

# Fight against climate change: "Environmental Security" to reduce & manage disaster risks





# Watching River Pollution (Radionuclides and Heavy Metals): How to Avoid the Impact of Climate Change on Populations and Economy in Central Asia



Funded by the EU

SDGs



- This project is implemented in Central Asia, where water resources are critical after the legacy of the uranium mining tailings of the former Soviet Union.
- Water resources help maintain life in general, avoid population migration, and prevent humanitarian crises. Countries covered are **Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan**.
- The main water resources in these countries are transboundary rivers, Amu Darya and Syr Darya. Water security and safety of these transboundary rivers is a common challenge in the region.



Introduction

Purpose

Scope Of Activities

Outcome

ENG | 日本語





# What does water river monitoring stand for in Central Asia?

- After the Fukushima disaster in Japan, nuclear pollution spread in the air and seawater. Luckily, the ocean's vast water helped absorb most of the pollution, making it easier to manage.
- In Central Asia, rivers are the only source of water . People, livestock, crops, and food safety all depend on these rivers. Water comes from sources and melting glaciers. The ice of the glaciers imprisons, in some cases, highly polluting dust from the former uranium sites from the Soviet era.
- Water is essential for all living things.
- Central Asia, like Japan, has mountains and is prone to earthquakes. There are also gold, copper, and uranium mining sites in the region. Earthquakes can cause natural disasters that lead to water pollution.
- This cycle is called Natural Disaster Risk.





# Setting up a digital tool for environmental security in the frame of climate change.

- At ISTC, one of the major activities is to introduce technologies and innovations for capacity building in prevention preparedness of official bodies and other key stakeholders to avoid, at best, and reduce, at worst, the impact of disaster on the populations and economies of countries.

## Digital tool—SAVE(Space Analytics for Visual Environments)



This is known as Environmental Risk Management. In this project, an innovative tool called SAVE(Space Analytics for Visual Environments) has been developed by the ISTC Technology Team. This tool uses artificial intelligence (AI) to support observation and assess how pollution starts and spreads. It also helps monitoring floods and keep track of important buildings that could be affected by flooding.



SAVE is great for early responders, as it helps them anticipate problems and prepare better for emergencies.



This way, environmental risks can be detected at an early stage, using data from space, so that we can better prepare for disaster and reduce the impact on populations, livestock, and food safety.





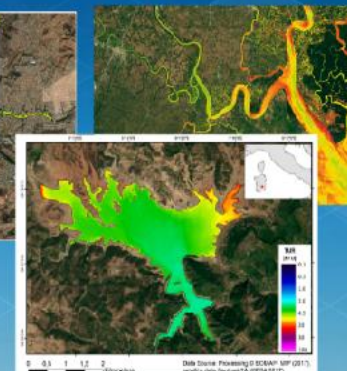
# How Earth Observation Data Can Make Our World Safer

- Satellites, a powerful tool for collecting data from the sky above, are being used in this project. Digital maps can be created from satellite data, which resemble video games but actually represent the real world.
- Ground stations deployed in advanced countries collect this digital data. These stations are the big antennas you might see in some places in Japan.

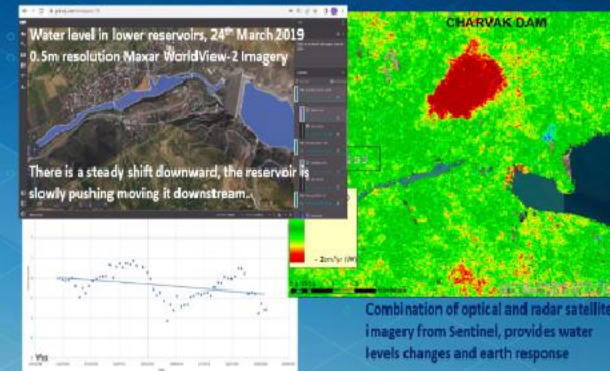
- This data can be turned into a digital map of the rivers, using different colors to indicate pollution levels.
- The same information is also used to monitor dam movements and check for possible collapse. All these features will be available on ISTC digital platform, helping specialists make the right decisions.



- ❖ Turbidity
- ❖ Chlorophyll-a
- ❖ Temperature
- ❖ Water extent
- ❖ Mineralization



Spatial image of water monitoring pollution.



Spatial image of Dam movement monitoring.

ISTC is an Associate Partner of the European Spatial Agency (ESA) for the Program "European Resilience from Space" (ERS).

## PART 02



# How the Digital Platform SAVE (Space Analytics for Visual Environments), an ISTC Decision-Support Tool, works for Prevention, Preparedness, and Response.



## Step 1

### Tasking Definition for Satellite Data

Tasking for satellite data is defining what is needed for satellite observations. This involves selecting the area, time, data type (like imagery), and required resolution to best use satellite resources for specific needs, such as environmental monitoring, disaster response, or agricultural assessment.



SAVE covers most cases of existing disasters, such as flooding, fire monitoring and fire spreading, earthquake monitoring, and later, an early warning system for fires, earthquakes, and water pollution spreading.



## Step 3

### Data Merging for Safety Preparedness

The analysts' work is to combine data and create a digital terrain map. This is done by analysts from different countries' space agencies or the ISTC Tech team, based on available skills. Civil protection specialists share details about critical infrastructure in their countries, such as dams, reservoirs, hospitals, schools, power lines, pipelines, and industrial facilities. Once data is geolocated, civil protection and risk assessment specialists analyze it to create simulations for first responders to develop contingency plans and prepare effectively.

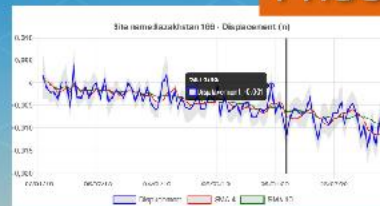
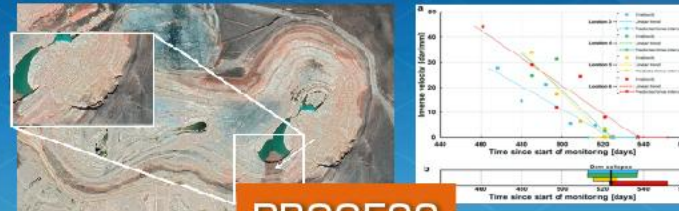
## Step 2

### Merging Satellite Data into Database

The data is merged into a database, and land cover is visualized. The Digital Elevation Model provides a 3D view of the terrain, useful for various applications offered by ISTC. We then apply our algorithms to achieve the expected results.



## PROCESS



**Kazakhstan.**  
Polluted mine tailings slide



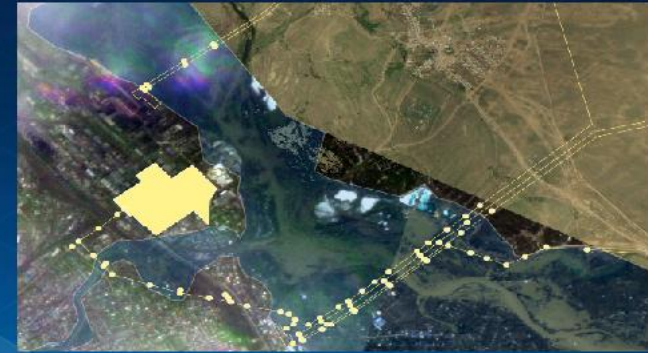
**Brazil.**  
Collapse of a reservoir of polluted mine tailings



# User-friendly tool for water quality monitoring

The project aims to help official organizations in four countries (Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan) monitor water quality every day. It uses a user-friendly tool that shows satellite data with AI technology. This makes it easier to understand what's happening and helps them make quick decisions to prevent humanitarian and economic crises.

*Aktobe region. April 2024, Water expand after flooding of melting glaciers. Visual identification of the power line under the water* ▶



## Here are the main outcomes of the project:



**Better Water Monitoring:** the project will set up systems to check the water quality in the region, ensuring it's safe from things like radioactivity and heavy metals.



**Health and Safety:** With these improvements, governments will better protect people, livestock, biota, and the environment from pollution and harmful substances, especially during natural disasters worsened by climate change.



**Preparedness:** Overall, the project will help first responders better prepared and respond more effectively to any emergencies related to natural disasters.



*Aktobe region. April 2024, Water expand after flooding of melting glaciers. Visual identification of the power line*

