

Improvement of Operation, Maintenance and Safety of 6 large Dams in Kosova

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Abstract

The Kosova Government is assessing the safety and maintenance priorities of 6 large dams built between 1960-1982 for purposes including irrigation and hydro energy. The dams have a total reservoir volume of 555 million m³ and water surface of 23 km². The study covers a brief description of each dam, inspection results, stability analysis, risks to urban areas, necessary investments for rehabilitation and safety, and proposed action plans.

Introduction

The presentation aims to enhance the operation, monitoring, and safety assessment of six large dams in Kosova, which provide water supply to approximately half of the population. The study scrutinizes the dams' existing conditions, long-term behavior, stability, and flood risks. Our team of experts conducted a site visit, reviewed previous studies, and created guidelines for dam passports and emergency plans. The study assessed the dam monitoring system and suggested measures for future investments, real-time monitoring, and safety enhancement. The study analyzed the flooded areas in terms of surface, water depth, and risks to human life.

General data on 6 large dams

- **Batlava Dam** is an embankment dam built with a height of 46.45 meters, a crest length of 288 meters, and a discharge capacity of 534 m³/sec. Reservoir has a water volume of 40 million m³ at a maximum level of 635.00 meters above sea level.
- **Badovc Dam** is a 52-meter rockfill dam with a clay core creating a 26.59 million m³ reservoir primarily used for water supply.
- **Perlepnica Dam** is a 40m-high rockfill dam with a clay core creating a reservoir of 4.2 million m³ at 596m above sea level for water supply. Discharge system is of surface longitudinal overflow type and the water intake system includes a water tower and two pipes.
- **Radoniqi Dam** is a 61m-high rockfill dam with a clay core and a crest length of 770m, creating a reservoir with a volume of 102.0 million m³ at the normal level of 456.00m above sea level.

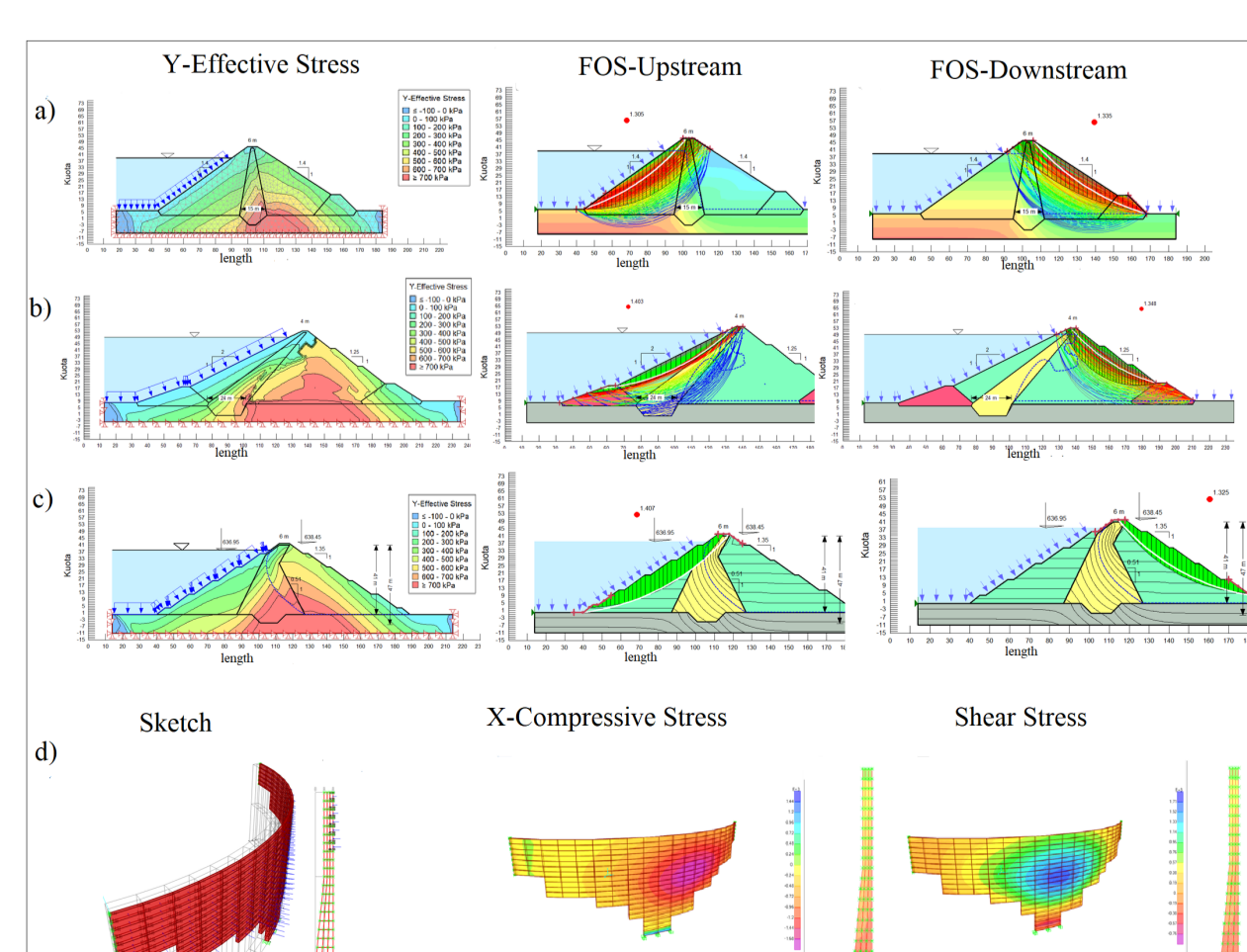
- **Ujmani Dam** is a 101-meter-high rock-fill dam with a clay core and a crest length of 519 meters, creating a reservoir of 370 million m³ of water volume at a normal level of use. Supplies electricity to the 35 MW Ujman HPP and provides water for downstream irrigation. Discharge system is of surface overflow type, and the water intake system is of the final discharge type.
- **Livoqi Dam** is a 23-meter-high concrete arch dam with a crest length of 90.6 meters, creating a reservoir with a projected water volume of 670,000 m³ at a maximum level of 599.00 meters above sea level. Current volume of the catchment is only 280,000 m³, rendering it ineffective for irrigation.

Long Term behaviors of 6 large dams

A study of six large dams included field visits and technical data analysis to evaluate their long-term behavior. The dams appear to be in good technical condition, but maintenance and monitoring have been neglected for over 20 years, and water volumes have not been measured for 30 years. Downstream risk has increased, and leakage should be further investigated. Repair and rehabilitation works are necessary, along with the installation of real-time monitoring systems.

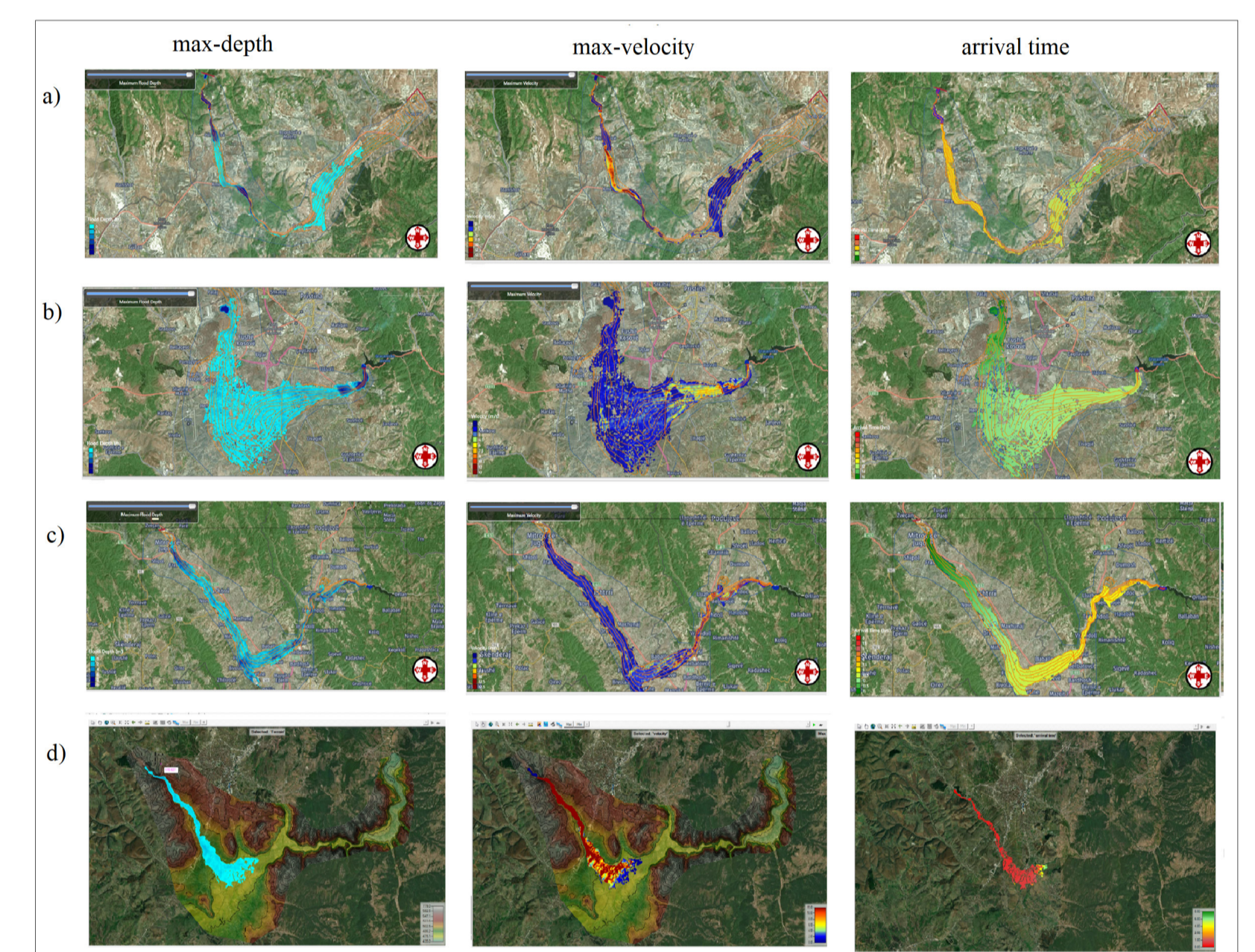
Stability analyses of four large dams

Our team conducted a thorough safety assessment of four dams using geotechnical and seismic data. We analyzed dam stability under different conditions, including earthquakes with recurrence periods of 475 and 975 years. Our Static and Dynamic Stability Analysis employed various design criteria, including seepage analysis and effective stress evaluation.



Risks analyses and Emergency preparedness plans

Experts analyzed flood wave data by considering historical data, technical and boundary conditions, maps, potential inflows, and three phases of modeling. The analysis revealed that the five high-risk dams, if failed, may endanger 50,000 inhabitants and flood over 12,000 hectares. All large dams need special attention, monitoring systems, emergency plans and alarm systems.



Conclusions and Recommendation

The 6 large dams in Kosova are old, unmaintained, and lack proper monitoring and safety measures. There is a lack of legal frameworks, monitoring systems, and data reports, which pose significant risks to the population downstream. Climate change also exacerbates the risks. To address these issues, the proposed measures include:

- resuming control and periodic monitoring of dams,
- completing and updating of legal frameworks,
- modernizing monitoring processes,
- increasing staff training,
- monitoring precipitation and water levels in real-time,
- investing in repairs and rehabilitation,
- Preparing emergency plans and installing alarm systems.



Radoniqi Dam