



NEXUS ASSESSMENT IN THE DRIN BASIN

KEY FINDINGS FROM THE WATER-ENERGY MODELLING ANALYSIS





Integrated water-energy modelling and the HPPs/floods interface

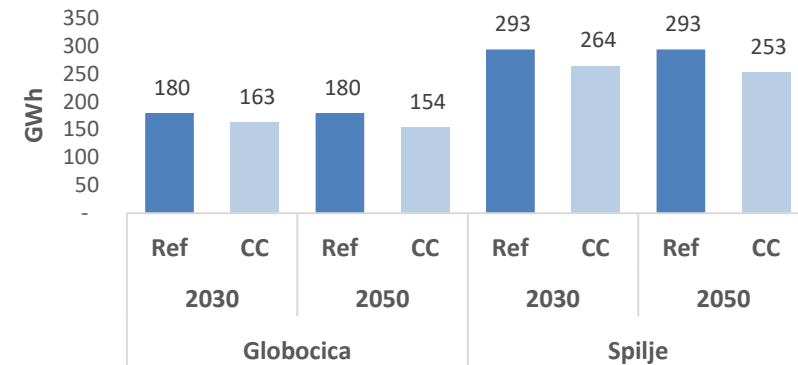
- Regional Electricity model linked to Panta Rhei to explore effects under different scenarios
- Assessing changes in flood-related damages under HPP Flood Protection scenario
- Model presented to Focus Group of energy experts and during Capacity Building Workshop (June-July 2021)

Climate Change scenario (CC):

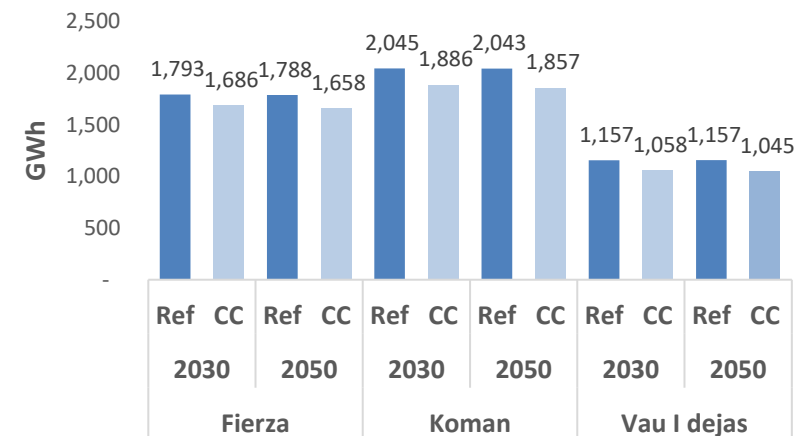
- The changes in electricity generation in North Macedonia will drop by 10% in 2030 and 14% in 2050.
- In Albania the drop will be about 7% in 2030 and 9% in 2050.

Losses in (GWh)	2021-2035	2021-2050
Globocica	17	20
Shpilje	27	32
Total ELEM	44	52
Fierza	93	108
Koman	154	167
Vau dejas	95	102
Total KESH	342	377

Change in Electricity Generation (GWh) in North Macedonian HPPs



Change in Electricity Generation (GWh) in Albanian HPPs



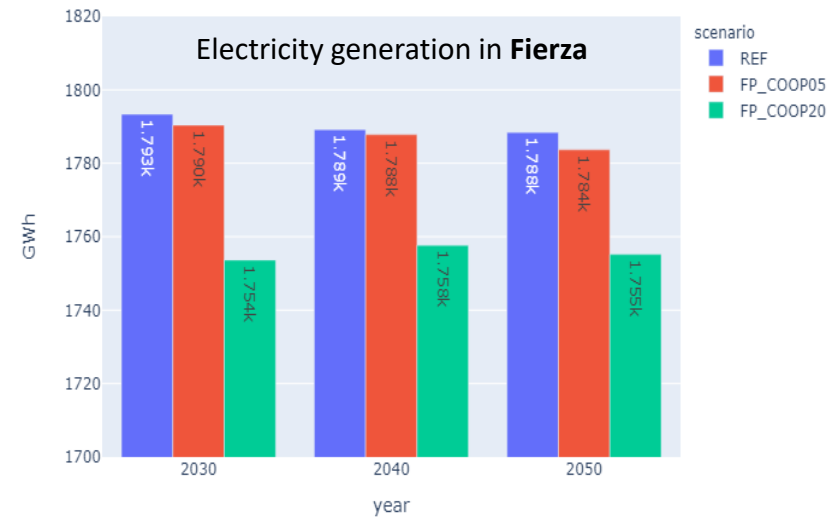
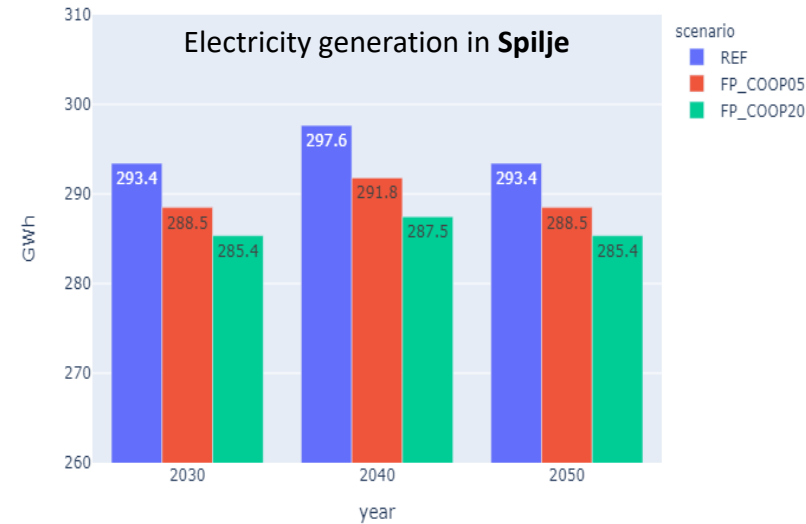
Flood Protection Scenario

- Explore the impact of increasing the buffer volume by 20% in key reservoirs on:
 - Electricity generation from HPPs
 - Flooded area downstream and related damages
- Key reservoirs: Spilje (MKD) and Fierza (ALB)
 - Large storage capacities & significant impact in terms of flood control
 - Other reservoirs have small storage capacity and do not affect the flood management in the basin.

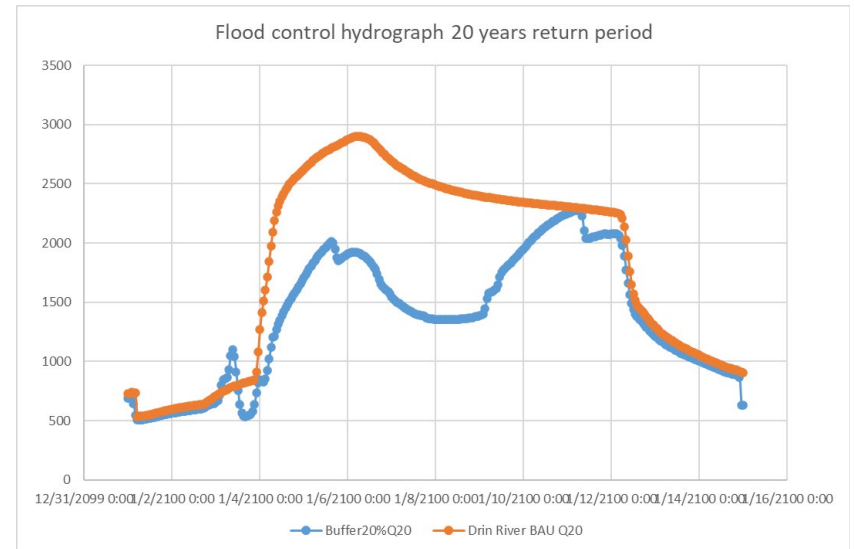
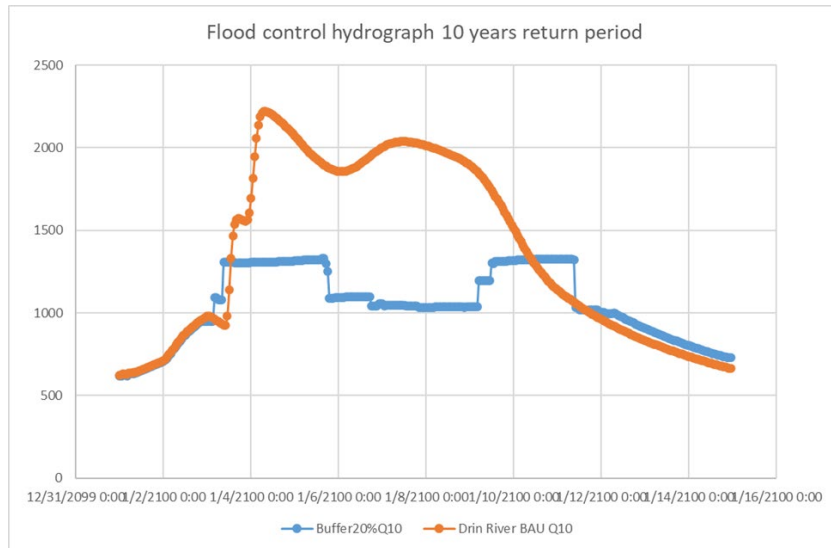
Flood Protection Scenario

- Changing the operational rules in Spilje and Fierza will have minor impact on electricity generation.

Dam	Spilje		Fierza	
Scenario	+5%	+20%	+5%	+20%
Mean annual change in generation (GWh)	- 5	- 8	- 5.4	- 34
% change in generation	- 1.7 %	- 2.7 %	- 0.3 %	- 1.9 %



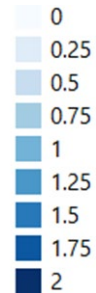
Flood Protection scenario:



Flood Protection scenario:



Water Depth BAU Q10



Water Depth Buffer 20% Q10

Source: UNDP model runs

Flood Protection scenario:

- Buffer 20% Q10 difference in water depths with BAU Q10

Source: UNDP model runs

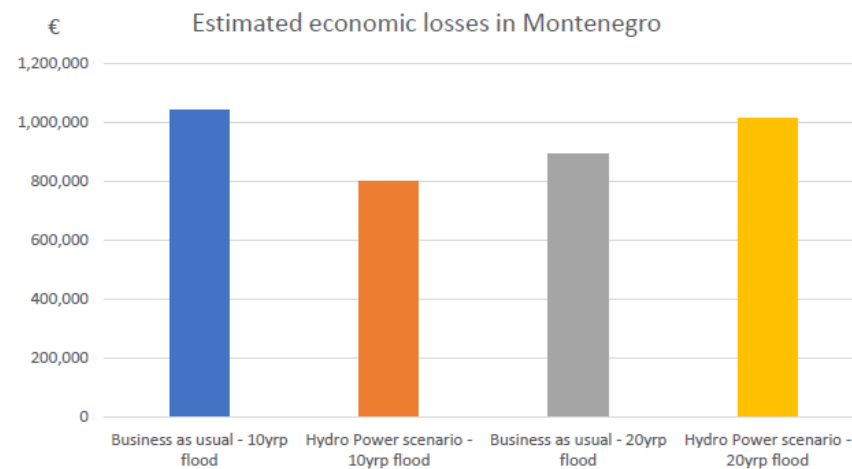
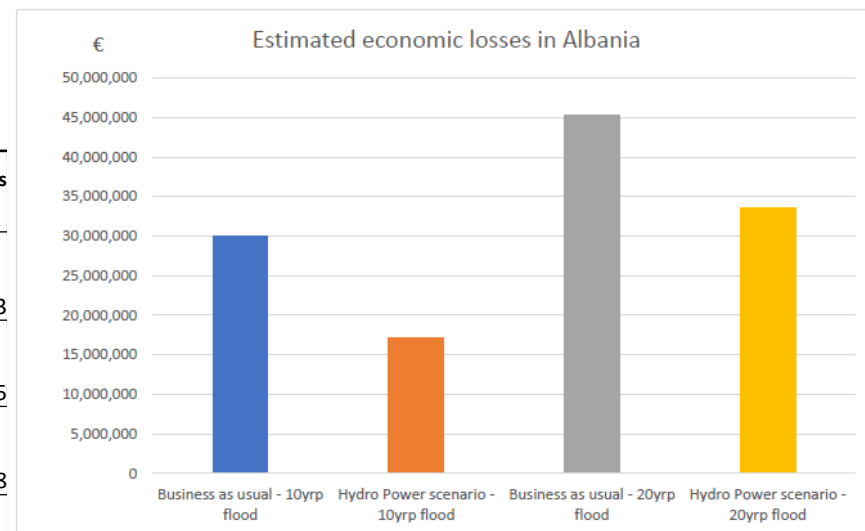


Flood Protection scenario:

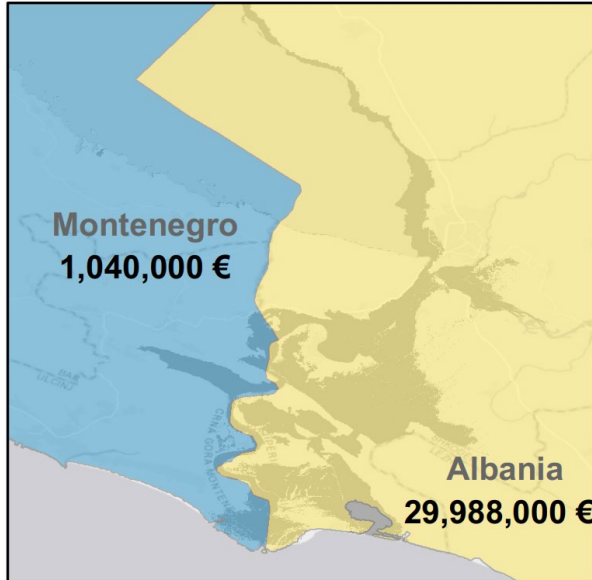
Loss type	BAU-10yrrp	BAU-20yrrp	HP-10yrrp	HP-20yrrp	BAU-10yrrp vs HP-10yrrp	BAU-20yrrp vs HP-2
Building structure (€)	14,491,814	26,895,007	5,156,529	16,854,414	-9,335,285	-10,040,593
Building movable (€)	7,487,219	13,794,372	2,730,085	8,718,737	-4,757,134	-5,075,635
Building damages (structure + movable) (€)	21,979,033	40,689,379	7,886,614	25,573,151	-14,092,419	-15,116,228
Agricultural (€)	5,038,987	6,029,962	2,966,198	5,268,291	-2,072,789	-761,671
Roads (€)	2,969,765	3,243,634	1,601,321	2,762,230	-1,368,444	-481,404
All economical loss summary (€)	29,987,785	49,962,975	12,454,133	33,603,672	-17,533,652	-16,359,303
People in danger (Persons)	205	244	141	213	-64	-31
Loss of life (Persons)	6	6	4	6	-2	0

Summary table of loss calculation results for Albania

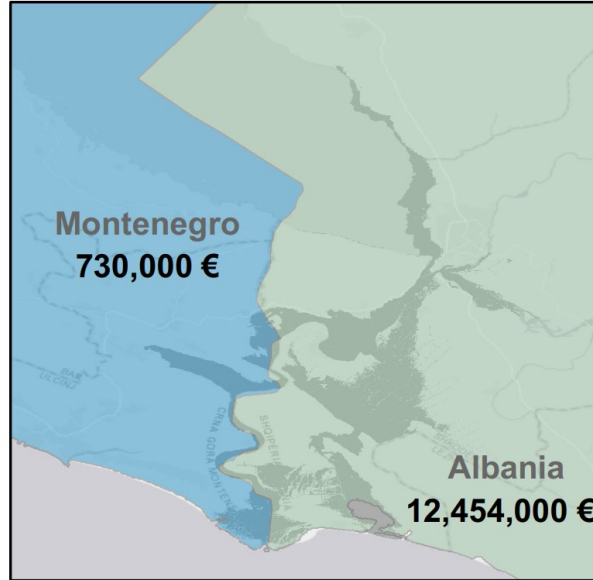
Source: DHI Assessment



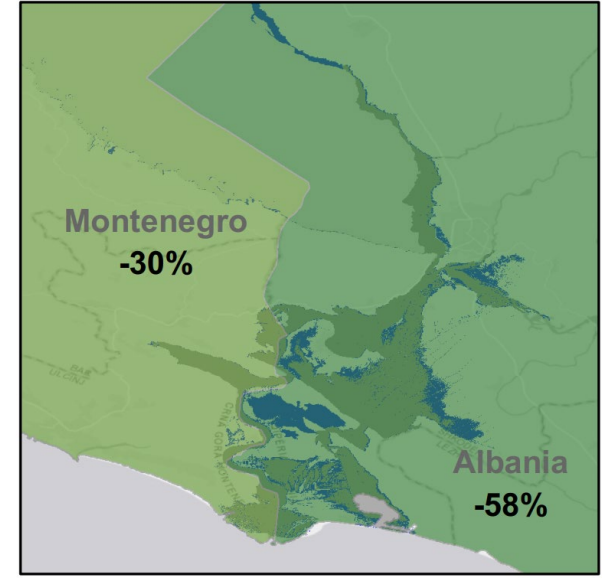
Flood Protection (FP) scenario:



Damages of 10-year return period flood event
BAU scenario



Damages of 10-year return period flood event
HP scenario



Difference in the estimated damages between
the 10-yrp BAU and the 10-yrp HP scenarios

Estimates of economic damages

Source: DHI Assessment

Key findings & Highlights

- Climate change may lead to 6-14% decline in hydro generation in the Drin basin in the coming two decades.
- The construction of Skavica HPP is expected to benefit flood mitigation and energy independency
 - additional modelling needed to quantify based on actual data
- Increasing the buffer volume of HPP reservoirs by 20% would have minor impact on security of electricity supply.
- The additional 7-34 Mm³ of volume would lead to considerable savings in terms of flood damages for small to medium floods.



Thank you for your attention!