ZABBIX

Monitoring Critical Services in Dams with Zabbix

A case study

Client

INDUSTRY
MINING

SIZE
12,000+ employees

LOCATION
BRAZIL (GLOBAL OPERATIONS)

A large mining company adopted Zabbix to monitor dams in high-risk areas, eventually using it to control more than 48,000 assets.

Challenge

A mining company operates dozens of tailings containment structures in Brazil. The critical nature of these operations involves not only industrial equipment but also the reliability of population alert systems.

Dam monitoring involves a combination of autonomous infrastructure and remote supervision. This setup allows for real-time tracking of the equipment installed on towers and ensures the proper operation of alert systems.

Each monitoring station is fully autonomous. Since they are not connected to the power grid, the towers operate using photovoltaic energy and battery systems and are interconnected through radio links.

Zabbix was configured to monitor voltage, charge status, radio connectivity, camera availability, and telemetry sensors. Any detected anomaly is automatically reported to the responsible team, with regional routing based on configured TAGs.

In addition to structural monitoring, Zabbix was set up to track the operation of mass evacuation systems. These systems include sirens and loudspeakers that must be activated in imminent risk situations, as established by Civil Defense standards and state regulations.

Solution

Each video monitoring tower installed on a dam operates with solar panels, batteries, communication radios, and multiple sensors — all essential components for continuous operation.

After adopting Zabbix as the main monitoring platform, the following data were recorded:

- **Active proxies: 71**
- **Monitored hosts: 48,300**
- **Monitored items: 8.8 million**
- **Active users: 2,200**
- **New values per second (nvps): approximately 5,900**
- **Estimated annual savings: BRL 8 million**
- **Monitored access points: over 7,500 (Brazil and abroad)**
- **Continuous improvement (Kaizen) projects based on Zabbix:** around 90% of initiatives

Replacing proprietary solutions with an open source-based architecture brought both technical and economic benefits, while expanding scalability and operational autonomy in monitoring activities.

Results

Implementing Zabbix for dam monitoring delivered the following results:

System failure prevention:

Early detection of anomalies in power sources, communication links, and sensors.

Automated alerts:

A reduced need for manual inspections, with intelligent fault routing via regional TAGs.

Public safety:

Guaranteed continuous operation of alarm systems in risk areas, with proven results in simulation tests.

Technical and financial efficiency:

An annual savings of BRL 8 million and consolidation of about 90% of projects based on the Zabbix platform demonstrate the tool’s strategic relevance.

Global-scale monitoring:

Distributed infrastructure across 5 continents and more than 20 countries, with centralized technical standardization.

Conclusion

The experience with Zabbix in the mining industry demonstrates how open source solutions can be applied to mission-critical environments with a high degree of reliability. The dam monitoring case reveals a systemic approach that combines automation, alternative energy, resilient communication, and real-time monitoring to protect human lives and operational integrity. This architecture can be replicated by other organizations seeking to combine operational excellence with sustainability and risk control.