and appliances adhere to water efficiency standards set by the Malaysian Government. Additionally, the **UM Development Checklist** (page 6) requires that new developments on campus incorporate at least 20% innovative green area elements. These may include features such as water-saving taps, contributing to water conservation efforts. The checklist also mandates that new buildings with water bodies establish a consistent database to monitor water-related data (e.g., water consumption and harvesting) and implement greener, natural, and inclusive technologies for managing water needs on campus.

Following the UM Sustainability Policy 2021-2030 and UM Development Checklist, various initiatives have been implemented to achieve these goals. This includes the installation of dual-flush toilet systems, retrofitting ablution taps, low-flow shower heads, and water- and energy-efficient washing machines. As a result, the number of water-efficient appliances on campus continues to grow. Additionally, water restrictors (thimbles) have been installed in all musollahs/mosques on campus, reducing water usage during ablution by 50%.

The university continues to tackle water loss by identifying and repairing non-revenue water from suspected leaks across campus. Furthermore, the UM Water Warriors initiative, established to promote the protection and conservation of water bodies, remains a key advocate for sustainable water management and education on campus.

The **UM Water Management Report 2022**, released by the UM Sustainable Development Centre (UMSDC) and the UM Estates Department (JHB), highlights various water management facilities that continue to operate through 2023.



**Above:** The UM Water Management Report primarily covers data from 2022 to 2023

**Right:** Examples of water-efficient devices at UM, such as low-flow taps and dual-flush toilets, which are prioritised as part of UM's building standards





## How UM Integrates Water Conservation into Campus Landscaping

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Universiti Malaya (UM) has partnered with landscape specialist Belalang Inovasi to install a low-maintenance **Vertical Greenery System (VGS)** at the Faculty of Built Environment. This innovative green wall system not only beautifies the campus but also plays a vital role in water conservation. The vertical garden uses a carefully designed irrigation system that minimises water consumption by channeling water directly to the plant roots, reducing evaporation and water waste. Additionally, a second vertical garden has been installed at the Research Management & Innovation Complex (IPPP), further promoting sustainable landscaping practices on campus.



At the Rimba Ilmu Botanic Garden, sustainable water management practices are also in place. One key method is **mulching**, which is used to cover the soil and reduce water transpiration. Mulch helps retain moisture in the soil by preventing rapid evaporation, particularly during hot weather, and enhances soil fertility by slowly decomposing over time. This practice significantly reduces the need for frequent watering, supporting UM's broader goals of resource efficiency and environmental stewardship.



The UM Estates Department's landscape team has prioritised the integration of **drought-tolerant local species** into the campus landscape design. These native plants, specifically chosen for their resilience in Malaysia's tropical climate, require minimal water once established, thereby significantly reducing the need for excessive irrigation. Local plant species have developed various evolutionary adaptations and physiological mechanisms that enable them to thrive in arid or water-scarce environments. These adaptations not only enhance their ability to efficiently utilise water but also minimise water loss and allow them to endure periods of drought. By incorporating these drought-tolerant plants into the landscape, Universiti Malaya is taking important steps towards sustainable water management and promoting biodiversity within the campus environment.



**Top:** The Vertical Greenery System (VGS) at the Faculty of Built Environment

**Middle:** Mulching practices at UM's Rimba Ilmu

**Bottom:** Drought-tolerant local plant species at UM



## Water Reuse Policy and Measurement

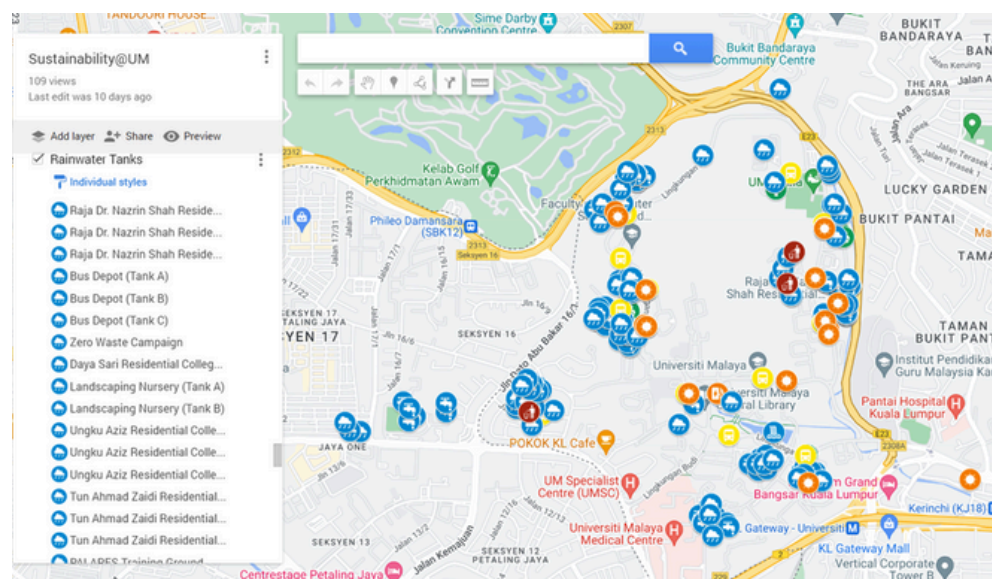
The UM Sustainability Policy 2021-2030 (page 16) aims to establish a systematic water management system that focuses on reducing, reusing, and recycling water. As outlined in this policy, the key implementation mechanism is to establish the implementation of sustainable water management and conservation via systematic water management system which integrates the reducing, reusing and recycling of stormwater/rainwater (i.e rainwater harvesting system) in several faculties and or Responsibility Centers (RCs). Furthermore, outlined in the UM Development Checklist (page 10), all new developments on campus are required to detail how they will harvest rainwater for irrigation and utilise greywater for flushing.

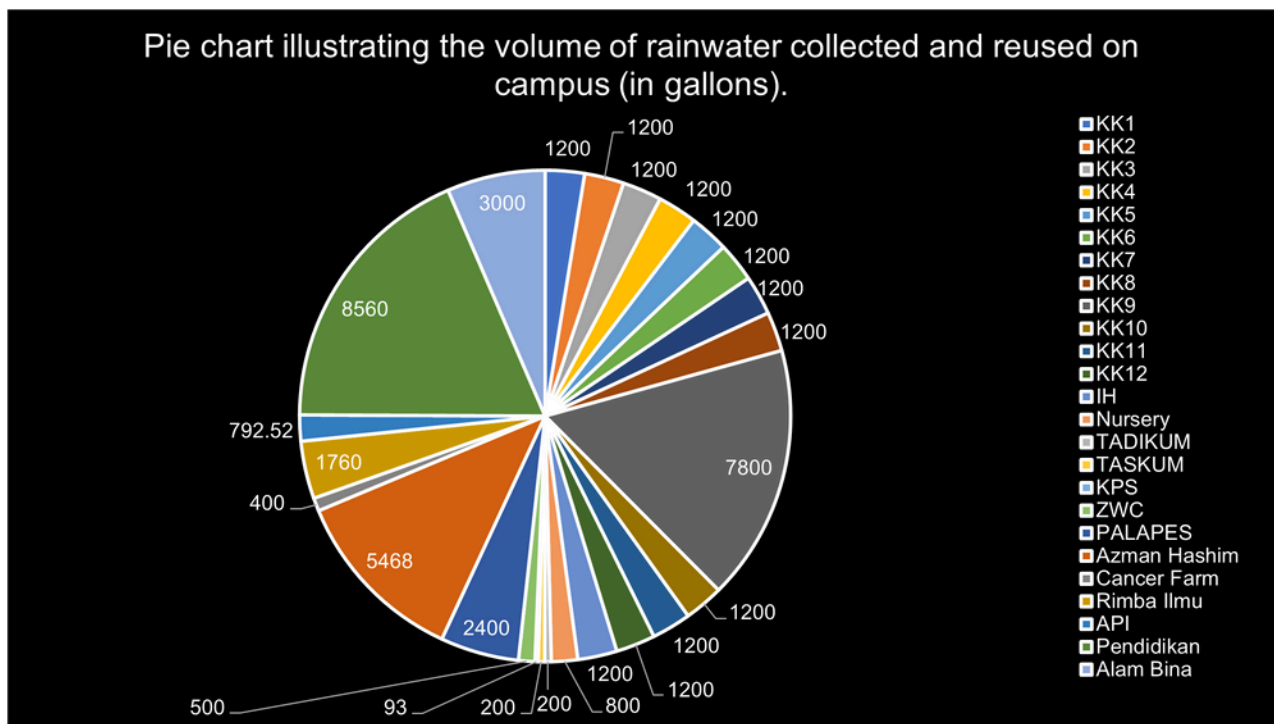
In line with the UM Sustainability Policy 2021-2030 and the UM Eco-Campus Blueprint, recycled water is actively used throughout the campus. This includes applications in fishponds, cooling systems, toilet flushing, as well as cleaning and plant watering in the Faculty of Built Environment. [SA1] The UM Water Management Report 2022, released by the UM Sustainable Development Centre (UMSDC) and the UM Estates Department (JHB), highlights various water reuse facilities that continue to operate through 2023.

Various rainwater collection and irrigation systems have been installed at Universiti Malaya (UM) to enhance water reuse across the campus. Rainwater harvesting involves the collection and storage of rainwater for later use, primarily for non-potable applications. At the university, harvested rainwater is commonly utilised for landscaping, cleaning, and ablution. This practice repurposes naturally occurring water that would otherwise be lost to runoff, thus classifying it as a form of water reuse.

A total of 62 rainwater harvesting tanks, with capacities of 200, 400, and 600 gallons, have been strategically placed at various locations, including residential colleges, faculties, the landscaping nursery, the bus depot, green fields, and the botanical garden. Additionally, a 3,000-liter rainwater harvesting tank was constructed in 2017 to provide a clean water source, equipped with a filtration system for ablution at the Academy of Islamic Studies Musolla.

**Below:** The locations of the rainwater harvesting tanks can be viewed on the Sustainability@UM Google My Maps





**Above:** Pie chart showing the volume of rainwater collected and reused at UM (measured in gallons)  
(Source: UM Water Warriors and UM Estates Department)

## Monitoring Our Waters: Students Take Action with Project River Care 2.0

Project River Care 2.0, in collaboration with the Institute of Biological Sciences, the UM Community Engagement Centre (UMCares), and the Glami Lemi UM Biotechnology Research Centre, was held on 28 July 2023. The event involved the participation of 38 students and 6 teachers from Sekolah Kebangsaan Datuk Undang Abdullah Chennah Jelebu. The primary objective of this program is to educate students about the importance of water quality and the methods used to assess it in local rivers. Through hands-on activities, the students engaged in monitoring river water quality in their village environment, gaining practical experience and knowledge about environmental conservation. This initiative aims to raise awareness among the younger generation about the significance of protecting natural water resources and to encourage them to take an active role in safeguarding their environment. The collaboration between educational institutions and community partners enhances the learning experience and promotes a sense of responsibility towards local ecosystems.



**Above:** UM volunteers training local students to monitor the river in their village



## Soil and Water Conservation in Malaysia's Tropical Forests

The Institute of Ocean and Earth Sciences (IOES) at UM organised the IOES Seminar Blue Carbon Series, in collaboration with the Japan International Research Centre for Agricultural Sciences (JIRCAS), featuring a free session on “Soil and Water Conservation for Sustainable Management of Tropical Forests” on 13 December 2023. This session focused on hydrological observations in Malaysia's tropical forests, highlighting the importance of soil and water conservation in maintaining the health and sustainability of these ecosystems. The collaboration aimed to share valuable insights and effective management practices through detailed hydrological studies.

**Right:** The event poster for the session on “Soil and Water Conservation for Sustainable Management of Tropical Forests” (Source: IOES)



## A Collaborative Workshop with Dzul Iman Quranic Life School and SMK Juasseh

The UM Water Warriors team was invited by Dzul Iman Quranic Life School to conduct a water monitoring activity focused on aquatic macroinvertebrates at the stream of Tasik Varsiti, Universiti Malaya. This initiative is part of the school's Penerokaan Ilmu dan Kemahiran program, which aims to enhance students' understanding of environmental science through hands-on learning experiences. During the activity, which took place in July 2023, the team provided students with insights into the importance of aquatic macroinvertebrates as indicators of water quality and ecosystem health. Participants engaged in hands-on fieldwork, learning how to identify different species and assess the overall health of the water body. By fostering a connection between students and their local environment, the activity aimed to instil a sense of responsibility and stewardship towards preserving water resources.



**Above:** Students from Dzul Iman Quranic Life School conducted biological water monitoring at UM in collaboration with the UM Water Warriors team



Furthermore, the UM Water Warriors team conducted a talk on water quality and facilitated a water filtration experiment for students from Sekolah Menengah Kebangsaan (SMK) Juasseh at the Centre for Foundation in Science, Universiti Malaya, in November 2023. This event was part of their educational field trip, aimed at enhancing students' understanding of Science, Technology, Engineering, and Mathematics (STEM) through hands-on learning experiences related to water conservation and environmental science.

**Right:** Students from SMK Juasseh learning about a water filtration experiment at UM



## UM Partners with UEM Sunrise for Water Quality Assessment in Kepong Metropolitan Park

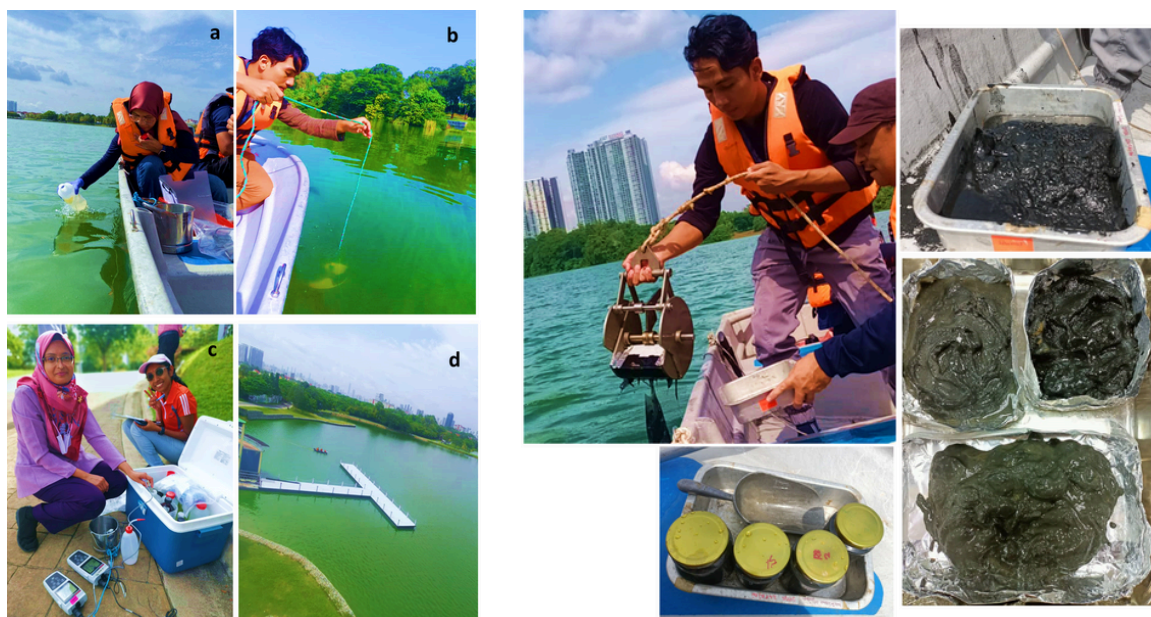
Universiti Malaya (UM) extended its expertise in water conservation beyond campus through a collaboration with UEM Sunrise Berhad. In partnership with Melati Ehsan Group, UEM Sunrise, via its joint-venture subsidiary Mega Legacy (M) Sdn. Bhd. (MLMSB), signed a Memorandum of Understanding (MOU) with UM's Faculty of Science to assess the water quality and heavy metal content of the lake in Kepong Metropolitan Park. This park, adjacent to UEM Sunrise's 72.74-acre Kiara Bay township in Kepong, played a central role in the integrated urban development.

Kepong Metropolitan Park, located at the northern end of Jinjang, is well known among locals for its daily kite-flying activities. The park spans 95 hectares, featuring a 57-hectare lake that supports recreational fishing. The lake, a former tin mining site, also serves as a vital ecological support, providing habitat for fish and birds and functioning as a natural reservoir to regulate water flow and prevent flooding in nearby areas. Plans are underway to use the lake for water-based recreational activities as part of the township's development.

The partnership, initiated by MLMSB, aimed to evaluate the lake's water quality to revitalise Kiara Bay's waterfront, ensuring it was safe, clean, and appealing for community recreation and water-based activities. This aligns with UEM Sunrise's commitment to environmental sustainability and community well-being. The MOU outlined two phases funded by a grant from UEM Group, UEM Sunrise's parent company. Under the leadership of Assoc. Prof. Ts. Dr. Wan Abd Al Qadr Imad Wan Mohtar from the Institute of Biological Sciences, UM conducted a comprehensive water quality assessment in phase one, testing for heavy metals, sediments, and microbiological content. The data were analysed according to the National Lake Water Quality Standard (NLWQS) and other relevant indices. Initial findings indicated that while the lake's water quality met class II standards (suitable for recreational activities), harmful algal blooms, particularly blue-green algae, were spreading in some areas. These algae produced toxins that posed risks to human health and aquatic life, leading to dead zones that negatively impacted the lake's clarity, biodiversity, and recreational value.

To combat the algal blooms, the study recommended controlling nutrient flow into the lake and improving water circulation. These actions were aimed at restoring the lake's water quality, allowing for the resumption of activities such as fishing, kayaking, and boating, while also supporting biodiversity and local economic growth. Continuous monitoring, coupled with enforcement of the Environmental Quality Act 1974, was crucial for maintaining the lake's health.

In phase two, UM will propose restoration measures based on the findings from phase one. These steps will aim to further improve the lake's water quality, ensuring it becomes a safe and vibrant public space. By enhancing the lake's health, the project will not only contribute to local water conservation efforts but also support the development of Kiara Bay's waterfront as a dynamic community hub for recreation and economic activities.



**Above:** UM researchers carried out a comprehensive water quality assessment at Kepong Metropolitan Park

## UM Researchers Support River Waste-to-Biochar Project for Water Conservation Beyond Campus

UM researchers played a key role in the “Sungai Selangor Citizen Science Programme Phase 2”, organised by The Malaysian Society of Soil Science (MSSS) and held on the 7th of October 2023. The program, funded by the UNDP GEF Small Grants Programme under the ICCA (Indigenous Peoples and Community–Conserved Territories and Areas) theme, focused on environmental sustainability, community empowerment, and innovative approaches to river waste management.

During the event, UM researchers hosted a booth and held a sharing session on the transformation of organic river waste into biochar, a valuable soil amendment for agricultural crops and reforestation efforts. This initiative emphasises the potential of biochar not only as a solution to managing river pollution but also as a tool for enhancing soil health, thereby supporting broader environmental conservation efforts. Biochar production offers a sustainable way to reduce organic waste in rivers, preventing harmful effects on water quality while creating a useful product that improves soil structure and retains moisture - critical for agricultural and reforestation projects.



This project has far-reaching implications for water conservation both on and off campus. By preventing organic waste from decomposing in rivers, the project helps reduce nutrient pollution and eutrophication, which can lead to algae blooms that deplete oxygen levels and harm aquatic life. These water quality improvements benefit ecosystems downstream, ensuring healthier water bodies for both rural and urban communities.

Moreover, the program involved a collaborative effort with key partners such as the Kuala Selangor Municipal Council (MPKS), the Selangor Water Authority Board (LUAS), Universiti Malaya (UM), the Forest Research Institute Malaysia (FRIM), and several community clubs, including Inspirasi Kawa, Kelab Generasi Warisan Seri Asahan, and Kelab Pendayung Kelip-Kelip Kampung Kuantan. These partnerships underscore the importance of community-based action in environmental management and river stewardship.

The Principal Officer for the project delivered a presentation detailing the journey of community empowerment initiatives that have led to the voluntary collection of river waste and its conversion into biochar. This effort has been facilitated by the use of a portable drum kiln, an invention by Universiti Malaya, which allows for efficient on-site biochar production. The voluntary nature of the project highlights the success of engaging local communities in water conservation efforts, demonstrating that practical, low-cost technologies can empower citizens to actively participate in the protection of their local water resources.

Read more about the program in the newsletter of The Malaysian Society of Soil Science (MSSS):  
[https://www.msss.com.my/2023/newsletters/NWL\\_Issue2\\_2023.pdf](https://www.msss.com.my/2023/newsletters/NWL_Issue2_2023.pdf)



**Above (left):** UM researchers from the Institute of Biological Sciences showcasing their biochar product made from organic river waste

**Above (right):** Participants and key partners of the Sungai Selangor Citizen Science Programme, Phase 2



## Kebun Harmoni: Empowering PPR Kerinchi through Sustainable Urban Farming

The Program Pemindahan Ilmu: “Kebun Harmoni Celik SDG” successfully promoted the Sustainable Development Goals (SDGs) and shared knowledge of urban farming with the PPR Kerinchi community in Lembah Pantai. Organised by second-year chemical engineering students at UM as part of the GIG1005 Social Engagement course, the event took place on 3 June 2023, under the supervision of Dr. Fathiah Mohamed Zuki.

Support for the program came from various representatives, including Tuan Haji A. Ghani Mohamed from LA21, Mr. Mohd Iskandar Jalawan and Ms. Nur Aqilah Riana from the Department of Agriculture (DOA), Mr. Iskandar from the SDG Centre, and PPR Kerinchi Chairman Mr. Hamzah, along with Mrs. Azura and Mr. Jasni from the Lembah Pantai Parliamentary Office.

The event featured several booths showcasing innovative designs in urban farming, including hydroponic systems, compost bins, and rainwater harvesting systems. The rainwater harvesting booth was particularly significant, as it demonstrated how urban communities can collect and utilise rainwater for irrigation, reducing reliance on municipal water supplies and promoting sustainability. Additionally, the UM students introduced the Kratky Method, a passive hydroponic technique that effectively saves water by allowing plants to grow in a nutrient-rich water reservoir without the need for pumps or continuous circulation. By eliminating soil and enabling efficient nutrient uptake, the Kratky Method promotes sustainable urban farming, making it an ideal solution for water-scarce regions.



**Top:** UM students demonstrating how to build a rainwater harvesting tank for the local community

**Middle:** The Kratky Method, showcasing a passive hydroponic technique

**Bottom:** Dr. Fathiah Mohamed Zuki at the launch of the program

## Sustainable Underground Flood Control System at Universiti Malaya

Universiti Malaya (UM) has implemented a permanent sustainable water extraction system primarily designed for flood control, where water from Sungai Anak Air Batu on campus is diverted into a flood detention pond. This innovative system features a concealed flood detention pond with a capacity of 16,000 cubic meters (m<sup>3</sup>) located underground at Padang C. The establishment of this flood detention pond was prompted by a significant flood event that affected the university and its surroundings, raising concerns from Kuala Lumpur City Hall (DBKL) about future flood risks. In response to this pressing issue, DBKL approached UM to devise a long-term solution to effectively manage excess stormwater. After assessments, Padang C was identified as an optimal site for the construction of the flood detention pond. This underground facility is engineered to temporarily store excess rainwater, helping to mitigate flooding during heavy downpours.

The pond is constructed as a covered structure, ensuring that the space above can still be utilised for recreational and community activities. In 2019, when the flood detention pond became operational, the existing Padang C was also renovated into a multipurpose football field, enhancing the area's usability and aesthetic appeal. The technology utilised in this system is known as StormTrap, a state-of-the-art stormwater management solution that captures, stores, and gradually releases excess water. This approach not only helps prevent flooding but also contributes to sustainable water management practices within the university. By integrating this system, UM demonstrates its commitment to environmental stewardship and resilience against climate-related challenges.



**Top:** Concealed flood detention pond at Padang C, Universiti Malaya



## Sustainable Groundwater Management at Universiti Malaya: Key Locations and Practices

Several groundwater sources that utilise sustainable water extraction technologies have been implemented across 10 locations on Universiti Malaya's (UM) main campus, satellite campus, and research field center:

- **Tasik Varsiti:** Groundwater is one of the main sources for the lake, supplied by a tube well approximately 100 meters deep, which continuously sustains the lake's water level.
- **Department of Geology, Faculty of Science:** A groundwater tube well is used for studying both the quality and quantity of groundwater. It also serves as an open classroom for students enrolled in the Hydrogeology course. Furthermore, in a research collaboration between the Department of Geology and the National Hydraulic Research Institute of Malaysia (NAHRIM), another groundwater well was constructed to study groundwater quality and chemistry.
- **National Water Balance Study:** As part of this study, two groundwater tube wells were constructed on the main campus - one at Tasik Varsiti and the other at Tun Syed Zahiruddin Residential College. The primary objective of the study was to assess water resource availability for the Klang River catchment. After the study was completed, the wells were repurposed as alternative water sources for the campus community.
- **Plant Nursery and Varsity Field:** Due to limitations in pipe distribution, UM has explored additional groundwater sources for clean water at three locations, including the plant nursery and Varsity Field.
- **Research Field Centre in Gemas, Negeri Sembilan:** Groundwater is the primary water source at UM's Centre for Agro-Science, where it is used for both toilets and irrigation.
- **Satellite Campus in Bachok, Kelantan:** Groundwater is also the main source of clean water at UM's satellite campus in Bachok. Given the abundance of groundwater in the area, the water is extracted and undergoes sand filtration treatment before distribution.

6



**Above:** Locations for groundwater technology at UM's main campus and research centers



## Sungai Selangor: Towards Sustainable and Resilient Water Supply

Sungai Selangor serves as the primary source of raw water for treatment and distribution across Selangor, Kuala Lumpur, and Putrajaya, including supplying clean water to Universiti Malaya (UM). A research team at UM conducted a study titled **“Sustainability and Resilient Water Supply at Sungai Selangor (Rawang Sub-Basin)”**, aimed at strengthening water security for the university and its surrounding regions. Led by Professor Ir. Dr. Faridah Othman from the Department of Civil Engineering, the team also includes researchers from the Faculty of Engineering, the Faculty of Arts and Social Sciences, the Faculty of Science, and the Faculty of Medicine. This study was carried out in collaboration with Air Selangor, the state’s primary water services provider.

The research focuses on identifying the causes of water supply disruptions within the Sungai Selangor River Basin, particularly in the Rawang sub-basin. The Rawang sub-basin has undergone the rapid land use development and has exhibit tremendous land use transformation since 2005 to 2020. By investigating the sources, causes, and impacts of these disruptions, the team seeks to develop sustainable, long-term solutions to enhance water resilience.

Their efforts align with SDG 6, especially the goal to “improve water quality by reducing pollution, eliminating dumping, and minimising the release of hazardous chemicals and materials”.

To achieve these objectives, the team worked closely with local agencies and authorities, conducting field visits, surveys, and water sampling to gather vital data. The study’s findings cover several key aspects, including the trend and analysis of river water quality, land use and land cover changes, and a risk assessment. The researchers also provided recommendations across various areas, such as technical and engineering solutions, land use planning, adoption of advanced technologies, governance improvements, and public outreach initiatives. Additionally, the research emphasises the need for a comprehensive water safety plan to ensure a sustainable and secure water supply for UM and the surrounding regions. By addressing both technical and environmental challenges, the study contributes to broader efforts in water conservation and resource management across Selangor.



**Above:** UM researchers in action as part of the study on “Sustainability and Resilient Water Supply in the Sungai Selangor (Rawang Sub-Basin)”

## Sungai Labis: A Collaborative Approach to Water Quality Monitoring

Researchers from Universiti Malaya, in collaboration with the Honourable Member of the State Legislative Assembly for Bekok, Labis, YB Tan Chong, and the residents of Labis, Johor - particularly in partnership with the Labis Che Thai Khor Moral Uplifting Association - successfully conducted a four-year study on six polluted rivers. Initiated in 2019 and completed in 2023, the research focused on identifying water pollution levels and training the local community to monitor water quality. The project, led by researchers from the Faculty of Science and the Faculty of Engineering, examined surface water pollution at six different sampling points, directly linked to an illegal aluminum waste dumping incident that occurred approximately fifteen years ago.

Water samples were collected from various sources around Labis, spanning from upstream to downstream locations, including the Juaseh Dam, Sungai Juaseh, Sungai Gatom, the intersection of Sungai Gatom and Sungai Labis, Sungai Labis itself, and nearby well water. These sampling sites were chosen due to their proximity to the aluminum dross dumping, which had displaced over 300 residents of Kampung Sungai Gatom. The study measured key water quality parameters such as Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Turbidity, Total Suspended Solids (TSS), bacteria, nutrients, and heavy metal content. The findings underscored critical water security issues, particularly for the Orang Asli villagers who rely on river water for consumption, highlighting the urgent need to address water safety concerns in the area.



PENYELIDIK UM JALANKAN PENYELIDIKAN DI 6 SUMBER AIR DI LABIS, JOHOR | UM EKSklusif

**Above:** UM researchers conducted a water quality study in Labis, Johor. Watch the full video here:

<https://www.youtube.com/watch?v=OVofXbS9HEE>

**Below:** Water samples collected from the river and tested.





## Collaborative Approaches to Water Management at Universiti Malaya

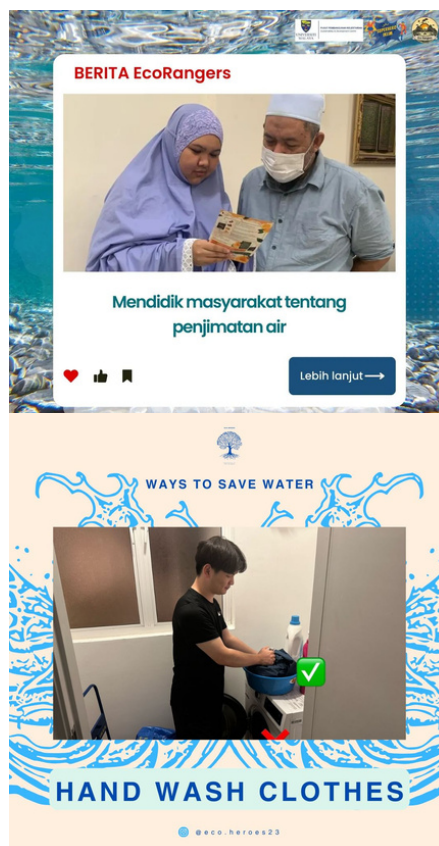
At the university level, a water management team is composed of members from the UM Estates Department (which oversees daily operations related to facilities, infrastructure, and assets, including water facilities and usage), the UM Sustainable Development Centre (UMSDC), and UM Water Warriors. Together, they have several key responsibilities, including reducing non-revenue water, monitoring and ensuring an adequate water supply for the UM campus, flood mitigation, maintaining water assets and facilities, increasing the use of water-efficient appliances, developing solutions to reduce water consumption, and actively promoting conscious water usage through communication strategies such as the university's internal mailing list, signage, booths, and informational talks.



**Above:** A member of the water management team from the UM Estates Department conducted a training session on fixing pipe leaks for the UM community.

## Superhero Iklim: Gamifying Climate Action and Water Conservation at UM

Dr. Nor Aishah Abdullah from the Department of Science and Technology Studies, Faculty of Science, spearheaded a gamification initiative called Superhero Iklim, launched on 30 October 2023. This six-week challenge aimed to foster pro-environmental behavior, particularly in combating climate change, while also promoting effective science communication. Throughout the challenge, participants undertook various eco-friendly tasks, with one notable bonus task focused on earning the “Water Warrior” badge. To unlock this badge, participants had to demonstrate 10 ways they conserve water on campus, encouraging practical water-saving actions and reinforcing the UM community's commitment to sustainable practices. The initiative also extended its reach through social media, where content on conscious water usage targeted the internal UM community, specifically staff and students who share the same facilities. While designed for the university, the social media posts garnered broader attention, helping to amplify the message of water conservation to a wider audience.



**Above:** Examples of UM students' social media content promoting water conservation and conscious usage on campus as part of the Superhero Iklim initiative

## Water Wise: Teaching Conservation Through Play at UM Early Childhood Education Center

Promoting conscious water usage through interactive programs at the Universiti Malaya Early Childhood Education Center, young children were engaged in hands-on activities designed to teach the importance of water conservation. This activity was organised by the UM Sustainable Development Centre (UMSDC). Through playful learning, the children participated in a fun exercise where they transported water from one container to another using a sponge, emphasising the value of water and how easily it can be lost. The activity was complemented by storytelling sessions that illustrated real-life scenarios of water wastage and the benefits of water-saving habits. By integrating play with education, the program effectively instilled foundational lessons on water conservation in an engaging and memorable way for young learners.



**Above:** Kindergarteners at UM learned about water conservation through play

## DIY Water Filters and Conservation: Promoting Sustainable Practices at Rumah No.2 Open Day

During the Rumah No.2 Universiti Malaya Open Day, hands-on activities promoted conscious water usage, focusing on water-saving techniques and filtration. Participants engaged in demonstrations that emphasised reducing water wastage in daily life. One key activity involved using water restrictor devices, which participants received in a toolkit to apply water-saving practices at home.

Additionally, participants were guided in creating DIY water filters using eco-friendly materials. This practical experience highlighted water conservation and purification, empowering attendees to take proactive steps in ensuring clean water and sustainable living.



**Right:** The UM community and the public participated in building DIY water filters



## Amplifying Voices for Water Conservation: UM Water Warriors and UMSDC as Water Ambassadors

Members of UM Water Warriors and the UM Sustainable Development Centre (UMSDC) have been elected as Wakil Duta Air Kita (Water Ambassadors) under the Kempen Air Kita, Tanggungjawab Semua, or #AirKita campaign. This campaign, organised by Forum Air, aims to proactively gather and amplify the voices of water users, with a special focus on addressing various water-related issues across Malaysia.

In collaboration with the NGO EcoKnights and the National Water Services Commission (SPAN), which oversees Malaysia's water and sewerage industry, UM Water Warriors and UMSDC have actively contributed by organising activities and delivering talks on several occasions. One notable example is Projek VOKAL (Voice of Climate Action Leaders), an EcoKnights initiative aimed at empowering youth to take leadership roles in water management and conservation. The program, held in August 2023, provided interactive capacity-building sessions on climate change and water-related issues, with members of UM Water Warriors participating as part of the panel.

Through a combination of sharing sessions, panel discussions, and group activities, participants in Projek VOKAL were encouraged to develop science-based communication materials that promote responsible water consumption in Malaysia. The initiative emphasises the importance of making complex water issues accessible to a diverse audience, translating scientific concepts into practical actions for everyday water conservation.

Read more about UM's role as water ambassadors in the #AirKita campaign: <https://www.airkita.org.my/wakil-duta-air/>



**Above:** UM's participation in the #AirKita campaign talk

## Promoting Water Consciousness: The Kita Jaga Air Challenge and Exhibitions

The Kita Jaga Air exhibition was held during the closing ceremony of the Kita Jaga Air Challenge in January 2023, and again at the Kuala Lumpur Eco-Film Festival in February 2023. The Kita Jaga Air Challenge, organised by the UM Sustainable Development Centre (UMSDC) in collaboration with Pengurusan Air Selangor Sdn. Bhd., was a 7-week competition that concluded in January 2023, drawing 429 participants. Throughout the competition, participants engaged in a series of weekly water conservation challenges aimed at raising awareness about sustainable water usage practices.

To extend the impact of the challenge, two exhibitions were held, designed to actively promote conscious water usage to a broader audience. These exhibitions showcased photo submissions and captions from participants, documenting their journey and efforts during the competition. The transformation of these submissions into a physical exhibition created a visually engaging narrative that resonated with the public, effectively spreading the message of water conservation beyond the competition participants to the wider community. By holding the exhibitions in prominent settings such as the closing ceremony and the Eco-Film Festival, the initiative reached diverse audiences, further embedding the importance of sustainable water habits in everyday life. The exhibitions not only highlighted individual efforts but also served as a platform for collective action, reinforcing the critical role of the community in preserving water resources for future generations.

**Top and middle:** The Kita Jaga Air exhibition at its closing ceremony

**Bottom:** Exhibitions at the Kuala Lumpur Eco Film Festival





## UM Water Warriors' Interactive Booth at the Program Duta Guru National Symposium

Members of UM Water Warriors were also invited to open an interactive booth during the Program Duta Guru (PDG) National Symposium. PDG is a collaborative initiative between Yayasan PETRONAS and the Ministry of Education Malaysia (MOE), facilitated by the Education Policy Planning and Research Division (EPRD), Teach For Malaysia (TFM), and Petrosains as implementation partners. This nationwide, multi-year program aims to enhance the capabilities of STEM teachers who serve schools predominantly attended by B40 students.

On 18 October 2023, the one-day event attracted approximately 200 visitors, primarily consisting of secondary school teachers from across Malaysia, who visited the UM Water Warriors' booth. During the event, attendees learned about various water conservation initiatives designed to promote sustainable practices in their schools.

The UM Water Warriors team held an engaging exhibition focused on water quality and water-saving techniques, aiming to inspire teachers to replicate and innovate similar initiatives within their own institutions. Interactive displays showcased practical strategies for water conservation, and educational resources that can be integrated into the classroom curriculum.



**Right (top and bottom):** UM Water Warriors members at the Program Duta Guru National Symposium