UNESCO-HELP Mesta-Nestos Basin

The dimensions of change in the management of the transboundary Mesta-Nestos river basin

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TWM IV, Thessaloniki, October 2008

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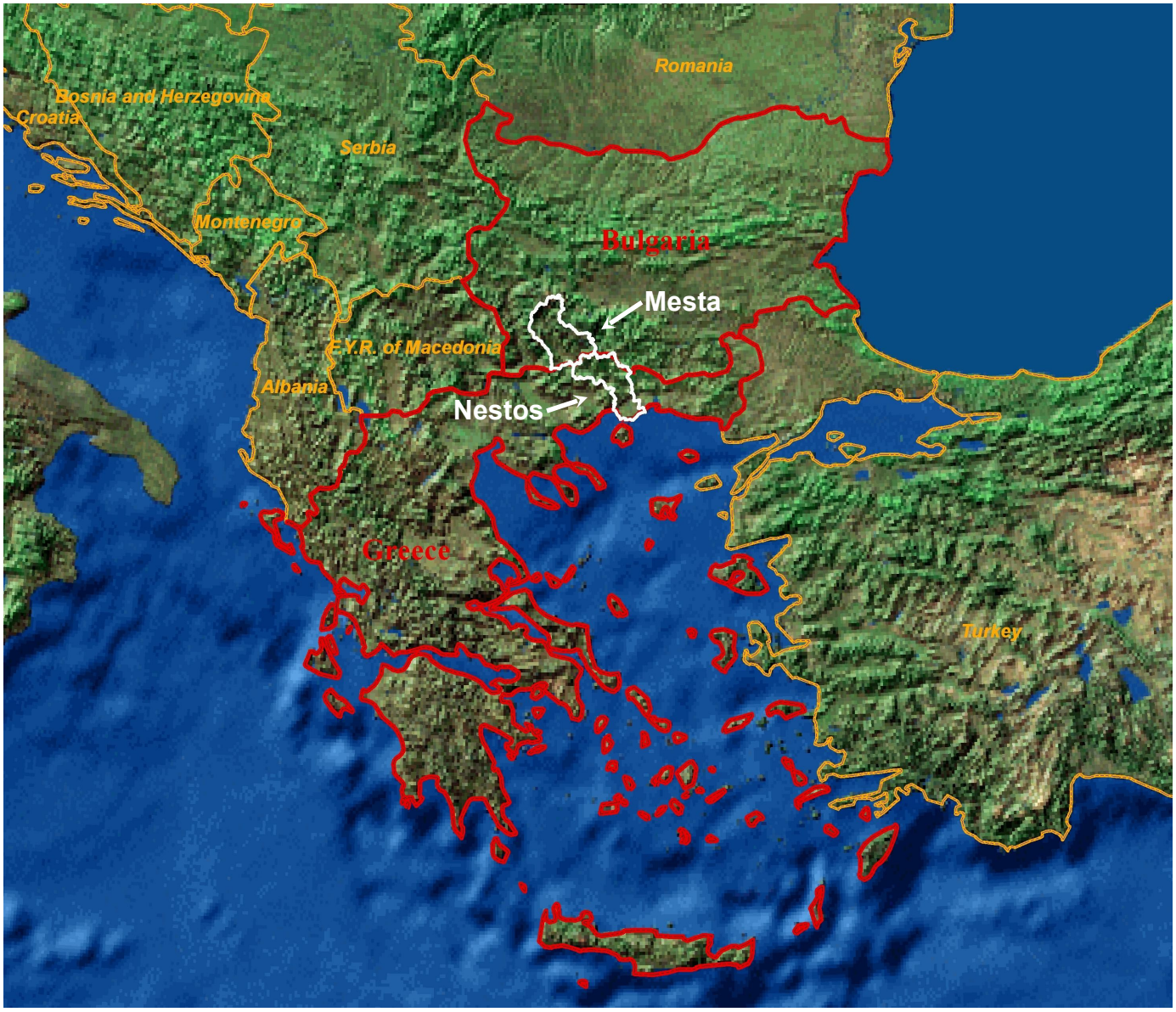
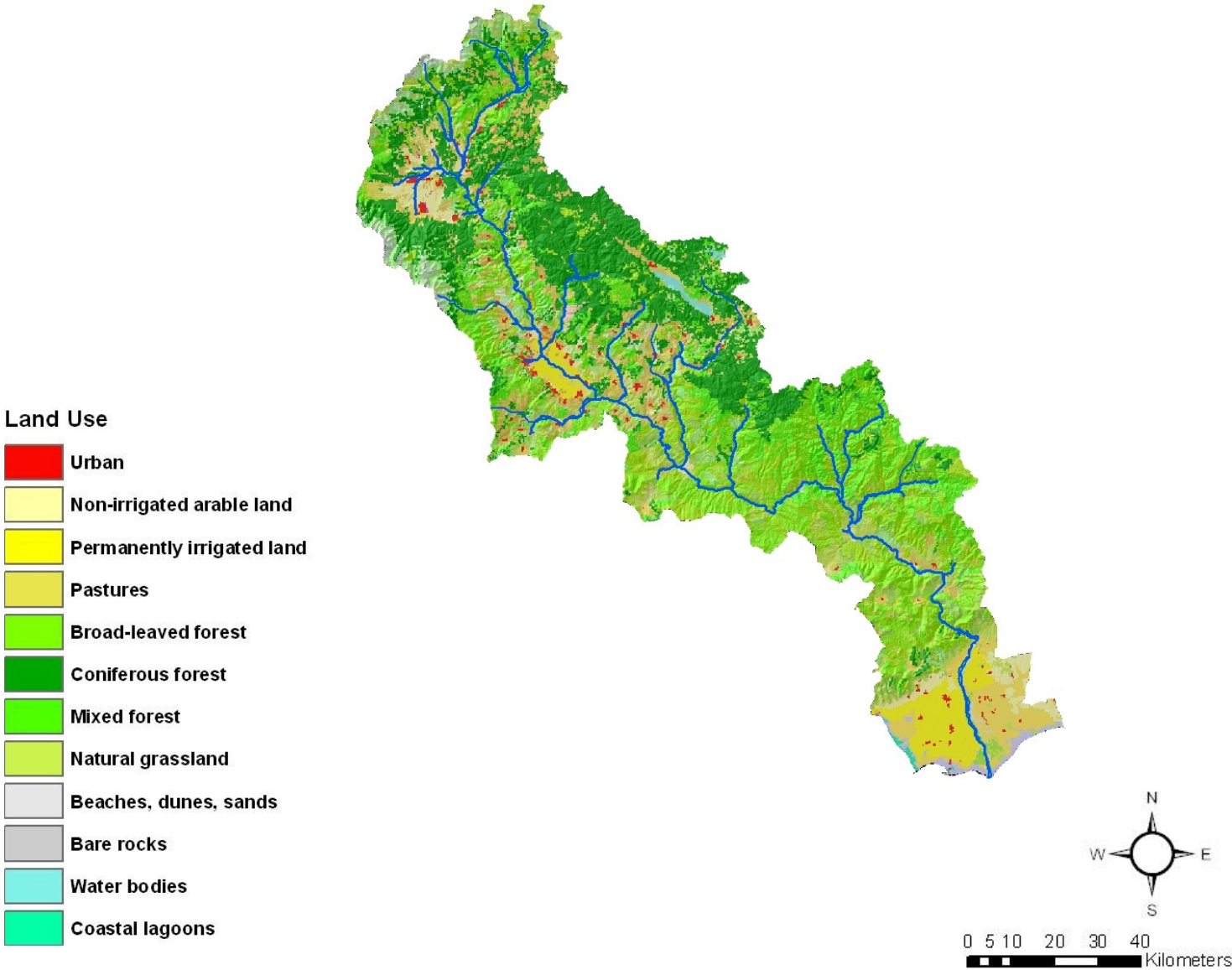
The Mesta-Nestos basin in the Balkans



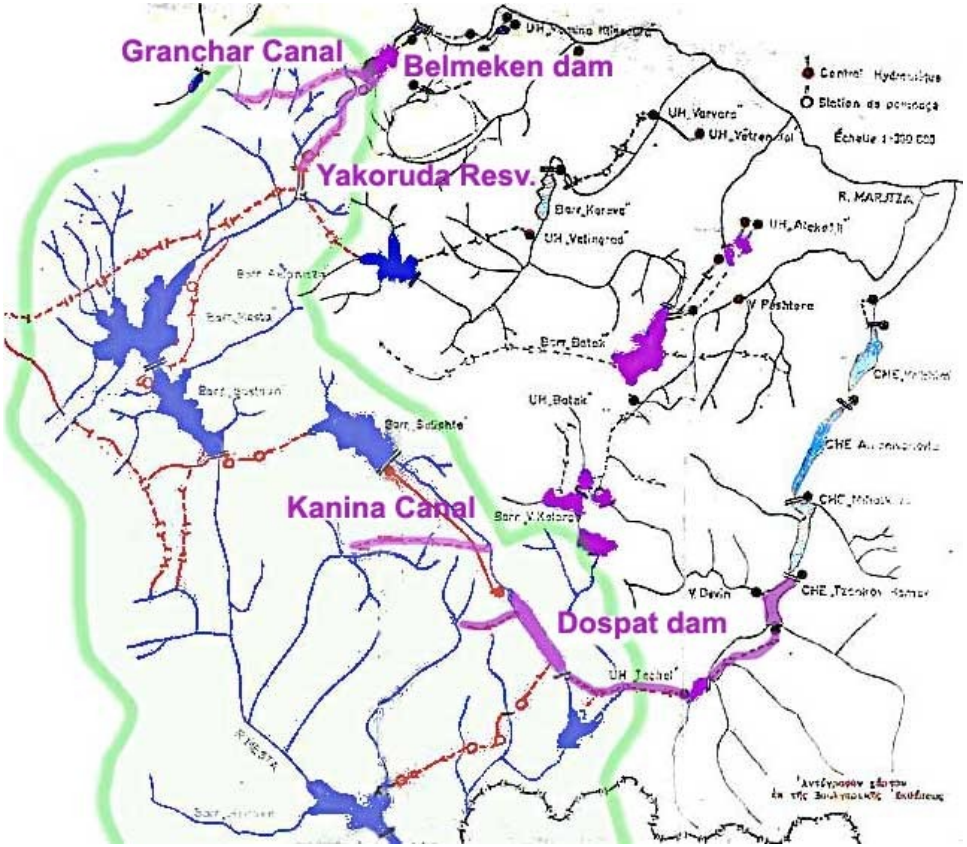
Physiographic features

Physical characteristics:

- Basin relief
- Hydrographic network
- Geology
- Land Use



The bilateral flow treaty



• **1964**, “Agreement on Cooperation between the People’s Republic of Bulgaria and the Kingdom of Greece concerning the utilization of the waters of the rivers crossing the two countries”

•**1971**, “Greek Bulgarian Committee for cooperation in the fields of electric energy and the utilization of the waters of the rivers crossing the two countries”

•**1995**, “The Mesta-Nestos treaty”:

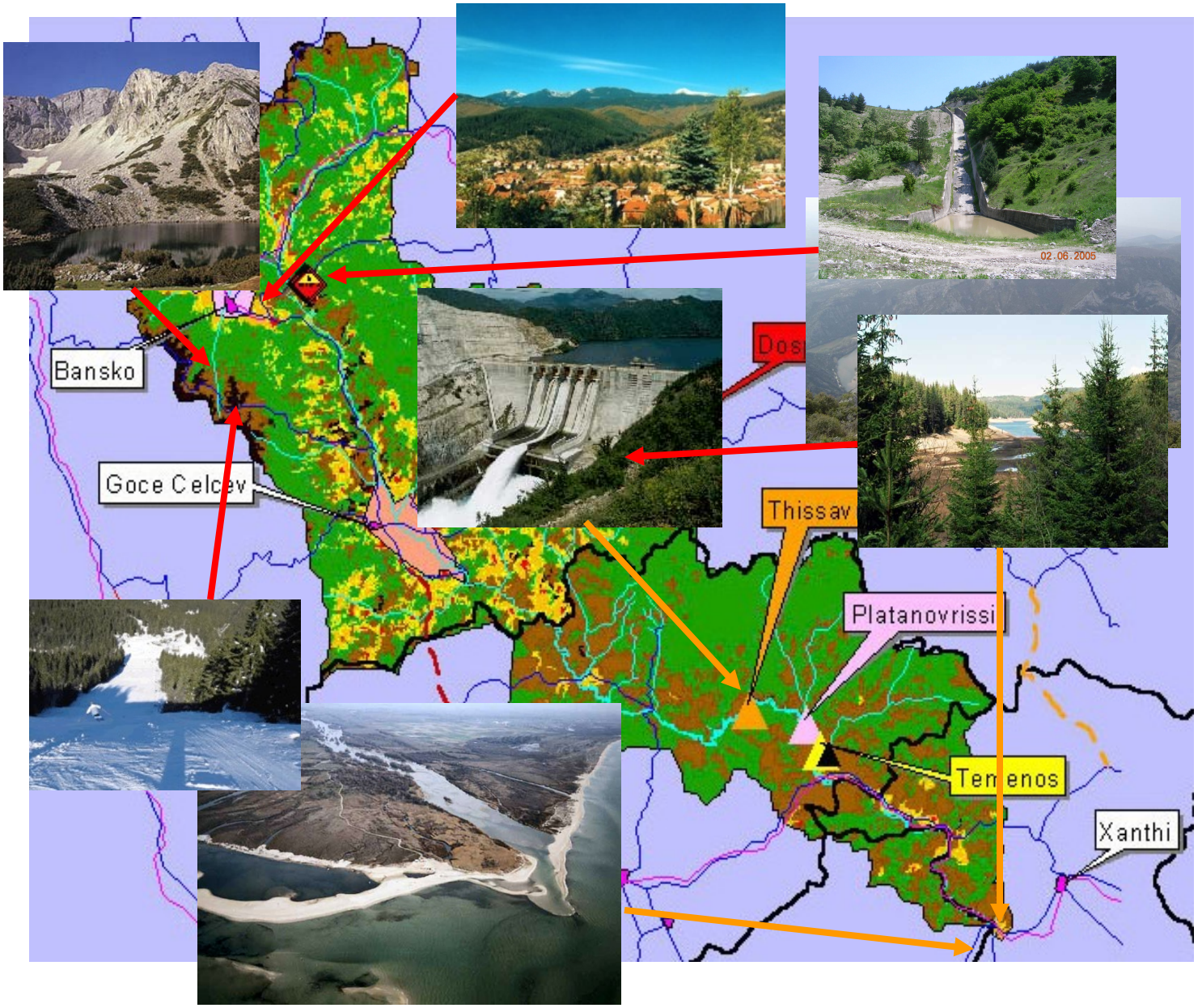
“**Greece is getting 29 per cent of the flow** of the river's water for the duration of the 35-year accord (1995-2030), while it is obligatory for the two countries to improve the quality of waters according to international standards and European Union directives.”

The agreement freezes in time a situation inherited from plans dating from the 1960s

The present day status

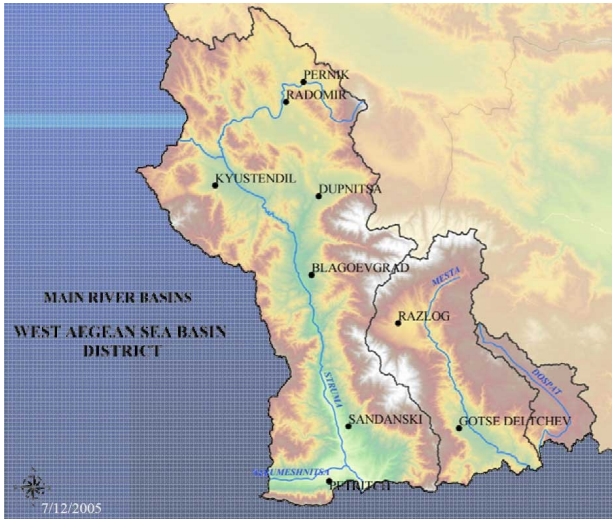
Socio-economic characteristics :

- The bulgarian part
- The greek part



Applying EU management standards

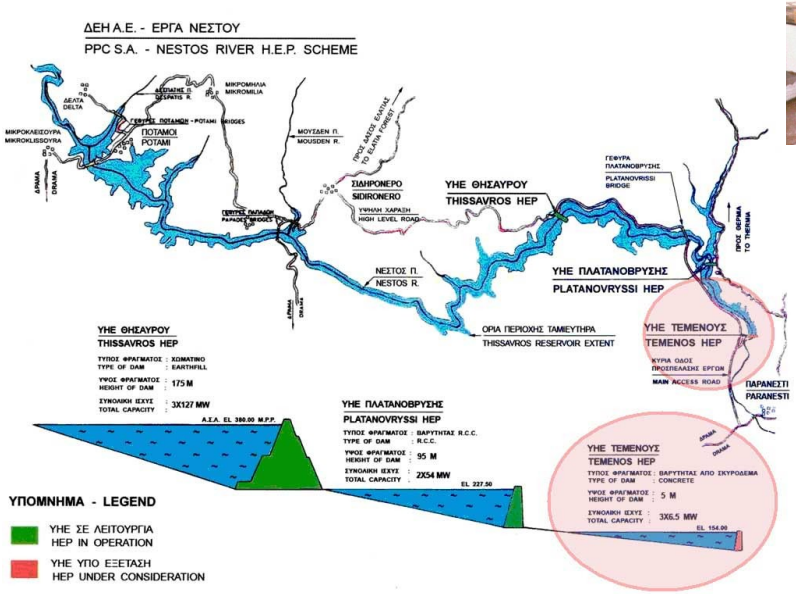
Water Framework Directive 2000/60/EC - Management of transboundary rivers and lakes

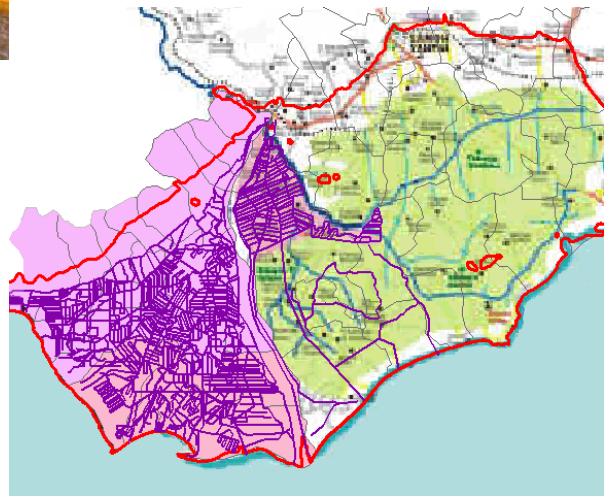


Bulgaria
Water management at basin scale
West Aegean Sea District
(http://www.mestaproject.eu)

Greece
Water management at region scale
Region of West Macedonia and Thrace

Development projects in Greece





Temenos dam project electicity/irrigation

Extension of agriculture to the Xanthi plain

The project needs to be financed on private funds

Development projects in Bulgaria

Snow tourism facilities in Bansko

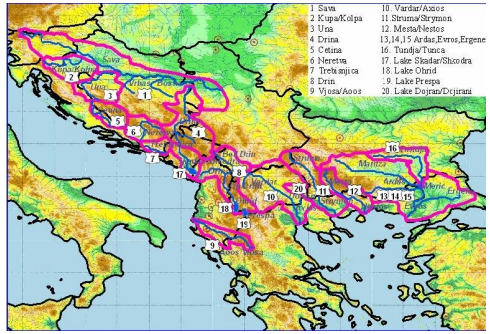
Hydropower plants
Byala and Cherna Mesta

Vacha Cascade – Tzankov Kamak Hydropower
Funded by EU and Austria

Bilateral cooperative programs

Numerous bilateral projects on the basin:

1) International Projects
Ex: INWEB/UNESCO chair, HELP-UNESCO program



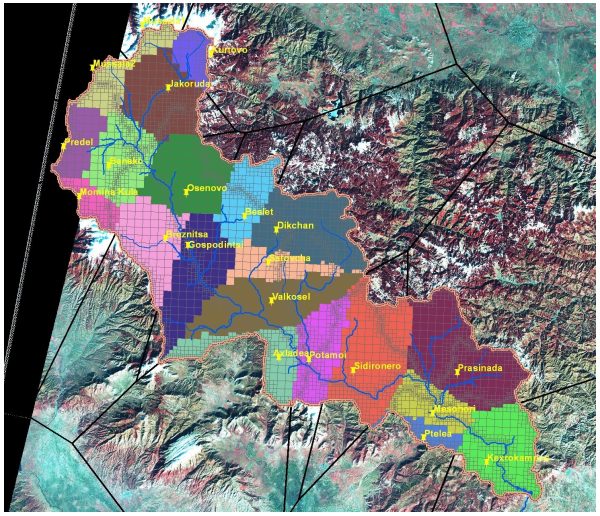
2) INTERREG – PHARE-CBC Projects
Ex: EUROREGION Nestos-Mesta, Mesta IWRM capacity

3) EU Research Projects
Ex : TRANSCAT – FP5, LIFE programs

4) NGOs and stakeholders initiatives
Ex : Global Water Partnership GWP – GEF IW:Learn

Publicly available climate data

- Meteorological data
- Hydrological data

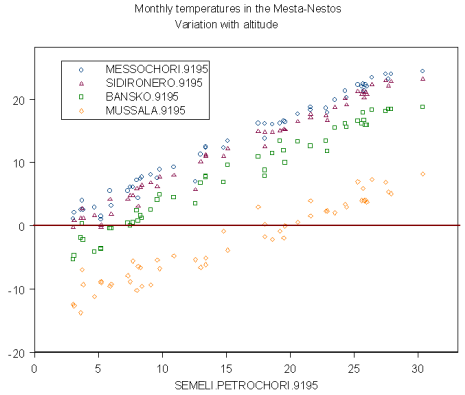


- **Rainfall**

20 meteorology stations cover the basin surface. The available common data are monthly from 1991 to 1995.
(Partial data in Mussala)

- **Temperatures**

2 measurement stations in the Bulgarian part and more than 10 stations in the Greek part.
Daily data.



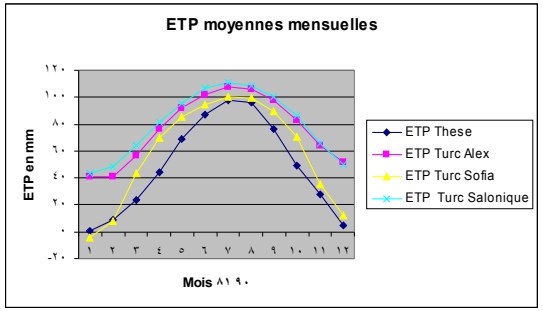
- **Evapotranspiration**

Turc formula

$$ETP = ۰.۱۳ \times T \times \frac{R_g + ۵۰}{T + ۱۵}$$

T = mean temperature

R_g = Global solar radiation



Publicly available hydrodrology data

- **Meteorological data**
- **Hydrological data**

Flow measurements

Greek Part (partial)

Papades
Thissavros
Platanovrissi

Bulgarian part (partial)

Yakoruda
Hadjidimovo

Data Publicly available through WMO

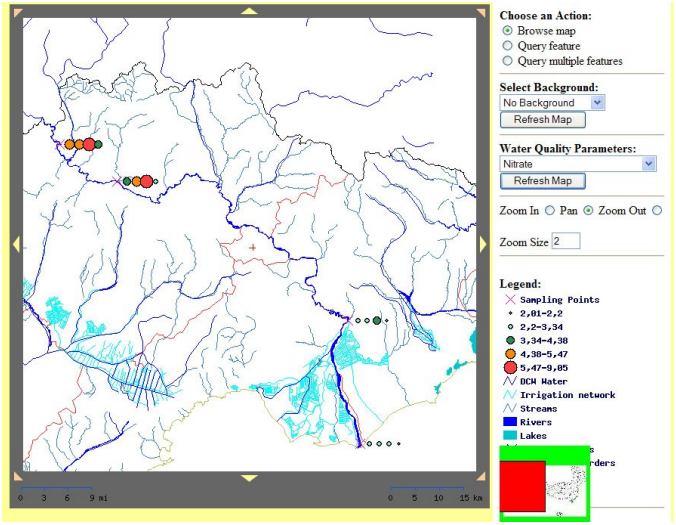
Temenos **monthly(1965-1996)**

Momina Kula **monthly(1965-1996)**

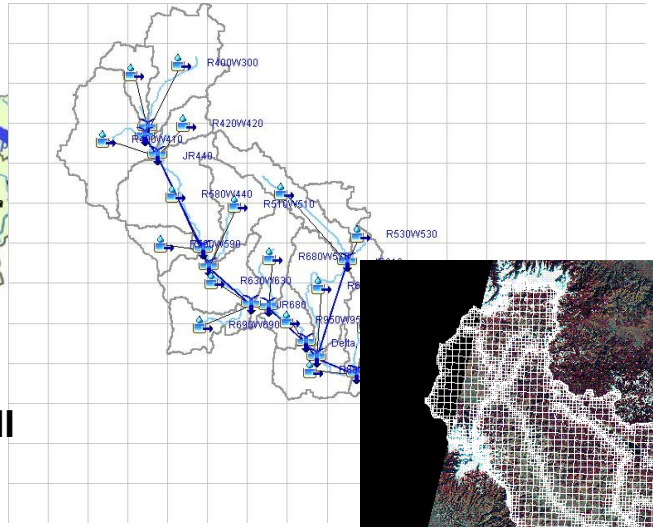
Water quality

2 automated stations in Bulgaria
4 stations control the water quality in the Greek part (**Since 2000)**

The water of the Mesta/Nestos River satisfy the A3 standards of potable water.

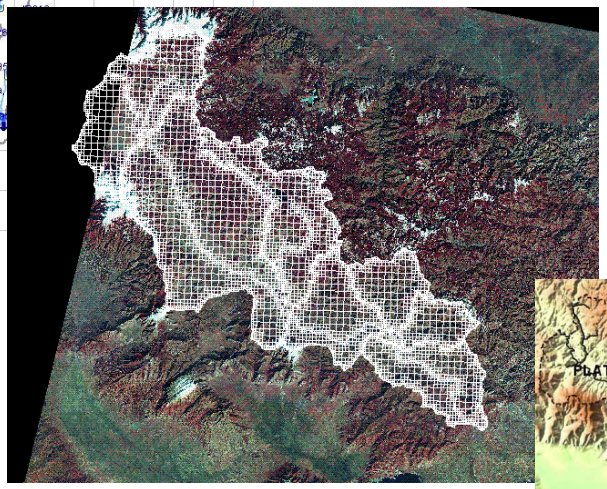


Past and on-going hydrological modeling

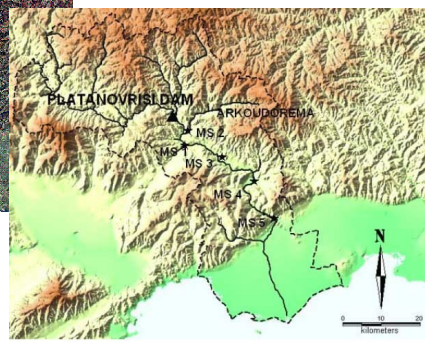


PHARE-CBC – MESTA II
MIKE-SHE
2007

TRANSCAT
HEC-HMS
2007

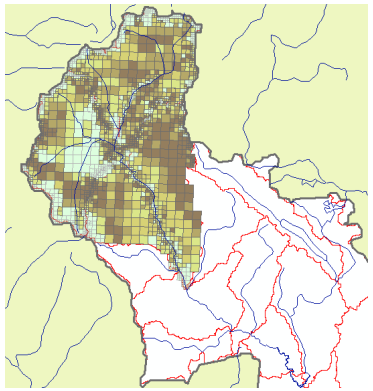


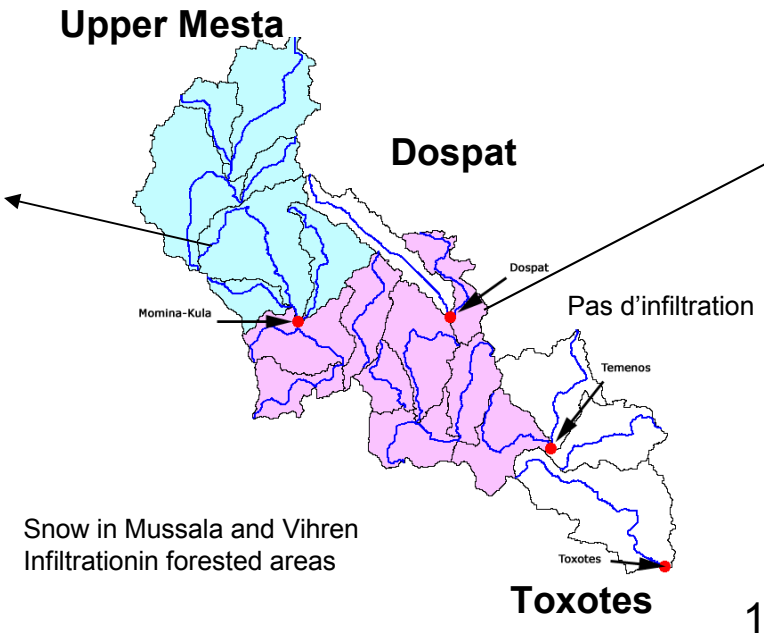
HELP-UNESCO
MODSUR
AUTH-DUTH, 2008

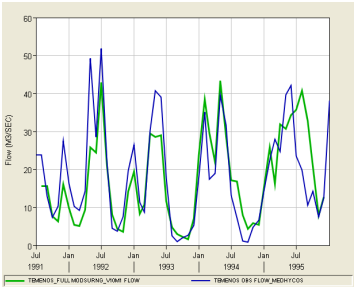


INTERREG III
SWAT
DUTH, 2007

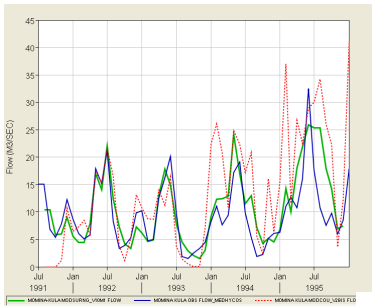
MODSUR hydrological modeling







Calibrated Temenos flow

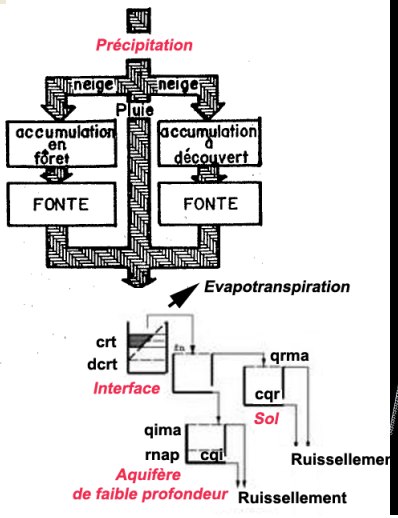


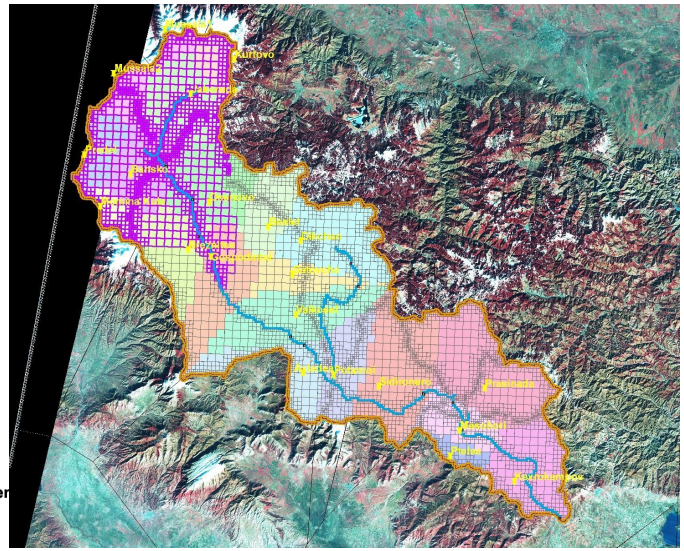
Snow in Mussala and Vihren
Infiltrationin forested areas

Calibration Period

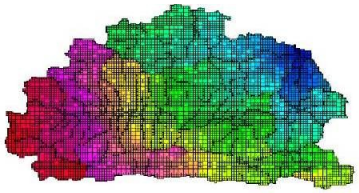
1 August 1991 to 31 December 1995

Calibrated Momina-Kula flow





A spatially distributed model

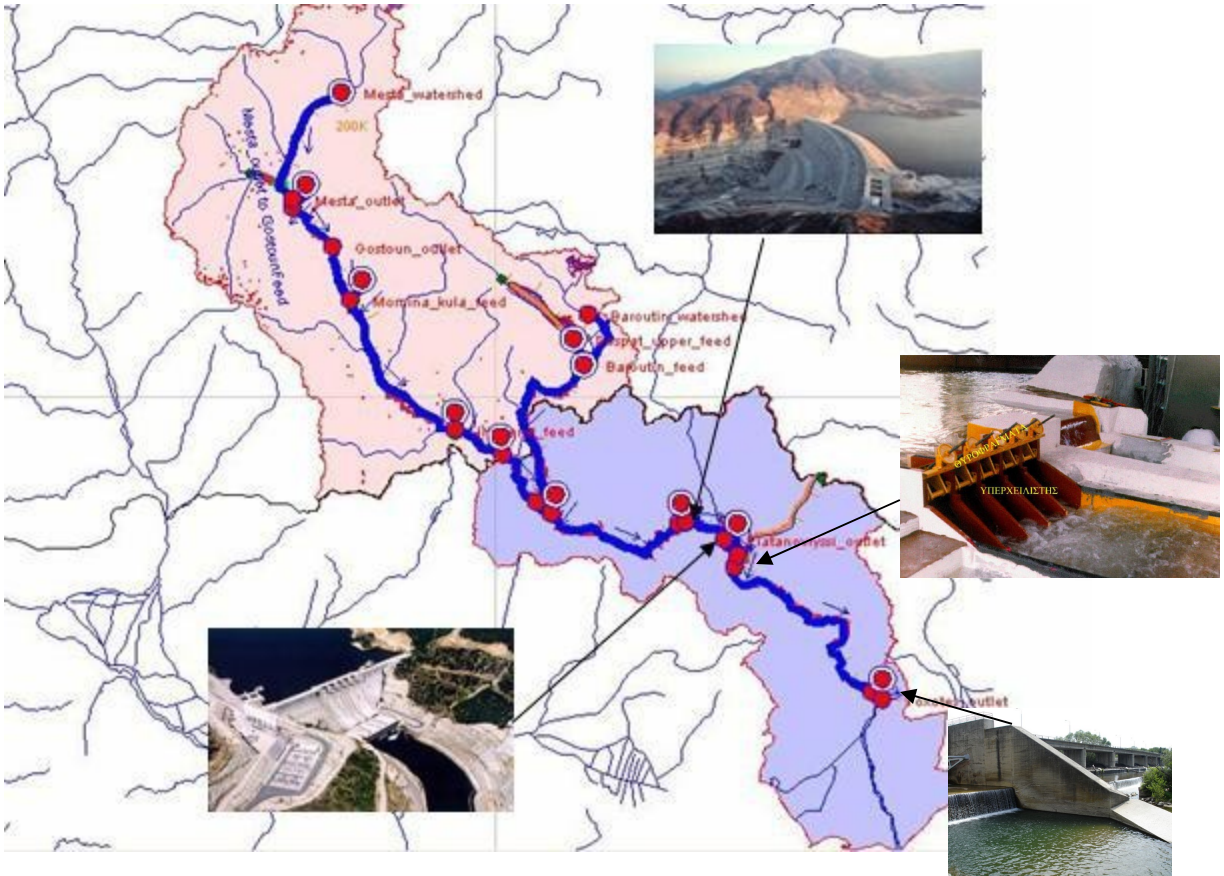


Also used by NIMH, Bulgaria
for modeling Maritza basin

HEC-ResSim Hydro-electric modeling

The objective of the dam's simulation is to evaluate, the economic and operational feasibility in long term, of the current and future irrigation projects in the Greek part of the basin.

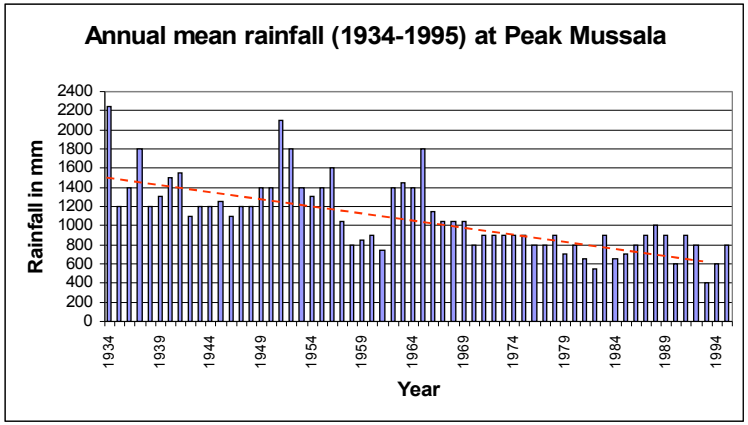
The modeling procedure of the Nestos dams was realised with the program **HEC-ResSim (USACE).** This tool works in hourly step and optimises the flows by taking into account the constraints of the exploitation (power, discharge)



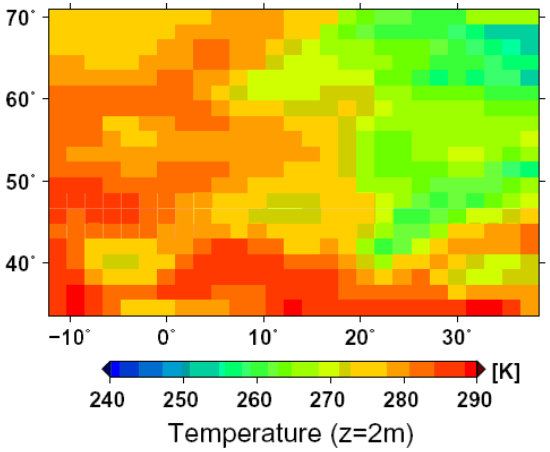
Climate Change: A local reality ?

A probable decrease of precipitation:

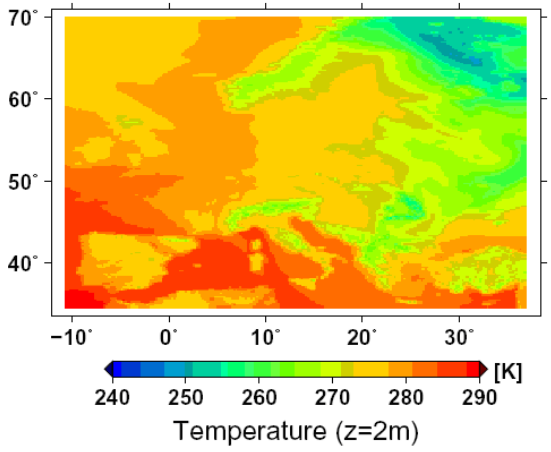
The monitoring of annual rainfall from 1934 to 1995 at peak Mussala (Rila Mountains), indicate a decrease trend. Climate change?



Need to use downscaled models such as CLM (Max Plank Institute)



a) Results from ECHAM5/MPIOM

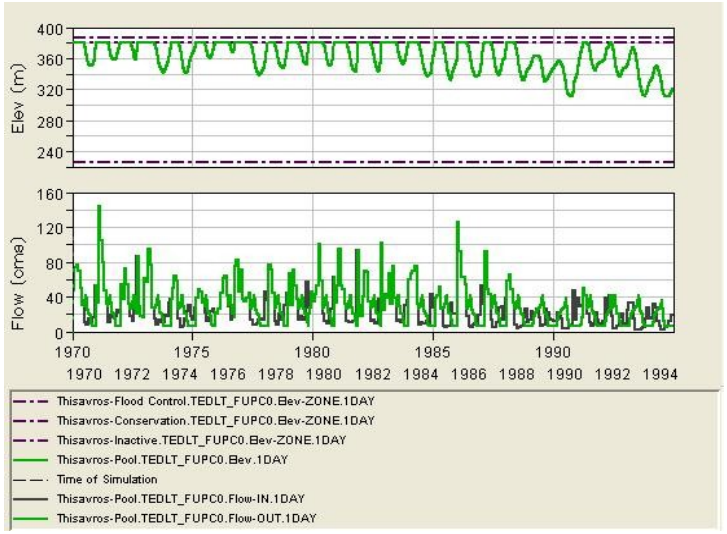


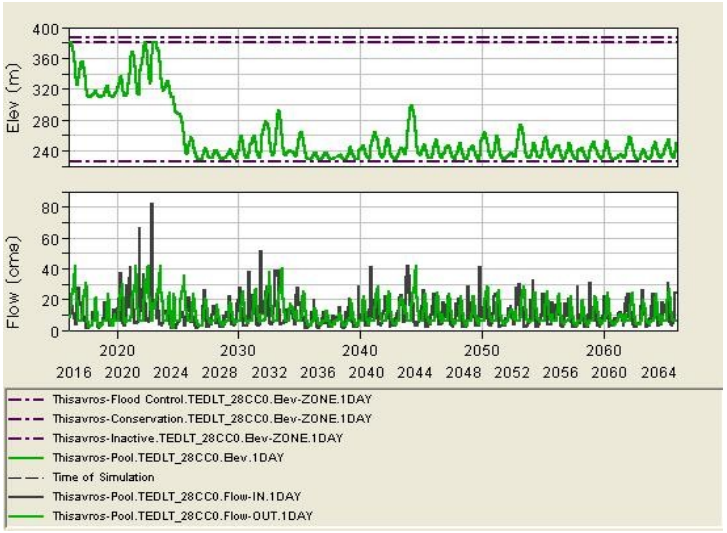
b) Results from CLM

The integrated simulation results

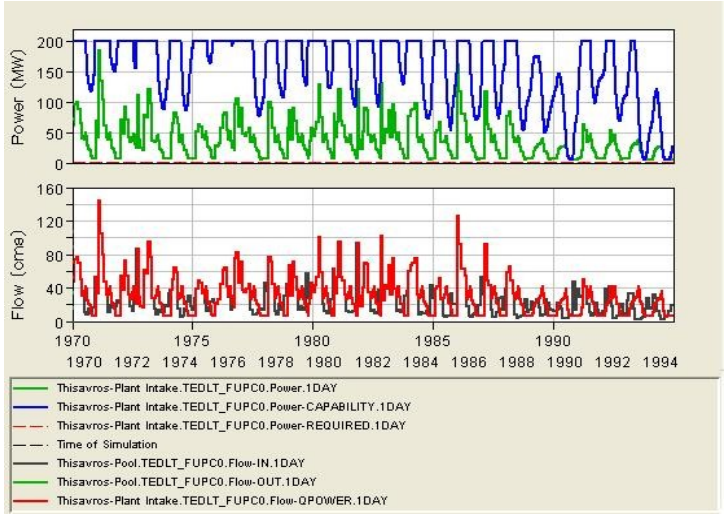
Past Climate – Full Flow	*Climate Change A2 – 29% Flow*

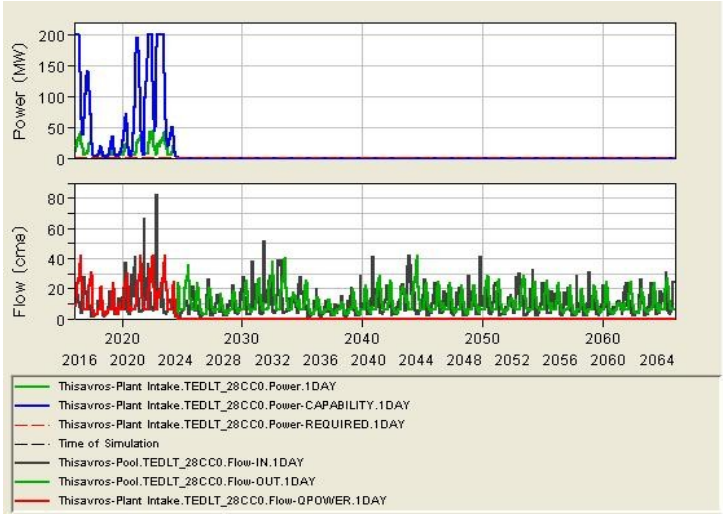
Thissavros dam





Reservoir level and outlet discharge



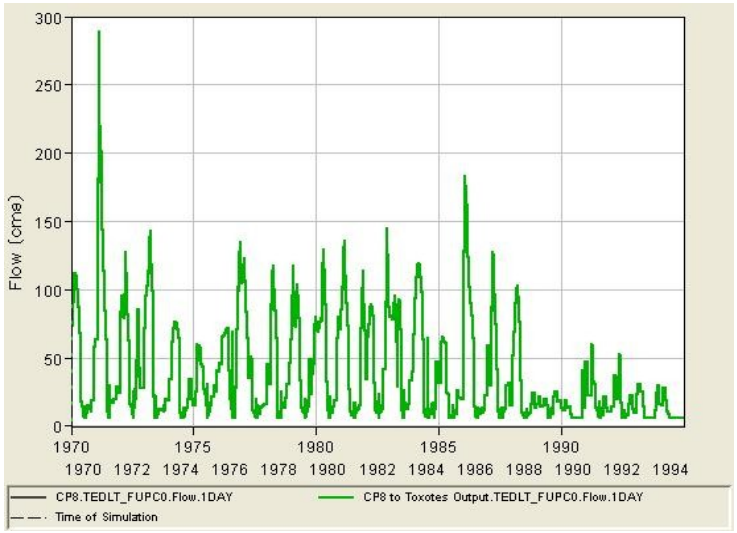


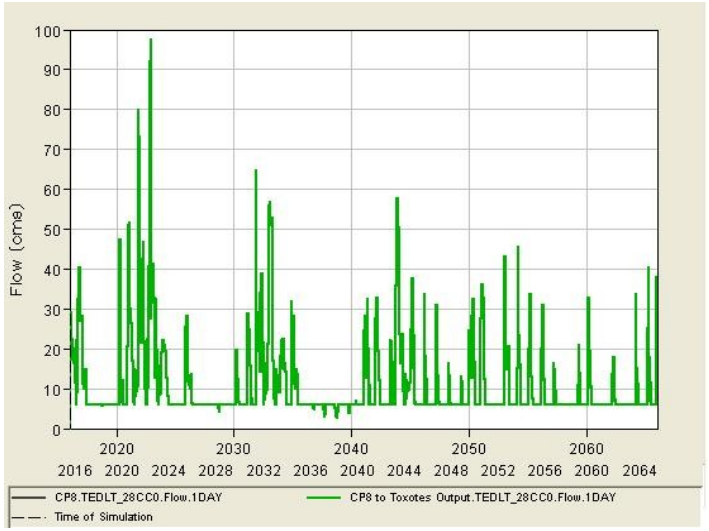
Electricity production simulation

The integrated simulation results

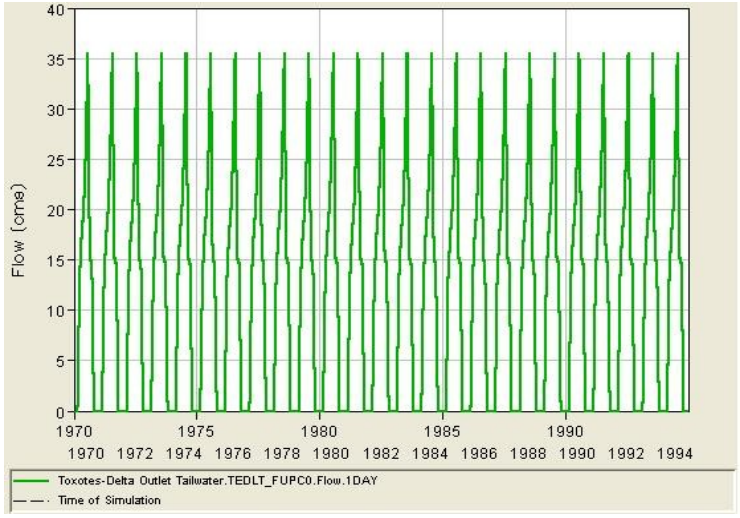
Past Climate – Full Flow	*Climate Change A2 – 29% Flow*

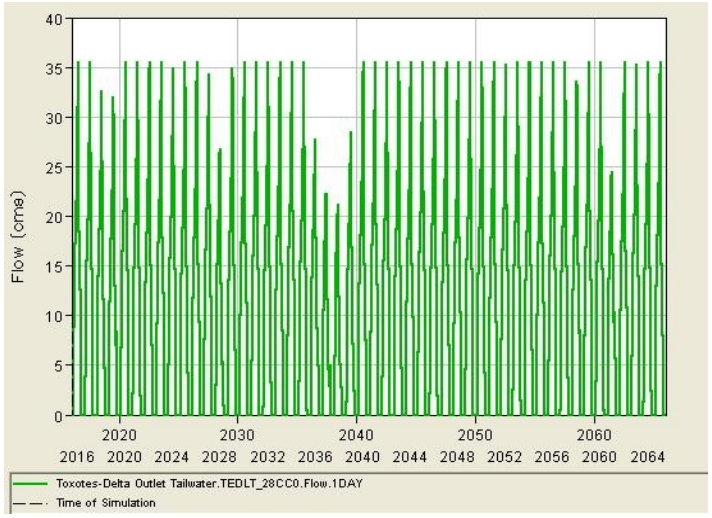
Toxotes dam





Simulation of dams' outlet flow (environmental flow)





Simulation of the flow in the entrance of the irrigation network

Possible recommendations

• **Renegotiate bilateral agreement stressing "sharing" rather than "splitting" water resources**.

It could be a multi basin agreement (Struma-Strimon, Mesta-Nestos, Maritza-Evros) inspired by the Spain-Portugal context which evolved since 1864 from split hydroelectric resources to shared minimum ecological status.

• **Build a historic climatic-hydrology shared database**

It could benefit from the existing UNESCO-INWEB platform. Need to convince sponsoring agencies to fund such an effort by Bulgaria and Greece agencies

• **Organize the coordination of modeling efforts by both sides' research teams**

Could be inspired by similar successful efforts such as PIREN-Seine in France

• **Promote the use of models by stakeholders for realistic scenarios**

Could use the HELP-UNESCO and GEF-SEE existing initiatives in a coordinated fashion

Thank you for your attention.