Drina Nexus Follow Up Project, component 3
Flow regulation and environmental flows

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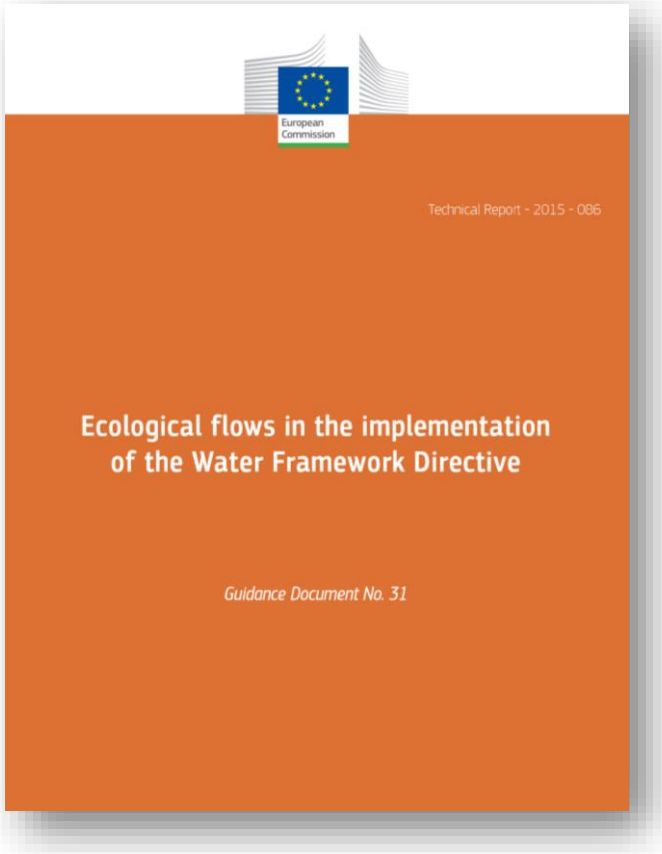
Scope of the study

1. *A review of international practice with environmental flows and good practices (in particular in the European Union and South-East Europe) and an analysis of the environmental flow regulation and its implementation in the three Drina countries;*
2. *An analysis of relevant international examples of agreeing at the transboundary level about specific aspects of flow regulation and reconciling different uses (hydropower, flood and low flow management, meeting ecosystem needs etc.);*
3. *Recommendations and options for formalizing the flow regulation in the Drina Basin.*

The European Guidance on Eflows



Background

Blueprint to safeguard Europe's water resources. Quantitative water management on a more solid foundation: identification of the ecological flow. Linked to environmental objectives.

Aims

This document aims to be guidance to **stimulate a common uptake of ecological flows** in order to support the achievement of the Water Framework Directive's **environmental objectives**.

Covering the whole WFD implementation process, it develops the steps where consideration for ecological flows is critically needed.

Working definition

Ecological flows are considered within the context of the WFD as "an **hydrological regime** consistent with the achievement of the **environmental objectives** of the WFD in natural surface water bodies as mentioned in Article 4(1)".

https://circabc.europa.eu/sd/a/4063d635-957b-4b6f-bfd4-b51b0acb2570/Guidance%20No%2031%20-%20Ecological%20flows%20(final%20version).pdf

Comparison of methods

	Hydrological	Hydraulic	Habitat modelling	Holistic
Scale	**Basin**	**Reach**	**Reach**	**Reach**
Based on	Ecosystem	Habitat	Species	Ecosystem
Cost	2.000 €	10.000 €	50.000 €	30.000 €
Time	2 days	1 month	1 year	1 year
Uncertainties	Medium	Medium	Medium-low	Medium-low
Defensibility	Medium	Medium	High	High

No single environmental flow assessment technique suits all social, economic, hydrological, and ecological contexts within a country.

Meeting of the Expert Group on Flow Regulation and Environmental Flows

- *Hosted by ISRBC in Zagreb 11-12 June 2019*
- *The Expert Group was formed of diverse expertise: water management and environment protection authorities, hydropower operators and civil society from Bosnia and Herzegovina, Montenegro and Serbia.*
- *Provides advice and input for the study by supporting the analysis, shaping the scope and developing the recommendations.*
- *Officials and experts agreed to work towards a harmonized methodological approach to determine environmental flows that provides water for ecosystem needs but also takes into account infrastructure on the river and water uses.*

WWF's view

- Montenegro – Water Act recognized e-flow from 2015, a by-law is endorsed in 2016, monitoring is also defined in 2018, but there are still issues in implementing it

- Bosnia and Herzegovina – Federation of Bosnia and Herzegovina had a by-law on e-flow, hydrological method chosen, in Republika Srpska only biological minimum

- Serbia – biological minimum is prescribed, although often without baseline data on hydrology and species

VARIOUS INTERNATIONAL EXAMPLES OF FORMALIZING FLOW REGULATION REVIEWED, AMONG THEM: Albufeira Convention (1998): Spain And Portugal

Legal framework for cooperation and coordination

- Environmental global protection of surface water and groundwater bodies and related ecosystems
- To guarantee sustainable water use and mitigate effects
  - floods,
  - droughts
  - water scarcity.
- **Cooperation** based on three principal elements:
  - Active, regular and systematic exchange of information and consultation
  - Harmonise technical, administrative and legal measures
  - Define a flow regime in international rivers
- **Coordination of water management plans and programme of measures (WFD)**
  - ✓ Common environmental objectives
  - ✓ Coordination of works & Programme of measures

Annual

Total volume in reference dams 1th March (hm^3)	Cumulated precipitation from 1th Octuber to 1th March	
	Precipitation higher than 65%	Precipitation lower than 65%
> 4000	600	400
3150-4000	500	300
2650-3150	400	Exeption (*)
<2650	Exeption (*)	Exeption (*)

Minimum flow

Qmin	2 m^3/sg
Annual mínimum volume	63,1 hm^3/año

From annual to trimestral

1 Trimester

Storage volume in selected dams [hm^3]	Pp higher than 65%	Pp lower than 65%
> 3700	63	42
2850-3700	53	32
2350-2850	42	Exeption (*)
< 2350	Exeption (*)	Exeption (*)

2 Trimester

Storage volume in selected dams [hm^3]	Pp higher than 65%	Pp lower than 65%
> 4000	74	49
3150-4000	61	37
2650-3150	49	Exeption (*)
< 2650	Exeption (*)	Exeption (*)

3 Trimester

Storage volume in selected dams [hm^3]	Pp higher than 65%	Pp lower than 65%
> 3700	42	28
2850-3700	35	21
2350-2850	28	Exeption (*)
< 2350	Exeption (*)	Exeption (*)

4 Trimester

Storage volume in selected dams [hm^3]	Pp higher than 65%	Pp lower than 65%
> 3400	32	21
2550-3400	26	16
2050-2550	21	Exeption (*)
< 2050	Exeption (*)	Exeption (*)

(*) Exeptions witn mínimum flows:

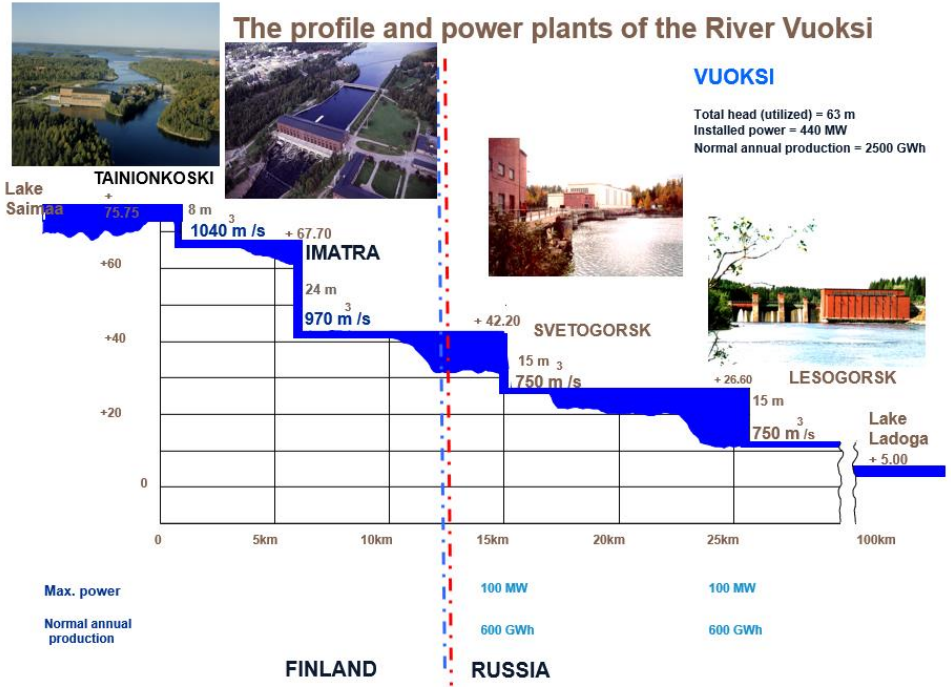
Vuoksi Discharge Rule (Finland, Russia)

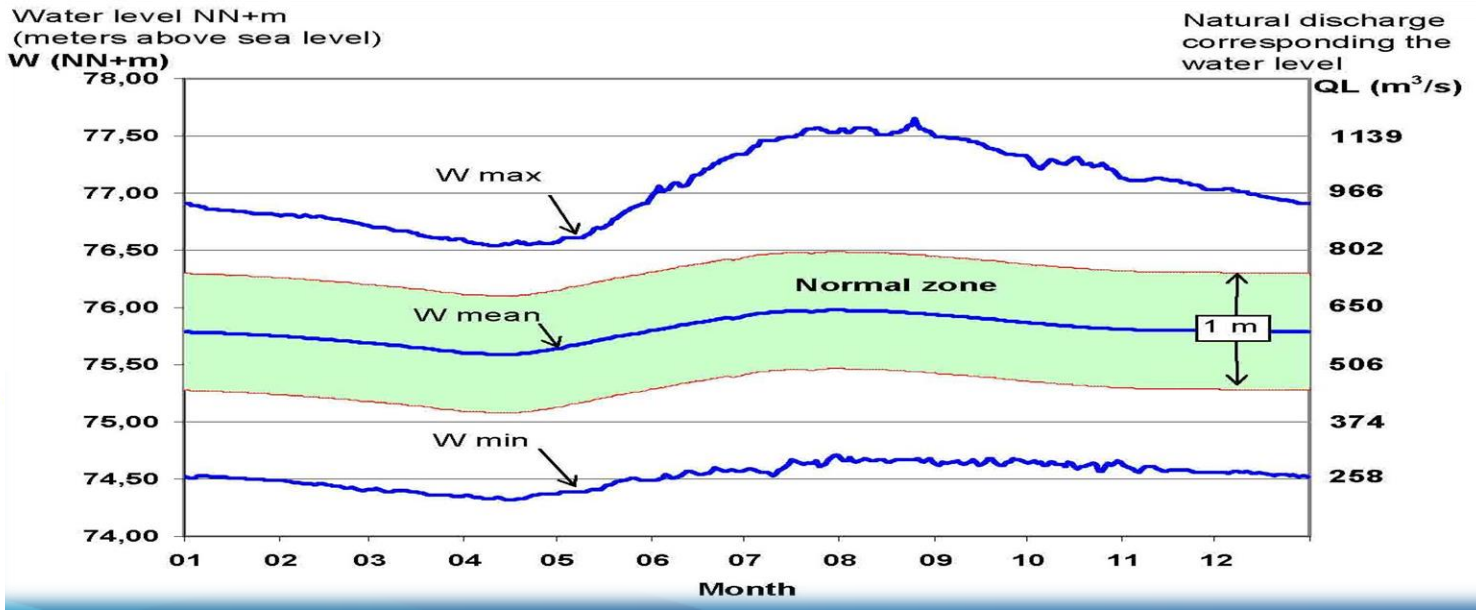
Hydropower and flood risks main challenges at the starting point in 1970s

Development targets at the outset

- Increase winter discharge and minimum flows in River Vuoksi
- Prevent exceptionally high and low water levels in Lake Saimaa & in River Vuoksi

First plan 1979 accepted by Joint Commission; Jointly accepted 1989, implemented 1991





Recommendation 1

Reconvene the Expert Group on Flow Regulation and Environmental Flows

Experts and authorities to progressively work towards adopting a harmonized methodological approach to e-flows through upgrading the legal and regulatory basis. The tasks:

- Agree about a common set of definitions
- Share experience and good practice about environmental flows, including the legal basis and about application to different types of waters, monitoring
- Agree about the key common features for approaches to e-flow: linking to the ecological status of water bodies, distinguishing what is feasible for old HPPs and new planned HPPs, heavily modified vs. natural water bodies etc. as appropriate. Different functions and uses to be reflected, move beyond biological minimum and building on hydrological approaches gradually.
- Indicators for critical environmental flows

Recommendation 2

Assessment of the current e-flow methods for harmonization potential

- Carry out a realistic assessment of e-flow calculation possibilities in the basin, based on current monitoring capabilities and country-level legal requirements. Build on the results of the project “Support to Water Resources Management in the Drina River Basin”.
- Review the legal aspects of methods for calculation of environmental flows, determine the scope of e-flows, select reference methods.
- Formulate a strategy for e-flow method selection according to the degree of conflict, urgency in time and costs. Validate methods through selected pilot studies.
- Evaluate the role and potential for use of e-flows in achievement of environmental objectives according to the WFD (e.g. in the context of the 2nd Sava RBMP)

Recommendation 3

Initiate a dialogue about operational rules for the HPPs between the power companies and authorities, supported by the necessary studies and data

- Start discussing about harmonized or coordinated operational rules for all the major HPPs to reflect relevant issues, water uses and functions.
- Promote transparency about the operational rules and regimes.
- Improve sharing of and access to hydrological and other data, and identify by river section the critical flow issues and related needs: flooding, sediment management, water shortage (including other/future uses), environmental flows, recreational uses etc.
- Determine the role of flow control for erosion and deformation of the river course and floating solid trash (landfills), pressures on water quality (dilution needs).
- Estimate the implications of flow regulation adjustments to electricity generation for an informed dialogue between the power sector and water management authorities. Clarify and agree where (small) hydropower development is possible.

Recommendation 4

Identify for best international practices options for sustainable coordination and optimization for flow regulation in the Drina

- Evaluate the relevance for the Drina of selected international experiences about diverse flow regulation aspects that have been formalized in some way elsewhere, as agreements, protocols, permit conditions, contractual or other legal/institutional arrangements. These include, for example, conditions for spare reservoir capacity as flood protection measure, compensating energy generation losses upon deviations from agreed discharge regime, specifying by a fine time-step flow requirements according to hydrological conditions (e.g. precipitation as threshold), determining flow releases to meet the requirements of ecosystem needs; swaps of electricity and balancing services, coordinated sediment wash out, river contracts etc.