DRYAD

CONNECTING THE NATURAL WORLD

Case Study - Terraformation (Hawai’i)

Innovative Wildfire Detection Enhances Forest Restoration at Terraformation’s Hawai’i Site

Background

Hawai‘i’s native forests, home to unique ecosystems and wildlife, face an increasing threat from wildfires, particularly in dry regions. Terraformation, a native forest restoration company committed to addressing climate change through large-scale restoration projects, identified the need for advanced wildfire detection to protect its efforts. By deploying a pilot of Dryad Networks’ Silvanet technology at their Pacific Flight restoration site at Kaupalaoa, Terraformation is exploring the efficacy of the solution to enhance both the safety of the site and the surrounding community.

About Terraformation

Terraformation is on a mission to restore native forests globally by equipping forestry teams with training, technology, and access to capital. In Hawai‘i, Terraformation is focused on biodiversity and sustainability, operating restoration sites that serve as models for process innovation. Their Pacific Flight site at Kaupalaoa, located on the leeward coast of Kohala, Hawai‘i, spans approximately 45 acres and is pivotal to their mission of reviving native ecosystems.

Wildfire Threats in Hawai'i

The west side of Hawai‘i Island is particularly dry, with invasive grasses that can easily fuel wildfires. In recent years, fires on Hawai‘i Island have come alarmingly close to Terraformation’s Pacific Flight site, threatening not only the native dry forest restoration efforts but also the safety of employees and nearby communities. One such fire even caused significant damage to the home of a Terraformation employee.

Limitations of Previous Fire Monitoring Approaches

Before adopting Silvanet, Terraformation relied on manual monitoring by a site manager living on the property. This approach, while vigilant, lacked early detection capabilities crucial for preventing fires from escalating into disasters. Early detection of smoke or fire is essential for rapid response, and Terraformation needed a solution that could provide real-time alerts across their entire restoration site.

The Solution: Why Dryad’s Silvanet?

Terraformation chose Dryad’s Silvanet system for its well-designed, robust capabilities in early wildfire detection. The mesh network of sensors provides continuous monitoring for smoke and fire, offering peace of mind and a proactive approach to wildfire prevention. The scalability of Silvanet also allows for future expansion as Terraformation’s needs evolve.

Integration with Existing Systems

The Silvanet system was seamlessly integrated into Terraformation's existing Grafana environment, where they already monitor battery levels, water tanks, and photovoltaic systems. By importing Dryad's data into Grafana, Terraformation can maintain a unified monitoring platform, enabling them to analyze historical data beyond the standard 10-day window and have a fallback notification system.

Deployment Details: Technical Aspects

Each Dryad Silvanet wildfire sensor covers a 100-meter radius and can detect fires as small as 2 square meters during their early smoldering phase, i.e., within minutes of ignition. The sensor detects hydrogen, carbon monoxide and other gases at the parts-per-meter level, and avoids false positives with built-in artificial intelligence. Silvanet's embedded AI processes real-time data from gas sensors, ensuring not only early detection but also accuracy in distinguishing wildfire indicators from other sources.

Each sensor is solar-powered, battery-free, weather- and ultraviolet-proof (IP67 rating).

Silvanet Wildfire Senor

Up to 100 sensors connect to a solar-powered Silvanet Mesh Gateway using LoRa, the open standards long-range radio network for the internet of things (IoT).

Silvanet Mesh Gateway

Up to 20 mesh gateways connect to one solar- or mains-powered Silvanet Border Gateway, which connects to the Silvanet Cloud Platform using a built-in LTE radio, Ethernet adapter or satellite uplink where there is no mobile network coverage.

Silvanet Border Gateway

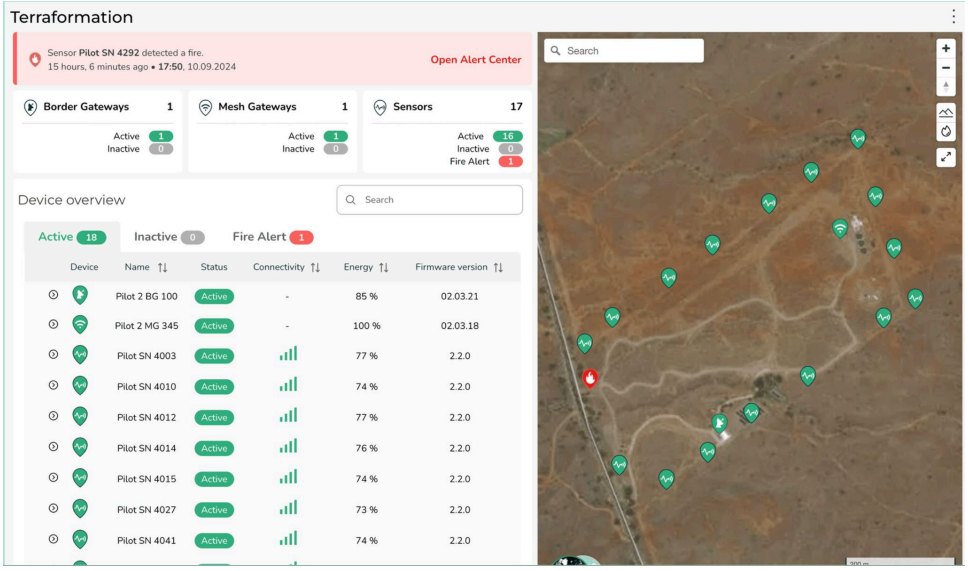
The Silvanet Cloud Platform provides comprehensive wildfire monitoring and device management.

Rapid Installation and Early Results

In August 2024, Terraformation received the Silvanet hardware, including 17 sensors, a Border Gateway, and a Mesh Gateway. The installation process was swift, allowing the team to deploy the gateways and sensors across the Pacific Flight site promptly.

Deployment app showing connectivity to Silvanet Cloud

Just a week after the calibration period, the system proved its efficacy. A smoke alert was triggered by one of the sensors near the main road due to nearby road construction involving hot tar. The on-site personnel quickly investigated and confirmed the source, validating the system's sensitivity and reliability.



Silvanet Site Management app - Device overview

Deployed Silvanet Wildfire Sensor

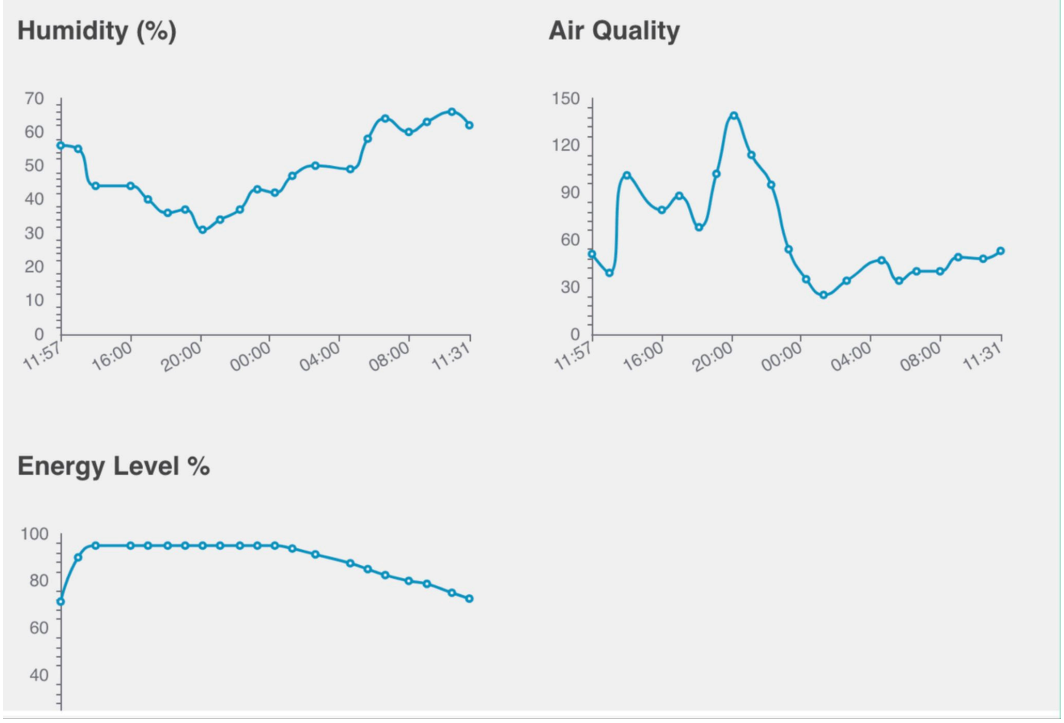
Benefits of Silvanet for Terraformation

Faster, More Efficient Response Times

The biggest advantage Terraformation expects is much quicker response times to wildfire threats. Early detection means they can act right away—whether it's notifying the local fire department or taking immediate steps on-site to prevent a fire.

Deeper, Data-Driven Insights

Silvanet goes beyond just detecting gases that indicate a fire. It also gathers important environmental data, like air quality, humidity, and temperature. This data gives Terraformation richer insights into the microclimate of their restoration site, enhancing their forest management efforts.



Silvanet Site Management app - environmental data

Environmental Protection

Terraformation's mission to restore biodiversity is closely tied to the fire prevention power of Silvanet. By stopping wildfires before they spread, they protect the native ecosystems they're working to revive, helping to fight climate change and preserve Hawaii's unique wildlife.

Community Benefits

If Silvanet detects smoke or fire nearby, Terraformation will alert the local fire department.This quick notification system will help firefighters respond faster, reducing the risk of devastating wildfires and protecting both residents and the environment.

Future Plans: Expanding Silvanet Coverage

Terraformation plans to extend Silvanet's coverage across additional areas of their Pacific Flight site, as well as to other restoration sites globally. As they expand their mission to restore native forests in fire-prone regions, Silvanet will play an integral role in ensuring the long-term protection of their efforts.

Conclusion

By adopting Dryad's Silvanet technology, Terraformation is raising the bar for proactive wildfire prevention in forest restoration. With Silvanet already showing promising results, Terraformation is confident it can improve wildfire detection and response on their site. As they continue to expand their reforestation efforts, Dryad's technology will play a crucial role in helping Terraformation restore ecosystems and fight climate change.

Testimonials

"We realized early on that developing our own smoke and fire monitoring system wouldn't give us the robust and reliable solution we needed. Dryad was already proven in the field, and their technology was a perfect fit for our site.

It's still early in the deployment process, but the system is already giving us peace of mind. We're a data-driven company, so having these data points on air quality, humidity, and temperature gives us a better understanding of the tiny climate changes on-site that we might not otherwise notice."

Bryn Lawrence, Site Operations Manager, Terraformation