THE INTERFACE OF HYDROPOWER / FLOOD MANAGEMENT IN THE DRIN BASIN

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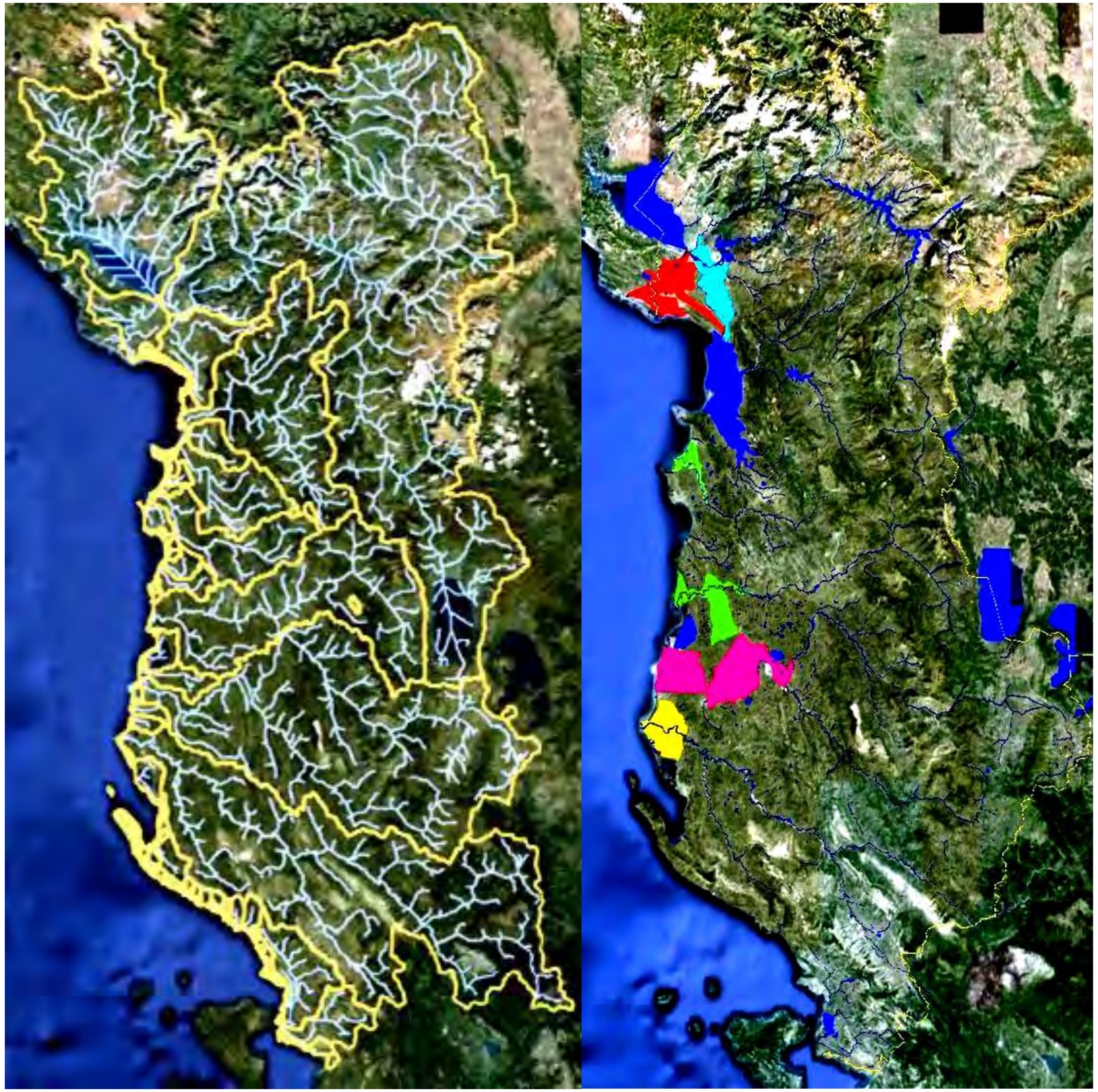
Floods from Albanian Rivers

- In Albania, the rivers constitute the highest flood risk, whose effects extended to 130 000 hectares of land.
- The floods are generally of pluvial origin and are occurring in the period of November – March, when the country receives about 80-85 % of annual precipitations.

The largest floods have appeared in the low western area of the country but small rivers and the torrents cause Flash Flooding too. As the urban development of the floodplain increased, the damage caused by flooding also increased. The conception of the flood-protection measures has been derived from an analysis of floods in the area of these rivers since 1962-1963. After the flood of these years, protection structures were constructed in some rivers. These structures were constructed with an average return period of 1%.



In January and December 2010 the flood caused major damage and disruption over a wide area.

The flooding of January 2010 in the district of Shkodra was at the time considered the biggest emergency event.

Some 10,400 ha of land was inundated and about 2500 houses and 4800 people were evacuated.

After being forced to release water, the discharge increased to 2450 cubic metres per second while the maximum capacity of Buna River is only 1600 cubic metres per second.

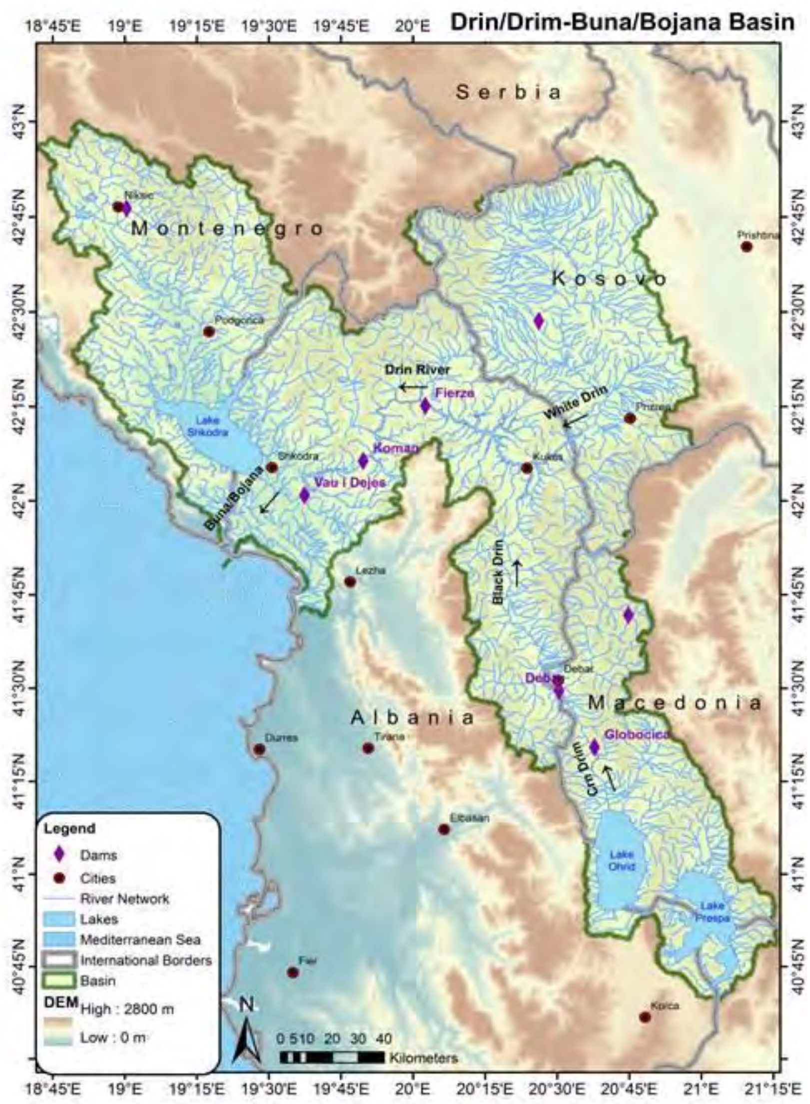
Another similar situation was in march 2018 in Buna River.

Historical Floods from Buna River

Drin deviation to Buna River

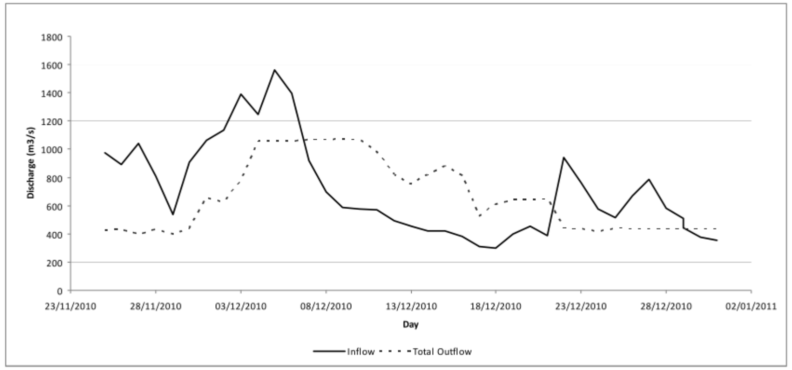
Flood of January 2010

DRINI-BUNA CATCHMENT AND ITS RIVER-DAM SYSTEM



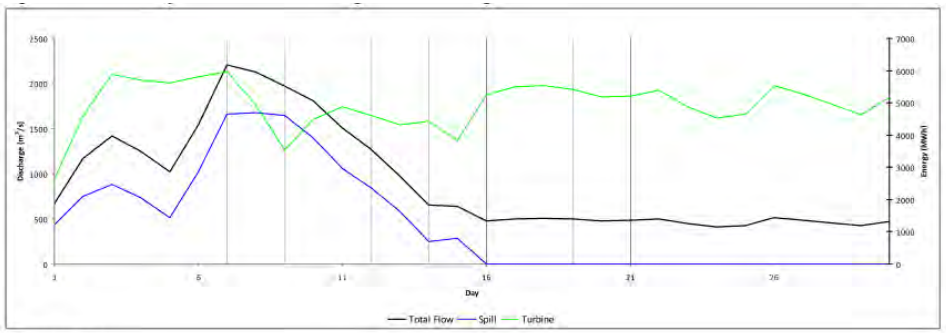
Study / Source		Fierze HPP		Komani HPP		Vau-i-Dejes HPP	
		WL (masl)	mio. m³	WL (masl)	mio. m³	WL (masl)	mio. m³
KESH document on regulation rules of Drini cascade (1988)	Dam crest	312	n.a.	185	650	79	700
	Max OWL	295	2620	175	530	76	560
	Min OWL	240	n.a.	170	435	74	540
	Active storage		2300		62,3		44

The Inflow and Outflow for Fierza Reservoir during December 2010



Source: KESH

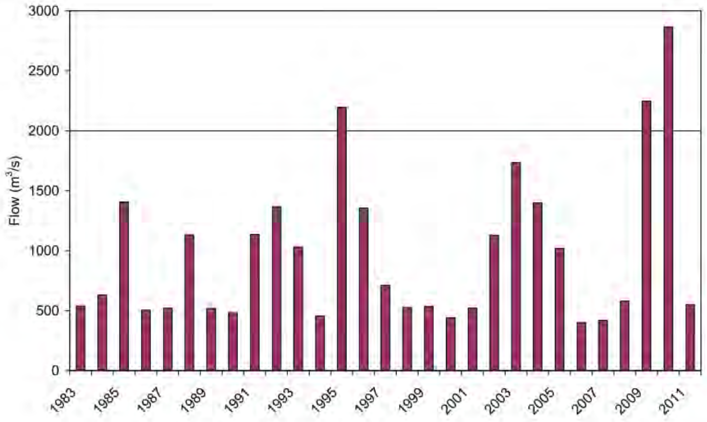
Vau Dejes Outflow and Power generation during December 2010

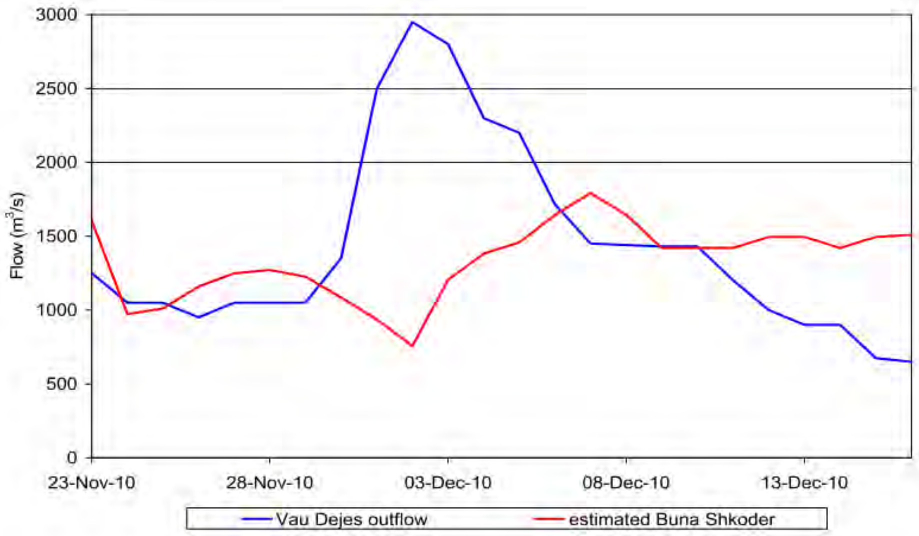


Source: KESH

(Source: Mott MacDonald)

Annual Maximum Flows from Vau Dejes Reservoir



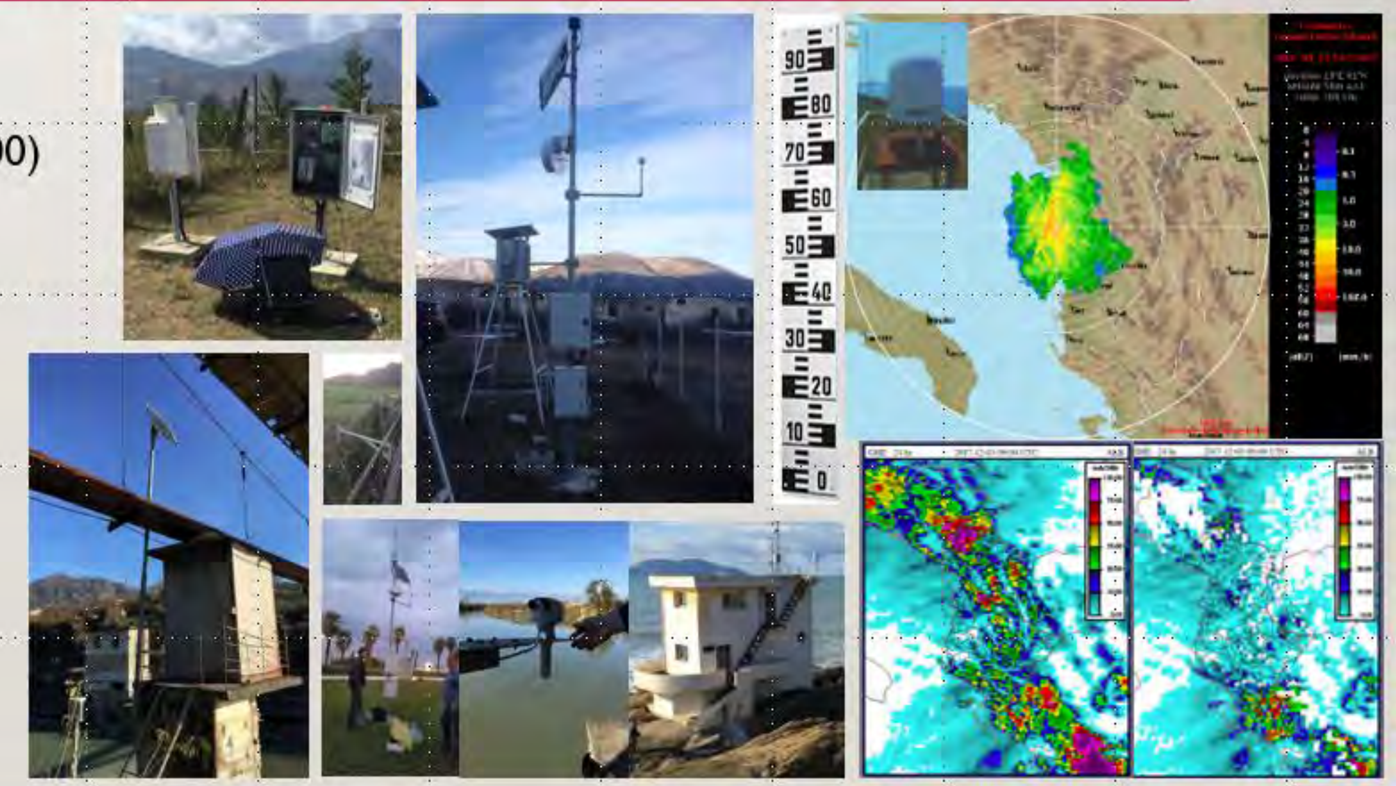


Discharge for Drini and Buna Rivers and impact from the dams

Introduction to the Institute of GeoSciences, Energy, Water and Environment

NATIONAL CENTRE FOR FORECAST AND MONITORING OF NATURAL RISKS (IGEWE)

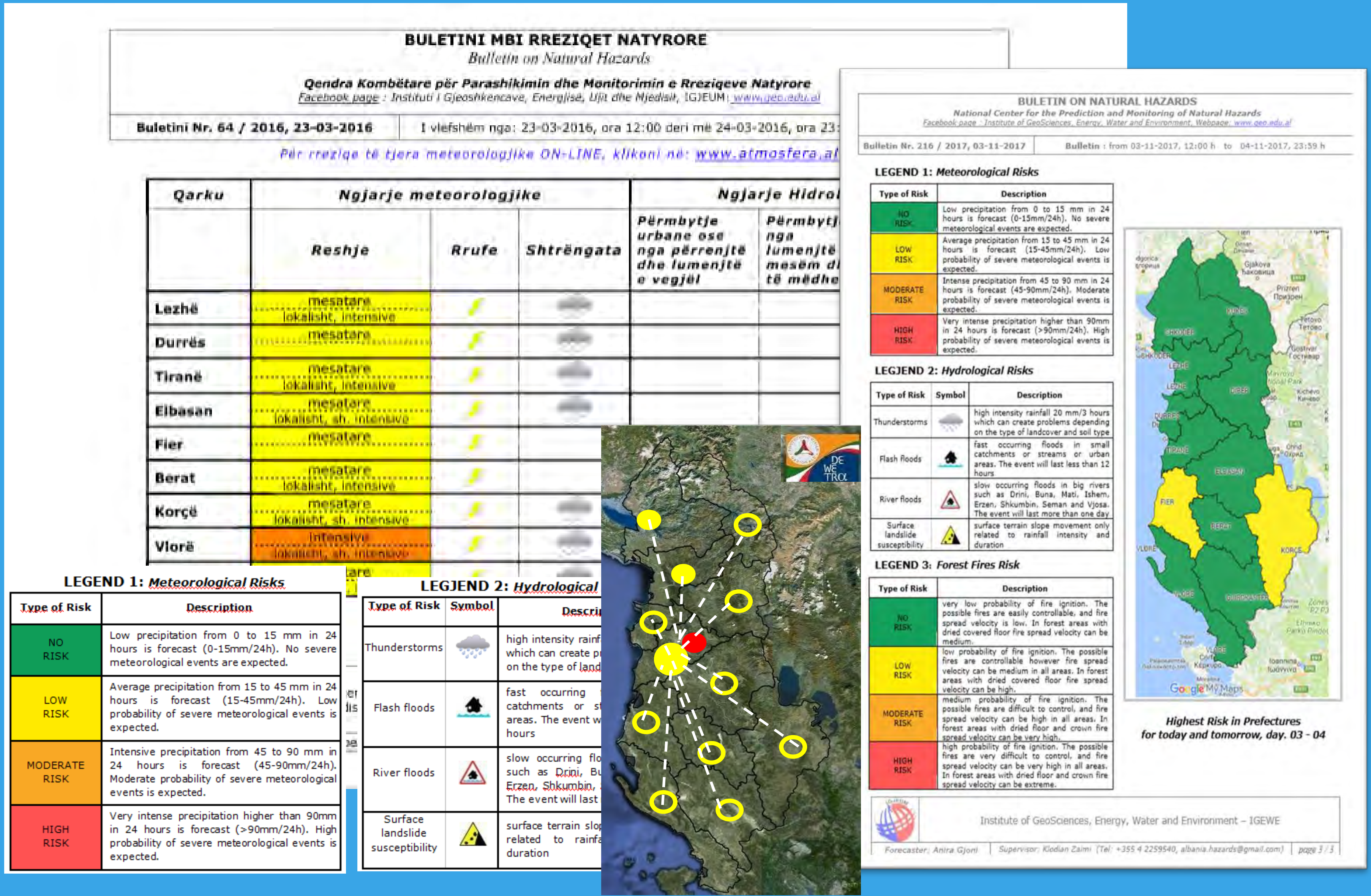
- Radar and Satellite data
- Manual stations (more than 200)
  - Meteorological
  - Hydrological
- Automatic stations (49)
  - Meteorological
  - Hydrological
  - Sea
  - Agro-climatic



Albanian observation network

Buletins for early warnings

Published 365 days a year at 12:00 p.m. in IGEWE web page, Facebook and sent by email.



GIZ and NEXUS PROJECTS:
1) Hydrological model

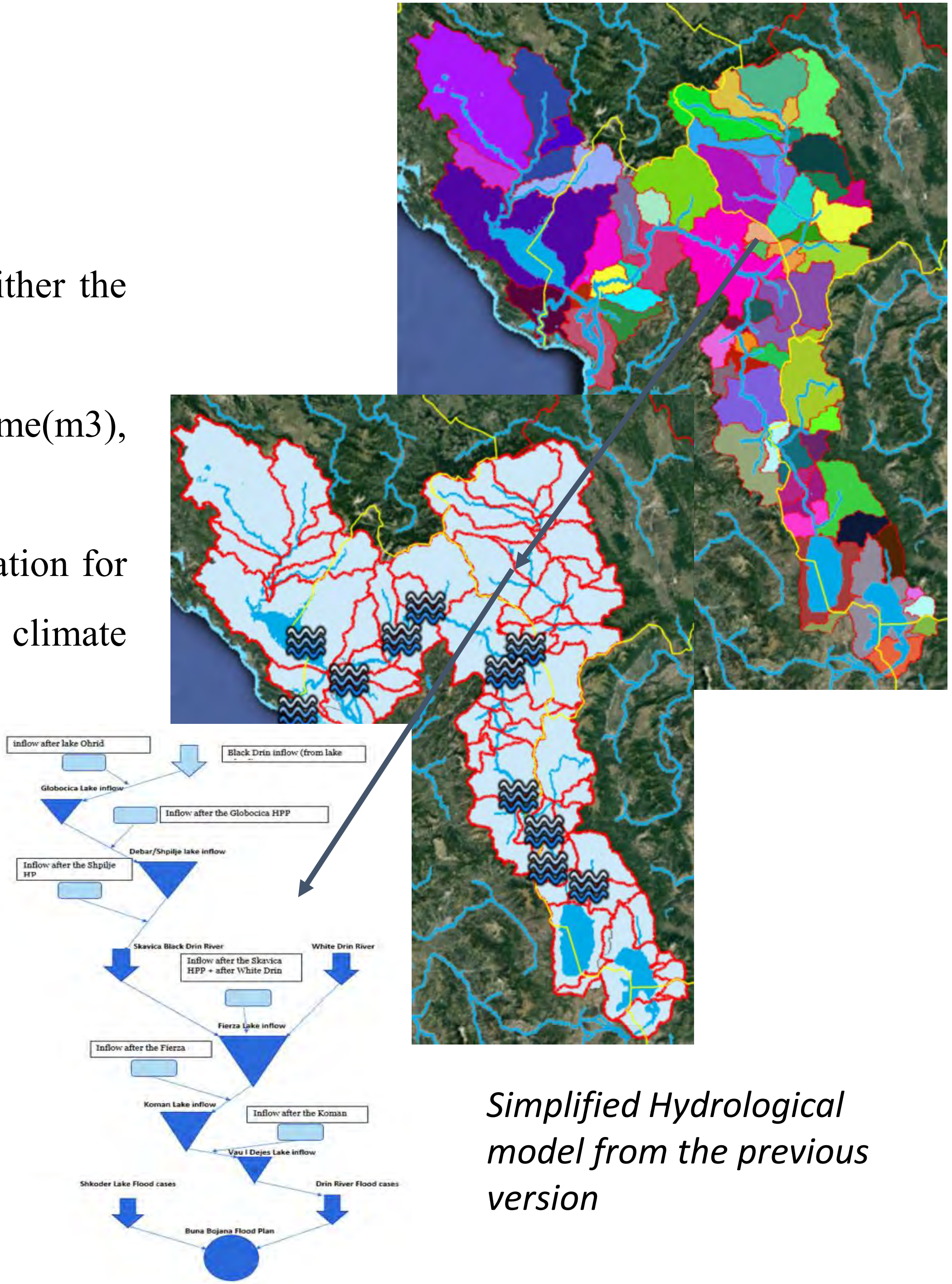
- Application of the hydrological model in around 20 000 km2.
- So far: Average year, Wet year, Dry year: monthly water flow for either the period (1980-1990) or the period (2000-2010).
- The model outputs are: rainfall(mm) distribution, ETP(mm), Volume(m3), Average discharge(m3/s)
- Next run of the model: hourly discharge, flood events, HPP optimisation for energy and floods, different scenarios including Skavica HPP and climate change impacts on water resources..

The number of hydrometeorological stations with available data in the tables below:

Sub-basin	Discharge	Water level	Storage elevation curve	Cross-sections	Rating curve
Albania	15	12	1	n.a.	n.a.
Montenegro	5	9	n.a.	n.a.	n.a.
Macedonia	6	6	2	5	n.a.
Kosovo	15	17	n.a.	11	n.a.

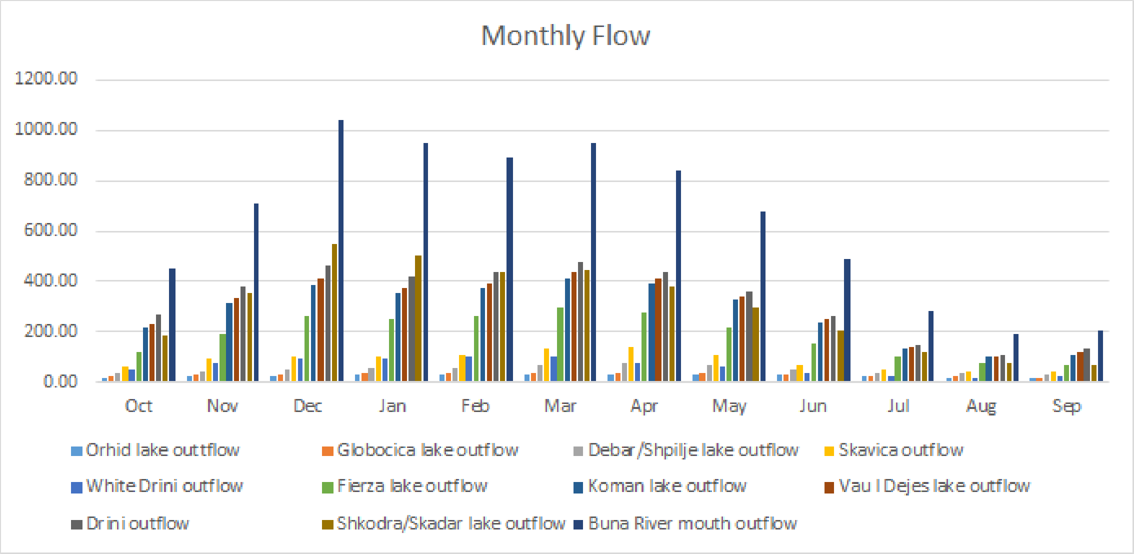
Sub-basin	Precipi-tation	Air temp-erature	Snow	Sunshine duration	Global radiation	Relative humidity	Wind
Albania	31	28	1	4	1	n.a.	n.a.
Montenegro	11	2	1	2	2	2	2
Macedonia	10	4	10	3	n.a.	3	4
Kosovo	2	3	1	n.a.	n.a.	3	3

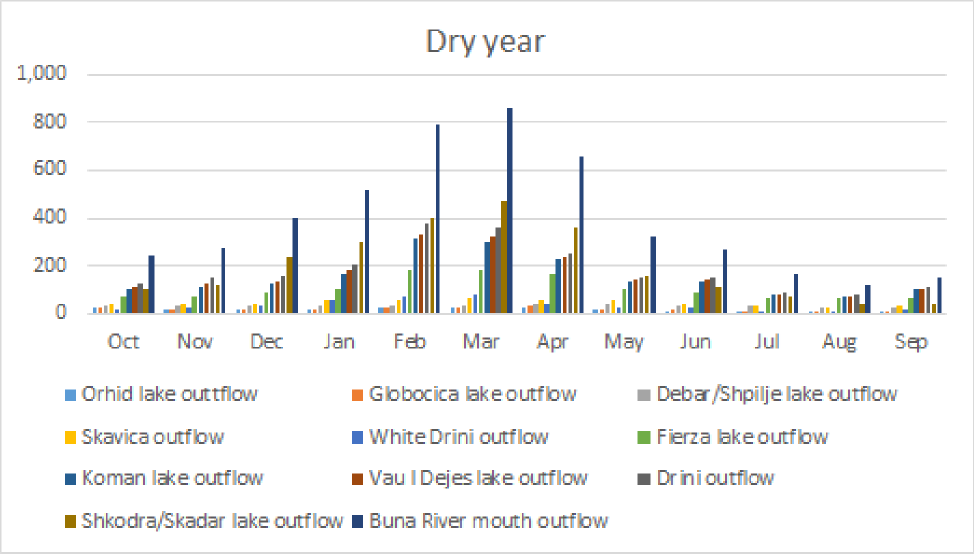
n.a. time series data are not available.

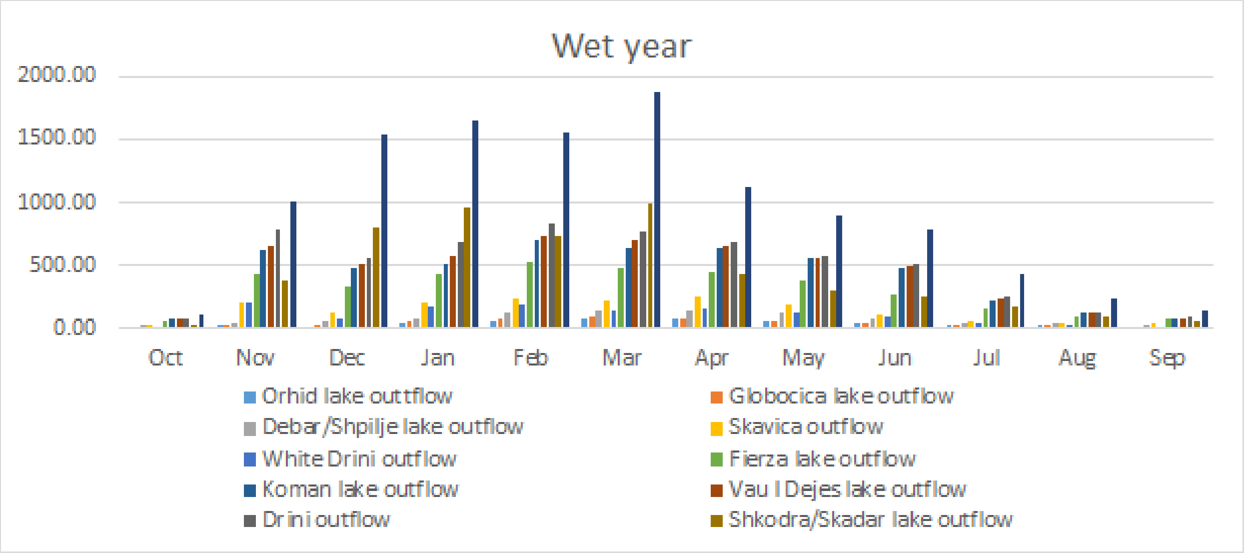


Simplified Hydrological model from the previous version

Results from hydrological modeling in some important locations

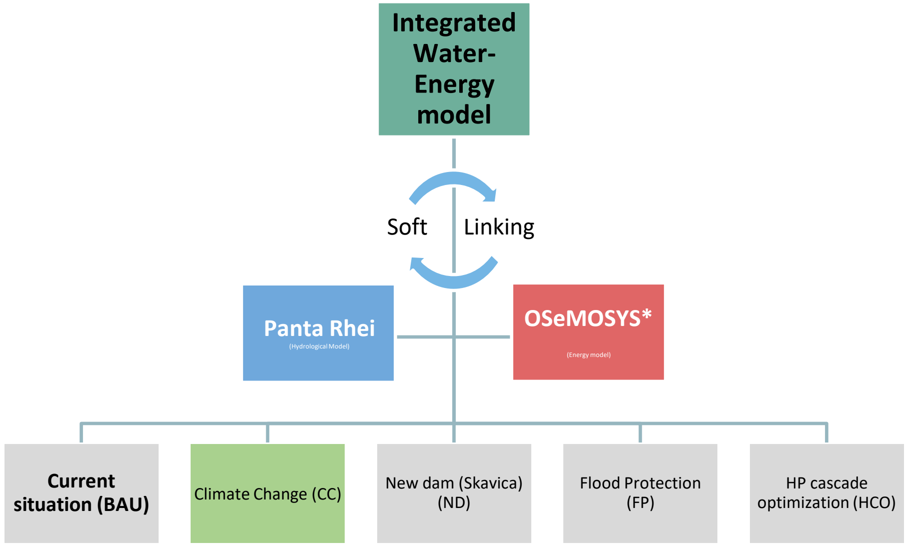


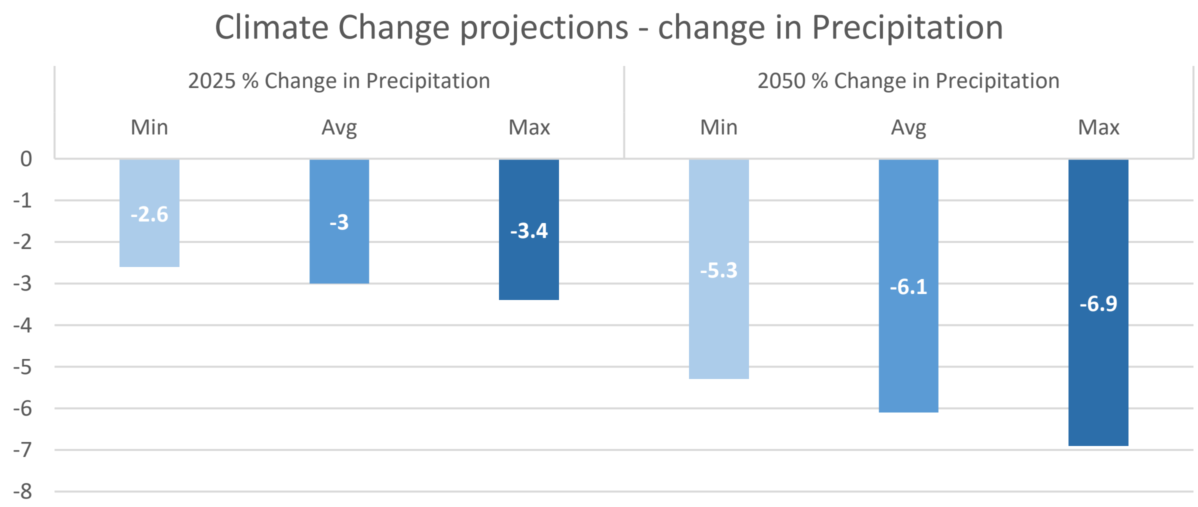


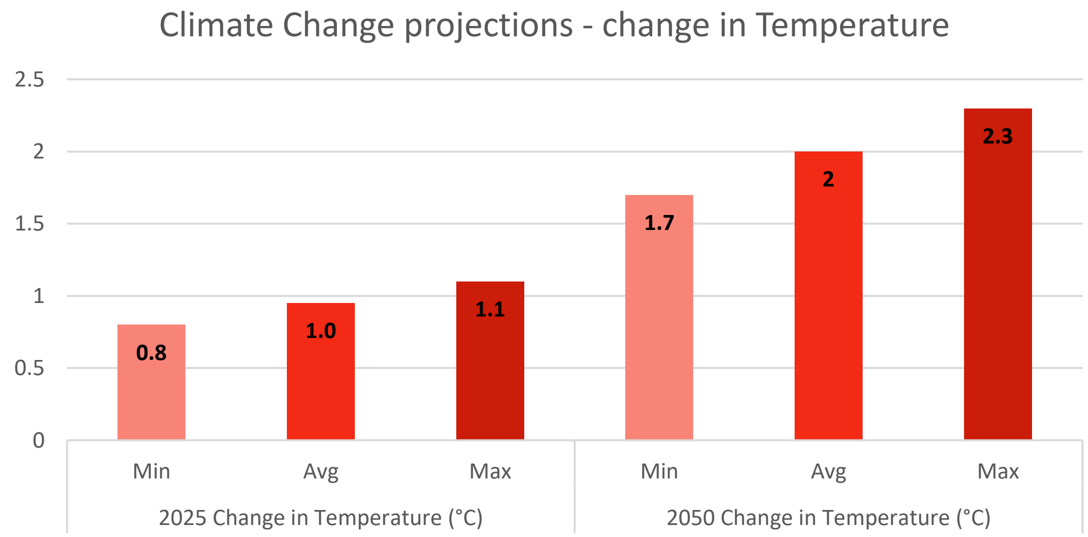


Climate Change scenario (CC):

- Flow: based on two sets of projections:
  - 2025: with avg (**-3%**) change in precipitation.
  - 2050: with avg (**-6%**) change in precipitation.
  - linear decline in water flow assumed between (2021-2025) and (2026-2050).

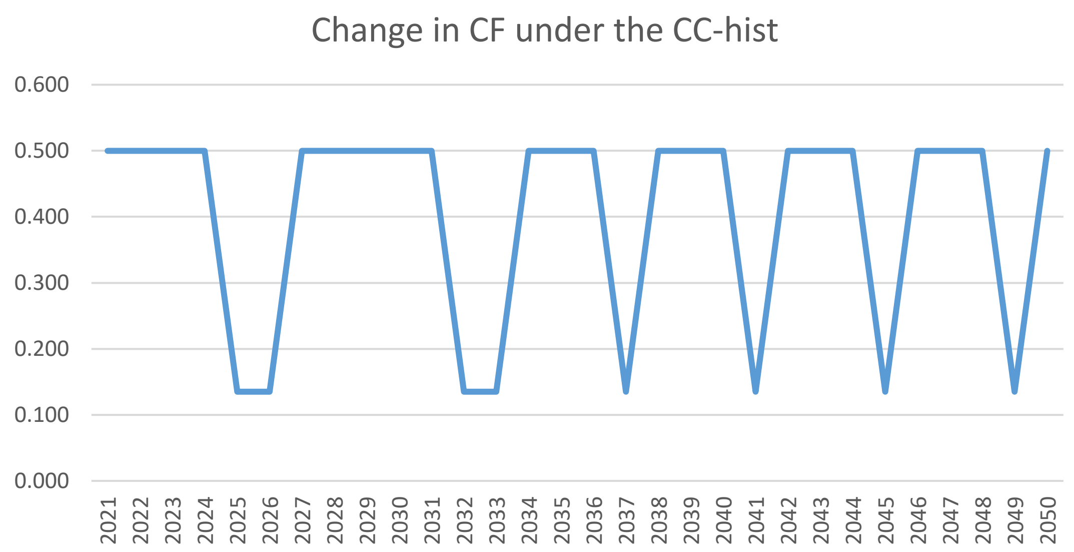






Climate Change scenario - historical dry year (CC-Hist):

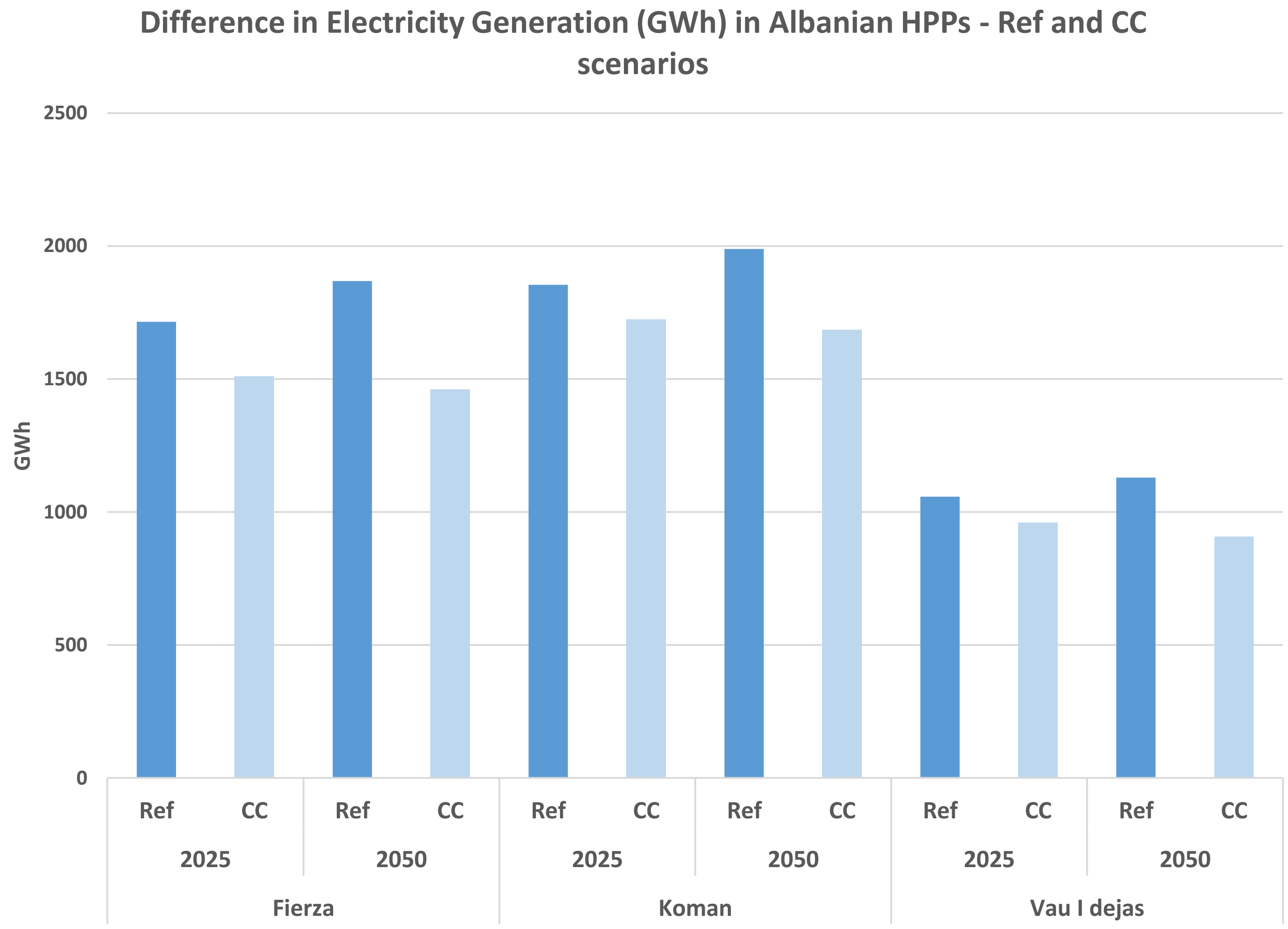
- Flow: based on historical data from 2001-2010:
  - The year with the lowest cumulative water flow was selected (2002).
  - The weekly flow in the dry year (2002) was taken for each location of interest.
  - Random frequency of dry years assumed between 2021-2050 to get a series of normal and dry flow.



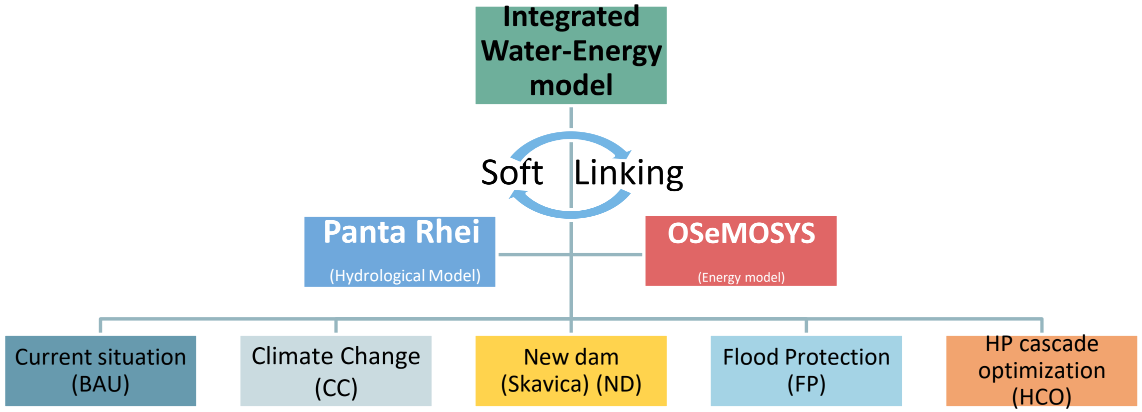
SELECTED INSIGHTS: Climate change scenario (**CC**)

Change in Electricity generation under the Climate Change scenario (compared to reference scenario):

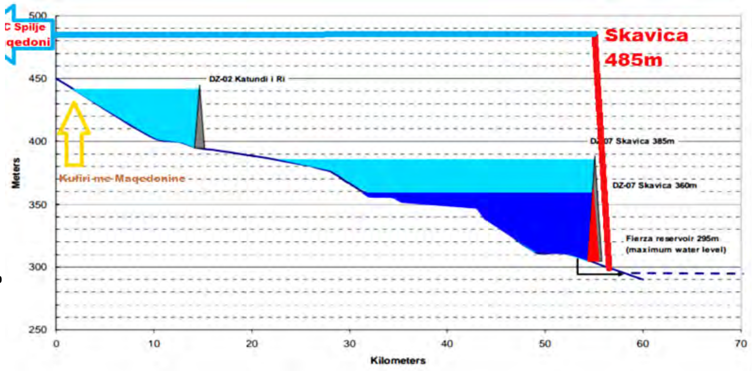
- **Fierza: (-12%** , -22%)
- Koman: (-7% , -15%)
- **Vau I dejas**: (-9% , **-20%)**

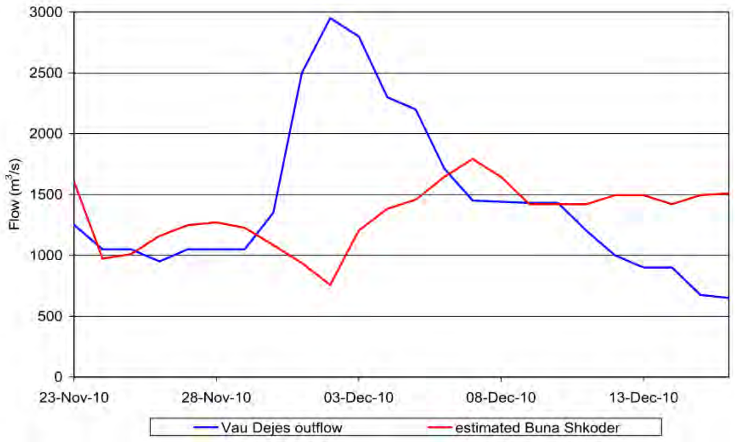


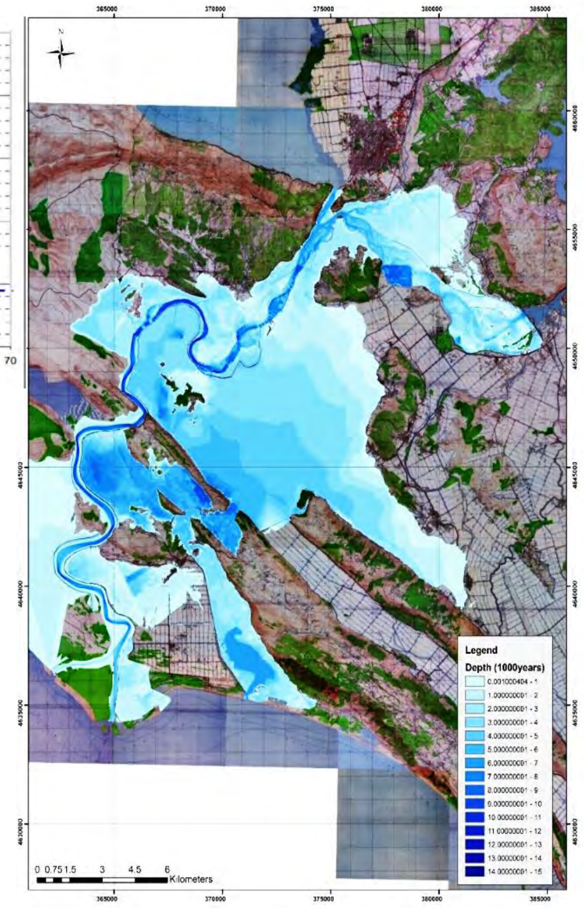
NEXT STEPS



1. Developing scenarios:
    a. **Skavica:** Impact on the floods downstream and water regime.
    b. **Flood Protection**: increasing buffer zone, impacts on floods and energy.
    c. **HPP cascade optimization**: coordinated operation for decreasing flood inundation.
2. Improve the granularity of the model (electricity trade, etc..)







Thank you for your attention!

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