

The background of the slide is a composite image. The top portion shows a wide river flowing through a valley with green hills and mountains in the distance. The bottom portion shows a winding river through a lush green wetland or marsh area.

# Quantifying hydropower and environment trade-offs in the West Balkans

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## Content

1. The future of water
2. West Balkans hydropower push
3. Environmental flow assessment



An aerial photograph of a clear, turquoise river flowing through a rocky, forested landscape. The river is surrounded by lush green trees and large, grey rocks. The water is exceptionally clear, revealing the riverbed and surrounding rocks. The overall scene is a natural, scenic view of a mountain stream.

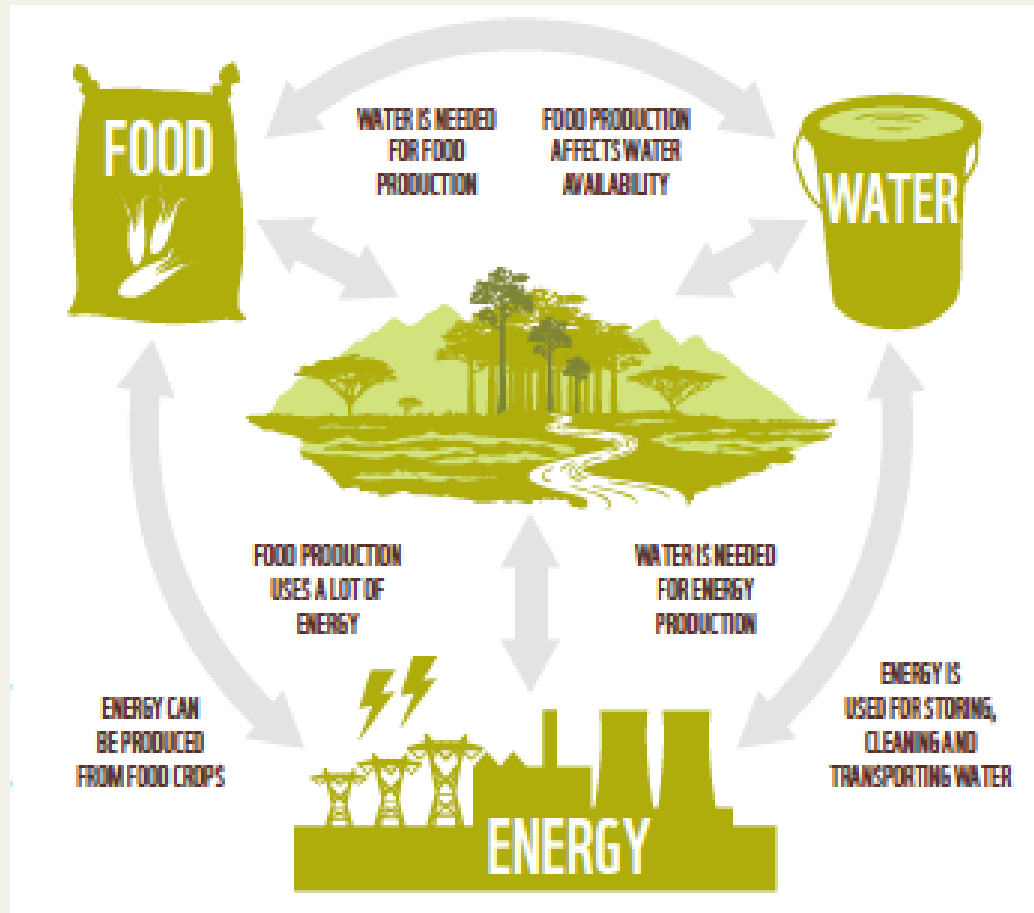
**Pure water is the  
world's first and  
foremost medicine.**

*Slovakian Proverb*

**Ecosystem services provided by water**

- provisioning services
- regulating services
- ecosystem support functions
- cultural services

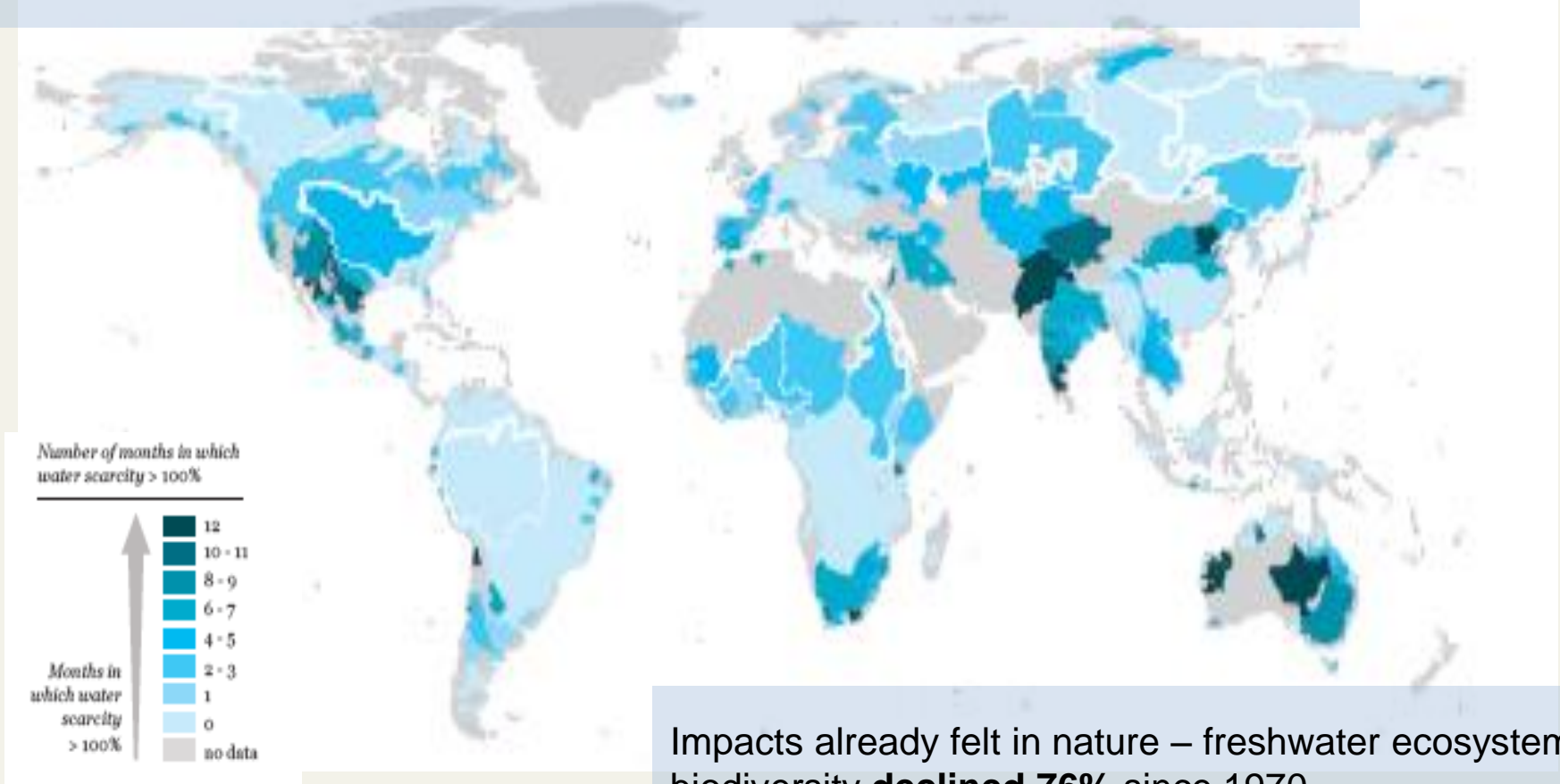
## Nexus approach



Integrating management and governance across sectors and scales to reduce trade-offs and build synergies

## Water footprint

More than 200 river basins, home to some 2.67 billion people, experience **severe water scarcity** for at least one month every year



Impacts already felt in nature – freshwater ecosystems biodiversity **declined 76%** since 1970





# Outstanding rivers of the West Balkans


- Very high integrity of river network, as indicated by WWF study (66% or 8.739 km)
- Global biodiversity hub threatened by plans for extensive hydropower development








# Climate change impact on the West Balkan rivers

## Change in annual precipitation by the 2050s




-  Increase
-  Decrease

 Temperature increase by 1.7-2.3°C by 2050 across the region (depending on the model and scenario)

## Present risks intensified by climate warming

-  Risk of forest fires
-  Risk of desertification
-  Risk of decreasing farming productivity and risk of failures of rain-fed crops
-  Sea level rise impacts on coastal erosion and salt water intrusion
-  Risk of floods
-  Drought and heat waves

## Projected change in mean seasonal and annual river flow between 2071-2100 and the reference period 1961-1990

-  Increase
-  Stable
-  Decrease





## Hydropower development always includes trade-offs

- Reciprocal relationship of energy production, water security and ecosystem integrity
- Focus must be on projects where benefits clearly outweigh **all** costs
  - environmental costs
  - national and transboundary levels
- Sustainable development aimed at minimizing trade-offs





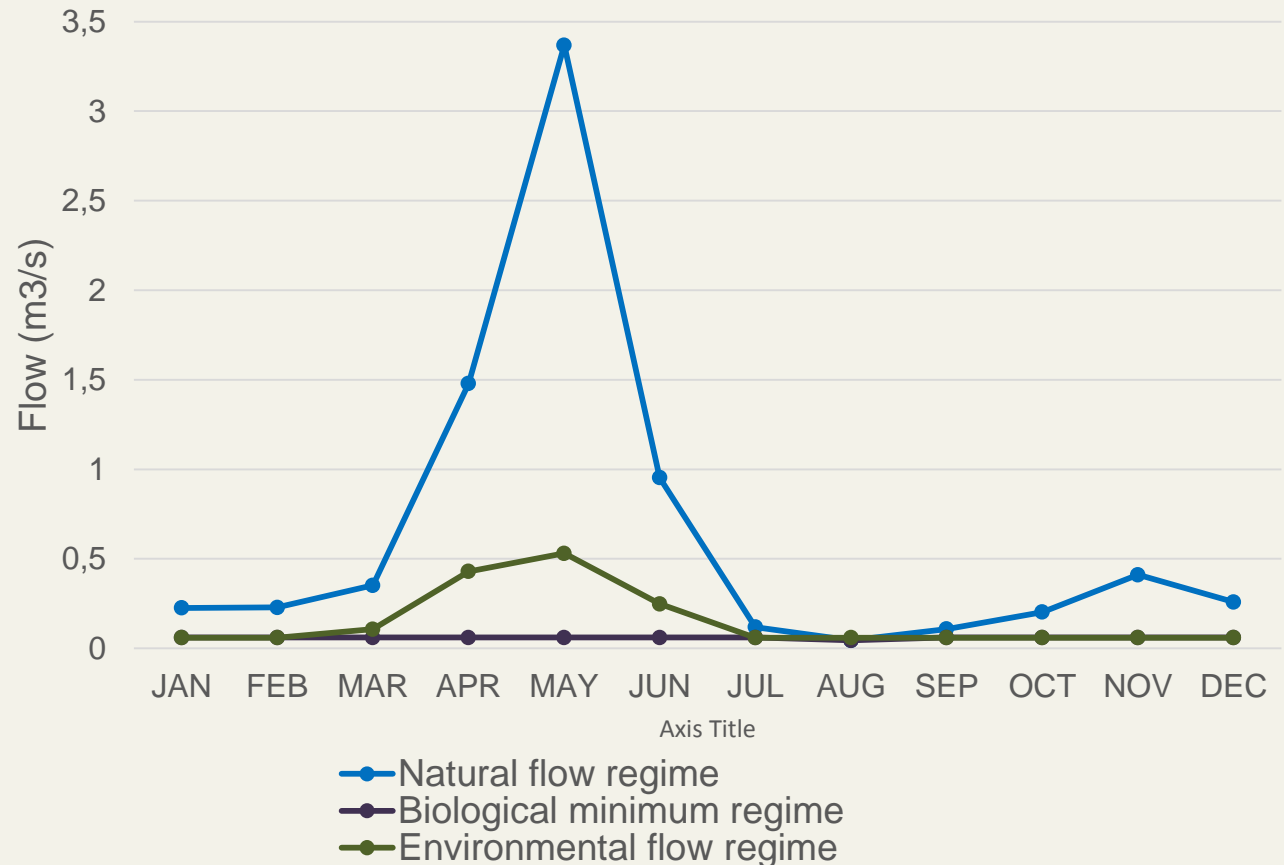
## Environmental flow approach as a tool for managing trade-offs between hydropower and environment

- Maximizing human and ecological outcomes
  - electricity generation from hydropower while ensuring implications for environment of changes to the flow regime are well understood and appropriately managed
- Eventual application to meet Water Framework Directive requirements
  - basin scale planning
  - attaining good water status

# Quantification of environmental flow approach

Case study: Small hydropower plant in Montenegro on Treskavacki Potok

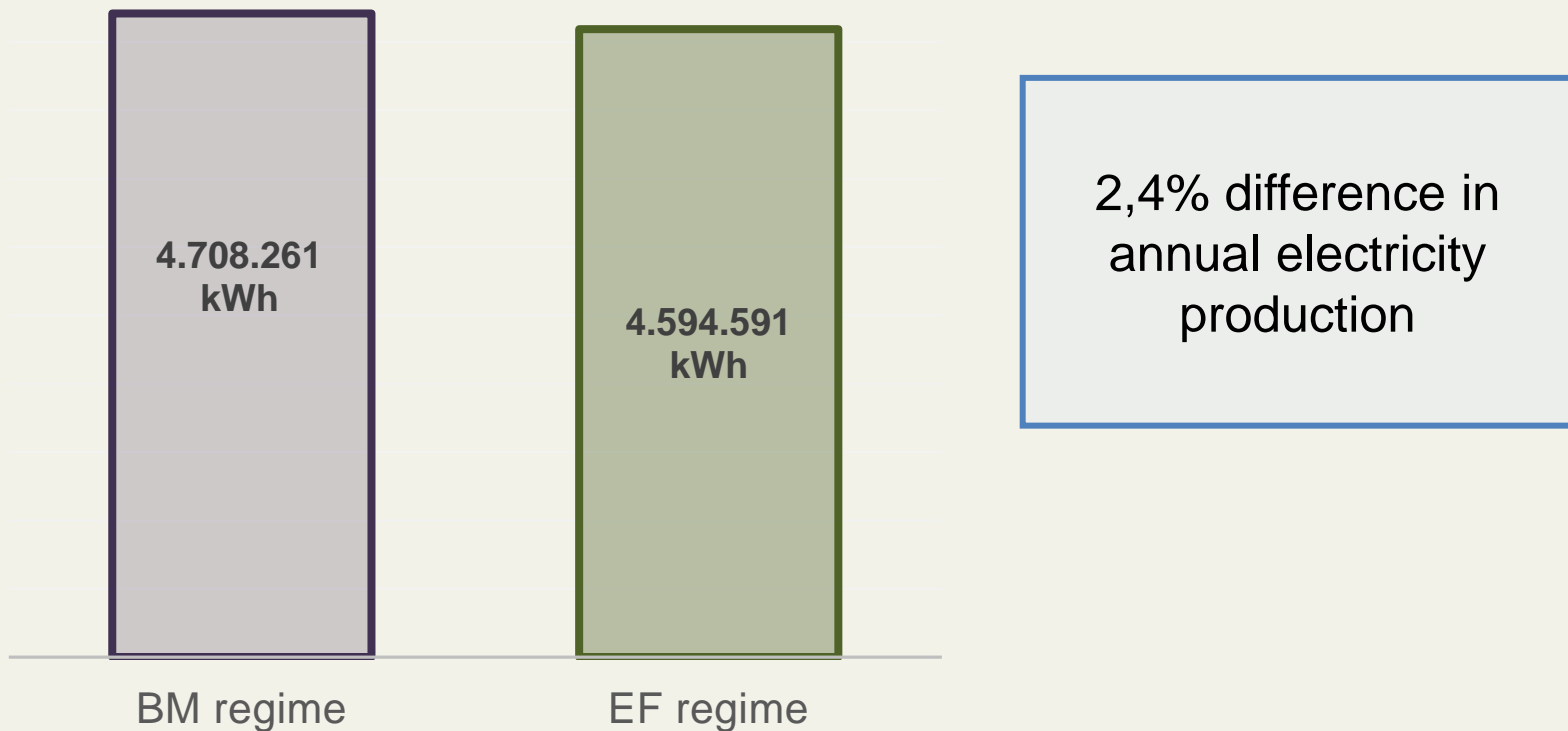
- Natural regime: recorded flow data
- Biological minimum (BM) regime: 10% of average annual flow
- Environmental flow (EF) regime: mimics variability of natural flow





## Quantification of environmental flow approach

Annual electricity production

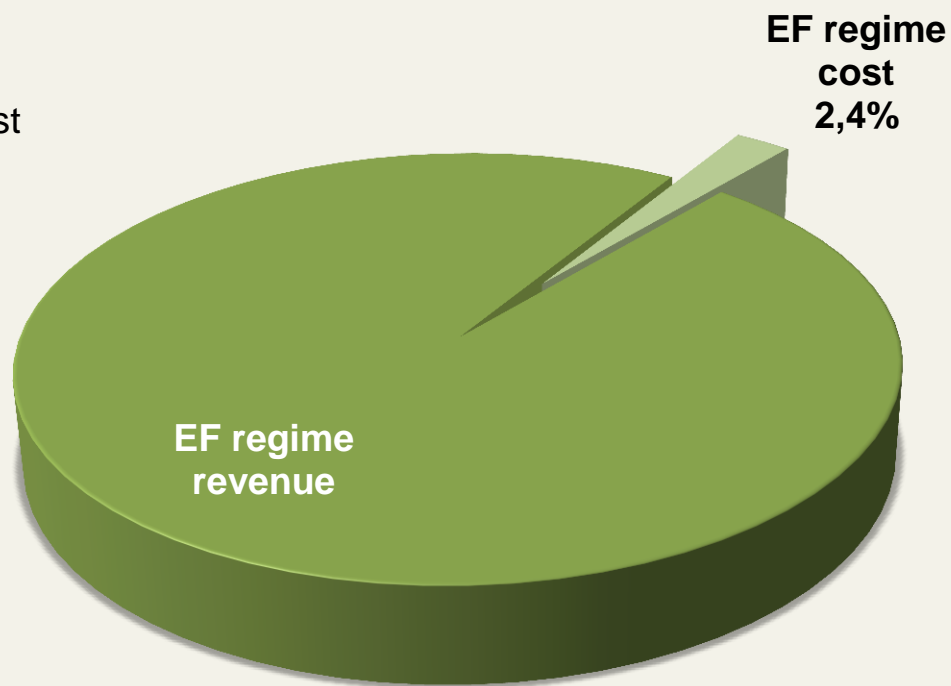


## Quantification of environmental flow approach

	BM regime	EF regime	Difference
Annual revenue*	350.295 €	341.838 €	<b>8.457 €</b>

\*Annual production \* Electricity price 0,0744 €/kWh

BM regime revenue =  
EF regime revenue + EF regime cost







## Conclusion

- Quantification on larger scale needed, however good indication of the level of financial impact
- Considering nature one of the waters users may not be so costly after all AND it pays back in environmental services spared
- Platform for transboundary cooperation and successful implementation of basin level planning



# Thank you

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