

Boosting Waste Management Efficiency in Slovakia's National Parks with IoT Solutions

Location: National Parks in Slovakia

Milesight Partner
Heliotics

Location
National Parks , Slovakia

Deployed Products
EM400-MUD(NB-IoT Version)*50

Applications
Smart Waste Management

Background

Slovakia's national parks are anchored by the country's most remarkable natural asset: its majestic mountains. Ranging from the alpine heights of the High Tatras to the rolling hills of Poloniny in the secluded northeast, these diverse mountain landscapes sustain the lifeblood of the nation—supplying pristine water and air, nurturing rich forests, and inspiring much of Slovakia's beloved folklore. The wonders of this landscape are effortlessly accessible in and around the national parks.

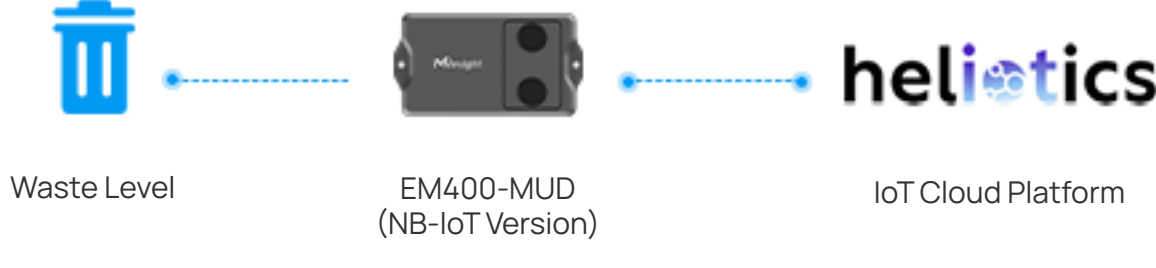
As the number of visitors has increased, waste management has become a vital part to guarantee not only natural environmental protection but also a positive visitor experience. Striking a balance between protecting resources and providing recreational opportunities is an ongoing challenge for most park and preserve managers. Our partner, Heliotics, in partnership with the Deposit Return System (DRS), a project was launched to improve waste management in Slovakia National Parks, focusing on tourist-generated waste.



Challenges

Slovakia national parks face several pressing challenges in managing waste effectively. High visitor numbers during peak seasons generate large volumes of trash. Wildlife activity, including bears, makes unsecured waste a safety concern. Most critically, bins are often located in remote or hard-to-reach areas, making access time-consuming and logistically demanding. Without visibility into actual bin fill levels, waste collection relied on fixed schedules—leading to frequent, often unnecessary trips. These inefficient routes increased operational costs and contributed to a larger carbon footprint in sensitive natural areas.

Solution



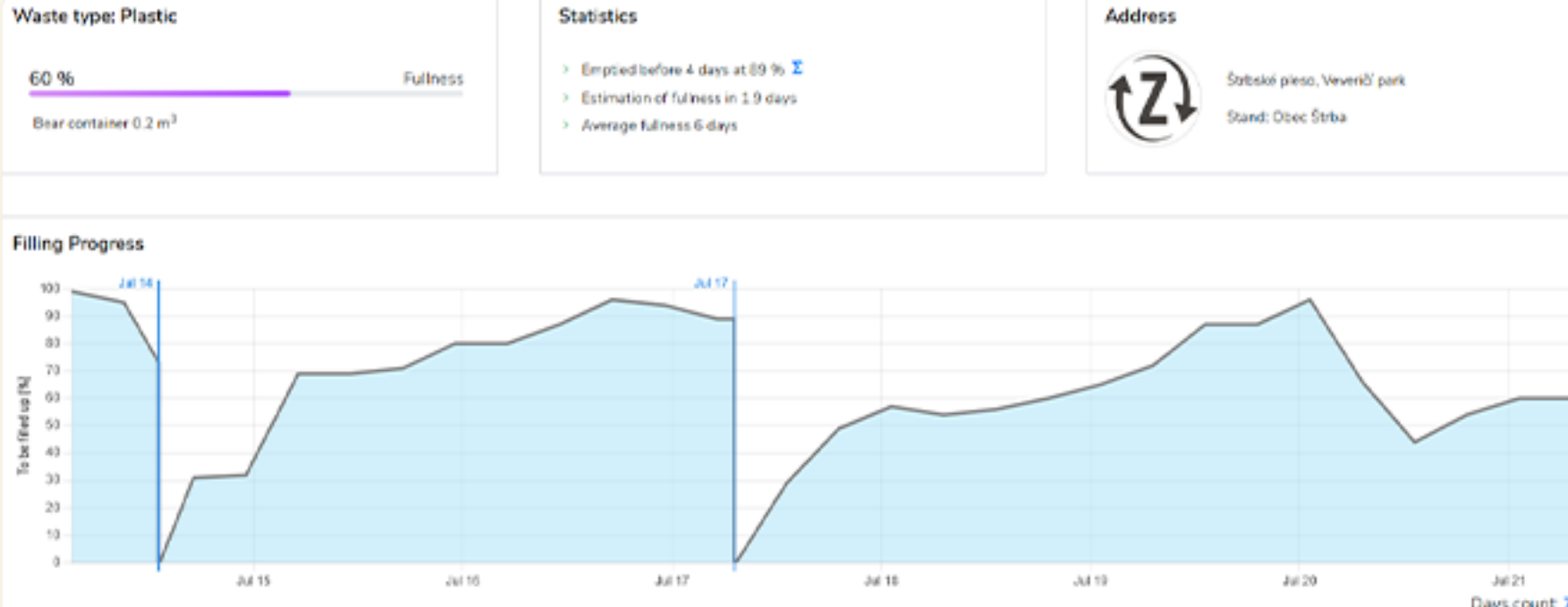
Efficient waste management starts with accurate, real-time data. The Milesight EM400-MUD Multifunctional Ultrasonic Distance Sensor offers smart sensors to monitor various aspects of waste management. Its ultrasonic distance detection technology allows for precise distance measurement and a minimal blind spot, making it ideal for smart waste management in medium and large trash containers. These sensors continuously track waste levels, ensuring reliable and accurate monitoring.

To address waste collection challenges in national parks, a tailored IoT solution was deployed through a specially designed interface called Vastum, running on the same system as Heliotics CORE. This platform enables real-time monitoring of container fill levels, helping reduce unnecessary trips, lower costs, and minimize environmental impact.



Vastum provides more than just raw data - it offers an intuitive, centralized dashboard where all container locations are displayed on an interactive map. Staff receive Smart Alerts via push notification, SMS, or email whenever a container approaches its capacity limit, allowing for faster response and avoiding overflow. Based on real-time data, the system also plans the optimal collection routes, ensuring that only full bins are collected, significantly cutting down on operational costs and reducing emissions.

#	%	Address	Waste type	◊ Avg. fullness [days]	12 Bin type	◊ Bin number	📍 Stand	🔍
🗑️	44 %	Odbočka pri Heliose	Plastic		10 Roller bin	TNP20250702123524	TANAP	📍
🗑️	32 %	K vodopádom 106	Plastic		0 Roller bin	TNP20250702123435	TANAP	📍
🗑️	58 %	Jaskyňa Gombasek	Plastic	9.1	Roller bin	TNP20250702123346	Slov. Kras	📍
🗑️	81 %	Jánska dolina	Plastic	0	Roller bin	TNP20250702123257	NAPANT	📍
🗑️	60 %	Jaskyňa Domica	Plastic	3.1	Roller bin	TNP20250702113801	Slov. Kras	📍
🗑️	54 %	Donovaly	Plastic	0	Roller bin	TNP20250702104211	NAPANT	📍
🗑️	22 %	Demänovská Dolina	Plastic	0	Bear container	TNP20240606145949	NAPANT	📍
🗑️	39 %	Dobšiná	Plastic	0	Bear container	TNP20240606145816	NP Slov. raj	📍
🗑️	100 %	Kráľova Hôľa	Plastic	0	Bear container	TNP20240606145625	NAPANT	📍
🗑️	66 %	Medová	Plastic	0	Bear container	TNP20240606145455	Poloniny	📍
🗑️	79 %	Správa NP Martin	Plastic	0	Bear container	TNP20230817133235	NP Veľká Fatra	📍
🗑️	100 %	Gaderská dolina	Plastic	0	Bear container	TNP20230817133150	NP Veľká Fatra	📍
🗑️	32 %	Hádelské sedlo	Plastic	0	Bear container	TNP20230817133122	NAPANT	📍



All this information is visualized in an easy-to-use interface that includes charts, real-time metrics, and historical trends. With advanced analytics, Vastum enables deeper insights into waste patterns and long-term optimization of collection strategies. Powered by NB-IoT, the sensors transmit data reliably even from hard-to-reach areas while maintaining low energy usage - a key requirement in remote natural reserves. This complete solution transforms waste collection into a smart, efficient, and environmentally responsible process.

Result

This solution has significantly improved waste management across seven Slovak National Parks. By leveraging Heliotics CORE, real-time monitoring enhances operational efficiency, optimizes waste collection schedules, and reduces unnecessary trips. With automated data processing and smart alerts, the system ensures cost savings, better resource utilization, and a cleaner environment for all.

Why Choose Milesight



For our deployments in national parks across Slovakia, we selected the Milesight EM400-MUD due to its rugged design, high durability, and precise ultrasonic level measurement ideal for harsh, outdoor conditions where maintenance access is limited. Its IP rating, long battery life, and reliable performance made it a perfect fit for use in remote locations like waste tanks and reservoirs.

Given the lack of LoRaWAN infrastructure in these areas and the challenging terrain, we opted for the NB-IoT variant of the EM400-MUD to ensure maximum signal stability without the need to install and maintain additional gateways. This approach allowed us to quickly roll out reliable monitoring across multiple locations, with all data streamed directly to our Heliotics CORE platform for real-time visibility, alerts, and long-term environmental reporting.



Milesight Partner

heliotics

About Heliotics

Heliotics provides comprehensive software solutions for production and industry monitoring, utilizing IoT technologies such as LoRaWAN® and NB-IoT. Heliotics CORE plug-and-play platform offers a highly customizable and scalable solution, integrating a range of smart sensors that empower manufacturers to efficiently monitor and manage their production operations.

Heliotics focuses on delivering seamless connectivity and real-time data analytics. Our platform streamlines monitoring, control and data integration while providing features such as predictive maintenance, downtime reduction, real-time alerts and advanced analytics for deeper insights.

With over a decade of experience across a wide range of industries, including automotive, logistics and machinery, we offer scalable, user-friendly solutions that help organizations optimize their processes, improve efficiency and make data-driven decisions.

About Deposit Return System

The Deposit Return System (DRS) is the official organization responsible for operating Slovakia's national system for collecting and recycling plastic bottles and metal cans. Its main goal is to reduce waste, prevent littering, and increase the recycling rate of beverage packaging across the country. DRS ensures that returned containers are properly collected, sorted, and processed in an efficient and environmentally responsible way.

