

Geological hazard evaluation for dams constructed at Drin valley



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1 Introduction

The Drin is a key component of the Albanian economy. Other than hydro power production, the cascade provides a variety of public services including tourism, water sport/transport, aquaculture, fishing, flood protection, and lately has been considered solar energy production as well. It has a basin area of 11,756 km², and an estimated discharge of 352 m³/s. Three hydropower facilities produce most of Albania's electricity power, named Fierza, Komani, Vau i Dejes, with 6 dams constructed over this cascade.

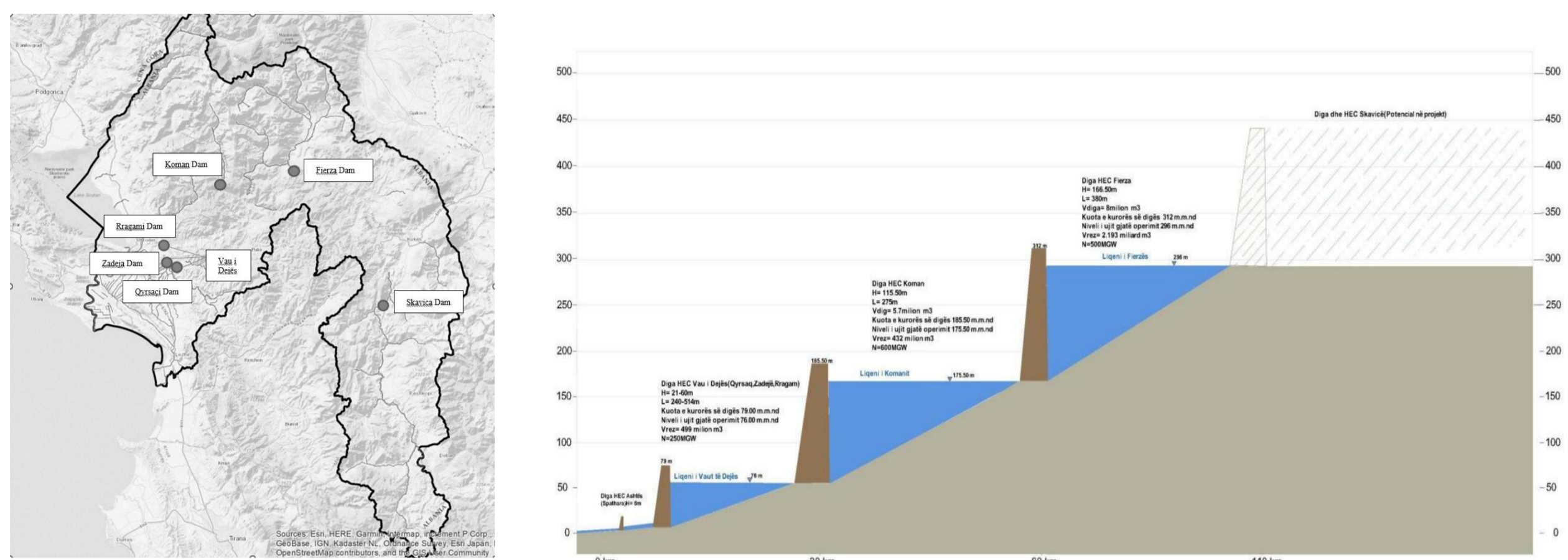


Fig. 1: General overview of dam location, types, technical data representation

2 Issues and remediation measures

- Rockslides and landslides, present on the slopes near all above-mentioned dams.
- Erosion phenomena, from surface waters and the waters of the Drin river itself.
- Leakage of water from the reservoir of each dam under the foundation of the dam or from the side slopes.
- Filling of reservoirs with alluvial deposits, (sedimentation).

- mapping,
- drillings,
- sampling,
- field testing and laboratory testing
- continuous monitoring and digital devices installation

Fig. 2: Representation of some of the works performed during the years over the dams at Drini river cascade

Tab. 1: Summary of the typical geotechnical parameters at dam areas

Dams/ Parameters	GSI	γ (kN/ m ³)	c (MPa)	ϕ (°)	Es (GPa)	E (GPa)	UCS (MPa)	G (MPa)	ν
Fierza Dam	45	25.8	0.42	36.5	28.94	34.56	28.6	345.7	0.36
Porava landslide	54	27.9	0.58	38.7	45.79	43.28	45.7	542.8	0.35
Komani Dam	52	26.5	0.48	48.4	38.47	42.59	65.8	578.4	0.25

4 References

Albanian National Committee of Large Dams, Tirana, Albania
A.L.T.E.A. & GEOSTUDIO 2000. 2012-2022. Geological & geotechnical study for Hydropower Plants at Drin River. Albania
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3 Lessons learned

After a careful study and evaluation process of the current condition of the large dams built over the Drin River cascade, their monitoring and maintenance, as well as their safety assessments and geohazard aspects the authors have concluded the following main geological hazards:

- Digital devices and tools installation to serve monitoring purposes of sliding events, rockfalls, water level measurements, leakage, seismic events etc...
- Detection, identification & protection of areas which can easily erode.
Riverbanks, the outside parts of the dams
- Detailed geological study at Komani dam to locate the exact place from where the groundwater flows and to prevent it.
- Bathymetric measurements to estimate the amount of solids deposited in the dam reservoirs from their construction period, controlling the sedimentation process.
- Preserve the water into the reservoirs by improving the sides of the dams with impermeable areas.
- Keep an eye to the tectonic activity
- Asset evaluation and management for all large dams and reservoirs of the Drin River cascade.
- Finding new green, modern solutions for energy production
- Better collaboration between professionals, geologists, geotechnical engineers, environmental engineers, electricians, and public sector.



Fig. 3: Geohazards present at Komani and Fierza dams' area

Considering the above-mentioned risks, the high risk for the people in the urban downstream area of Drini river Cascade and since all the large dams built over the cascade have a major role on the Albanian economy, the dam operator must develop a modern operational program, insuring dam's safety, continuous monitoring systems, risk control and assessment and asset evaluation.