

Minimising the risk of tailings dams failures through the use of remote sensing data



HR Wallingford is leading an international consortium, with UK and Peruvian partners to develop a UK Space Agency Project based in the mining region of Cajamarca, Peru. The project will provide a proof of concept for a more cost effective way to remotely monitor tailings dams and other tailings deposit areas utilising satellite technologies. The system will help reduce the risk of failure of tailings storage facilities and the consequent risk to population and damage to ecosystems downstream.

The challenge

Tailings dams are earth embankments used to store toxic mine waste and effluent. The failure rate of tailings dams worldwide over the past 100 years has been estimated to be more than two orders of magnitude greater than the failure rate of conventional water retention dams.

The failure of a tailings dam can result in loss of lives, large economic damages and irreversible damage to ecosystems, upon which many vulnerable communities rely for both their source of water and livelihoods.

There is a need for a cost effective service to monitor operational, closed and abandoned tailings dams and storage facilities, especially those in remote locations, and to help forecast potentially catastrophic failures.

Our objective

Our objective is to provide a proof of concept of a more cost effective way of remotely monitoring tailings dams and other tailings deposit areas utilising Earth Observation and Global Navigation Satellite System technologies combined with real-time in-situ devices and associated analysis and forecasting tools.

The project aims to

- > support the reduction of the environmental and social impacts of tailings dams and storage facilities failures in Cajamarca, Peru
- > influence the adoption of Earth Observation monitoring tools for tailings dams and storage facilities by engaging with key stakeholders
- > provide key stakeholders with an operational service to identify the probability of failure of tailings dam or storage facilities, the potential pollution incidents and to provide a recommended response.

What are we going to do?

We will monitor the displacement of infrastructures using a combination of Synthetic Aperture Radar (InSAR) and Global Navigation Satellite System (GNSS) technologies combined with real-time in-situ devices. Data analysis and forecasting tools will also be developed to issue alerts of unusual behaviour or weather conditions that could lead to a failure. The project is also investigating the use of Earth Observation (EO) optical data for monitoring pollution indicators.

The approach will be tested on a number of operational, closed and abandoned tailings storage facilities in the mining region of Cajamarca in Peru. It is currently challenging for governments with limited resources to be able to effectively monitor these sites.

The project started in March 2018 and will end in October 2020.

For further information, visit our website:
www.tailingsdams.info

The project contributes towards two of the United Nations Sustainable Development Goals (SDGs):



SDG 6.3: Improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally.



SDG 12.4: Achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil to minimize their adverse impacts on human health and the environment.

The project consortium

The project consortium is made up of UK partners: HR Wallingford leading the project, Telespazio VEGA, Siemens Corporate Technology, Satellite Applications Catapult, Oxford Policy Management, and the Smith School of Enterprise and the Environment at the University of Oxford; and Peruvian partners: Ciemam, the National Foundation for Hydraulic Engineering, and the National University of Cajamarca (School of Hydraulic Engineering and Faculty of Engineering).

The project is funded by the Global Challenges Research Fund under the International Partnership Programme, a 5 year programme run by the UK Space Agency seeking to use space solutions to make a positive and practical impact on the lives of those living in emerging and developing economies.

