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PRESERVING ALPINE RIVERS IN SLOVENIA WITH DETERMINATION OF ECOLOGICALLY ACCEPTABLE FLOW

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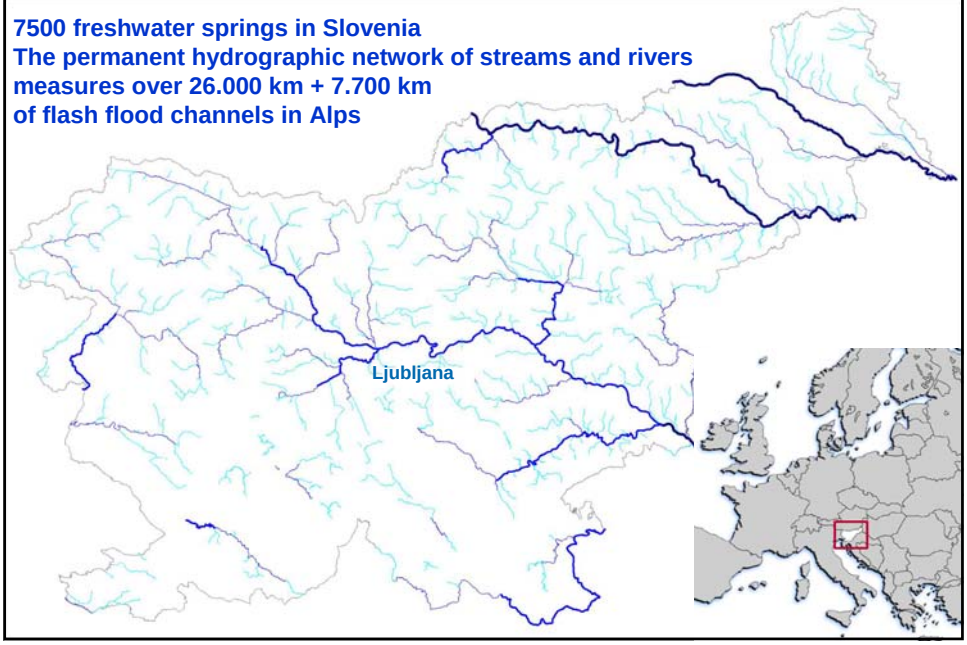
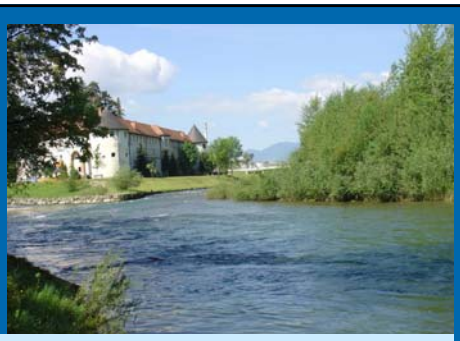
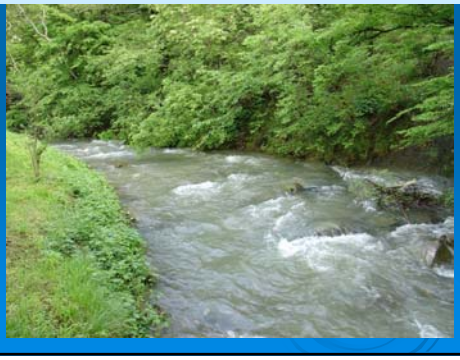
1. INTRODUCTION

7500 freshwater springs in Slovenia
The permanent hydrographic network of streams and rivers measures over 26.000 km + 7.700 km of flash flood channels in Alps



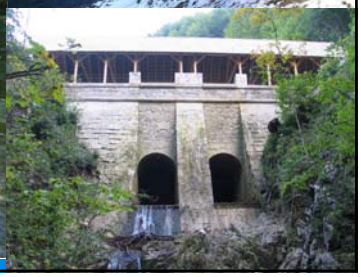


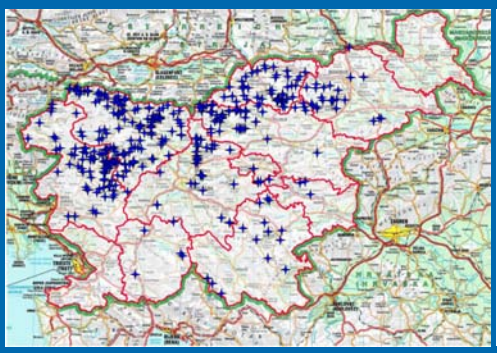
Water regime is very variable and sensitive to all kinds of human impacts!

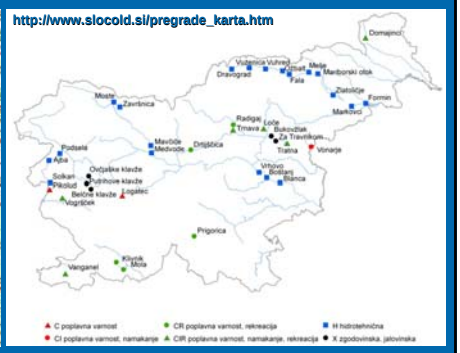


Water abstraction / diversion in Slovenia:

- Fish farming: 290
- Technological purposes: 80
- Irrigation: 40
- Drinking water
- Energetic use: 500
- Tourism ...

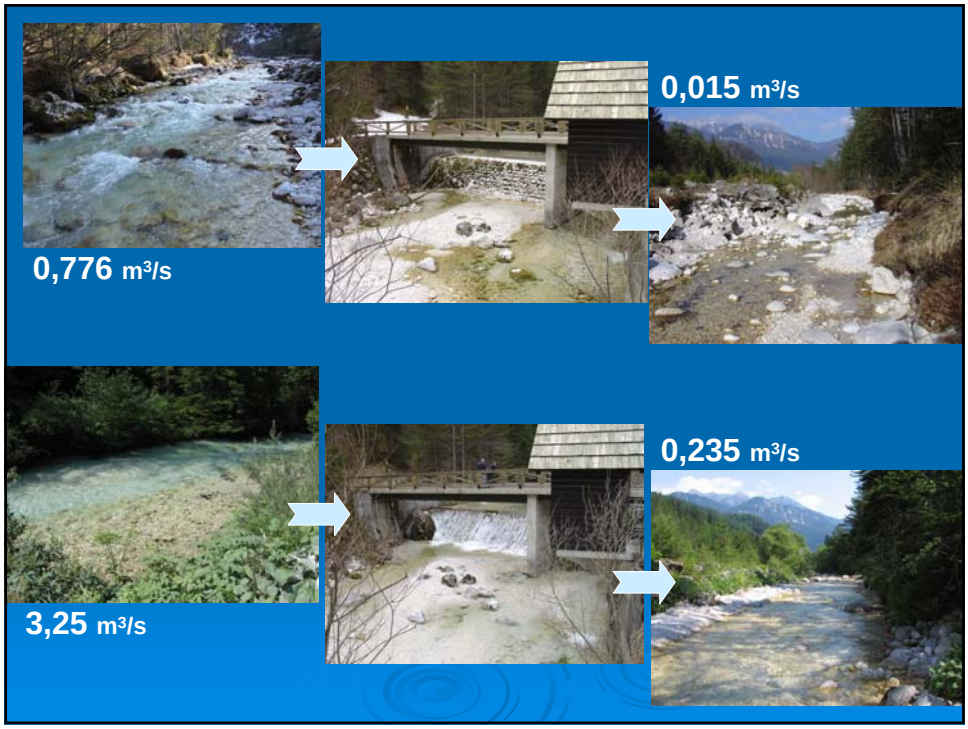


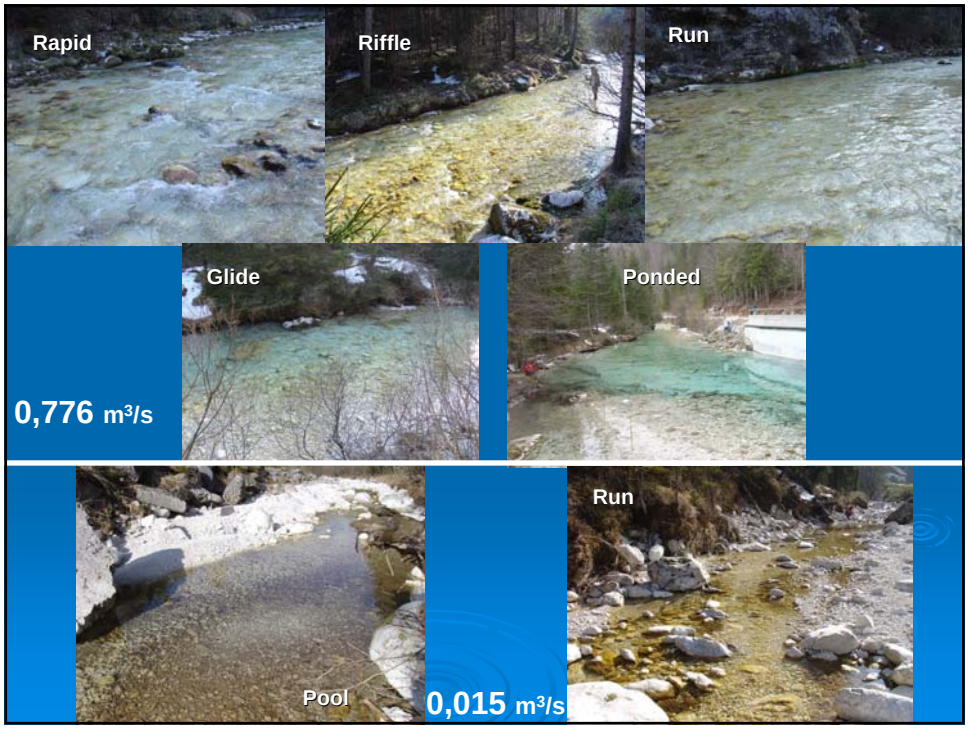




SHPP and HPP in Slovenia

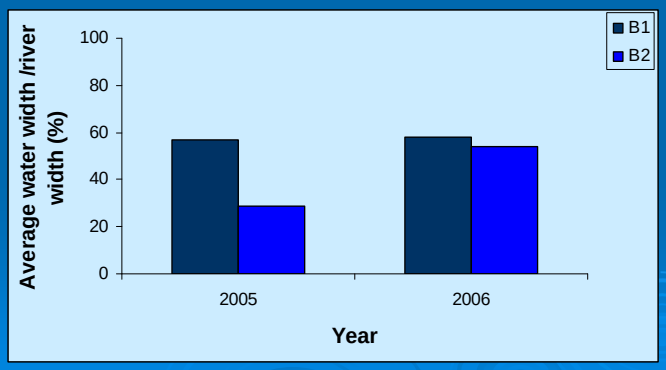

HYDROLOGY
MORPHOLOGY
PHYSICO-CHEMICAL PARAMETERS
BIOLOGY
RIPARIAN ECOSYSTEM
AQUATIC ECOSYSTEM


0,776 m³/s
0,015 m³/s
3,25 m³/s
0,235 m³/s


Rapid
Riffle
Run
Glide
Ponded
0,776 m³/s
Pool
0,015 m³/s
Run

Comparison in mesohabitats between 2005 and 2006

	2005		2006	
	B1	B2	B1	B2
No. of mesohabitats/km	43	81	19	38
Mean water width (m)	9.20	3.15	9.30	6.40
Q (m^3/s)	0,776	0,015	3,250	0,235



2. DEFINITION AND METHODS FOR EAF DETERMINATION

- Biological minimum, Minimum flow
- WFD → New Water Act 2002: ECOLOGICALLY ACCEPTABLE FLOW is the quantity and quality of water which preserve ecological balance in the stream and in the riparian zone and do not worsening the ecological status of running waters

EAF: to protect river ecosystem

ECOLOGY : ECONOMY

There are complex effects between ecosystem parameters, these show that the ecosystem is able to adapt to relatively small changes which occur in nature. If the balance is interrupted by big changes then the ecosystem is not stable anymore.

→ EAF determination is a difficult task: interdisciplinary approach for EAF determination and each section of the river should be treated separately

Methods for EAF determination:

1. Hydrological methods

   look up tables, indices

2. Hydraulic rating methods

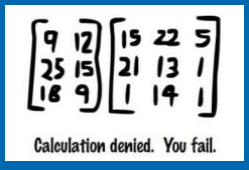
   fieldwork, rapid desk - top analysis, combination hydrology, hydraulics, ecology

3. Habitat simulation

   relation flow: habitat

4. Holistic methodologies

   functional analysis, panels of experts



3. APPLICATION OF EAF

- 1992 - 1994: Criteria for minimum flows
- 1992 - 2009: EAF evaluation on more than 200 river sections with water abstraction/diversion
- Results of fieldwork and experiences were selected criteria

RAPID AND DETAILED METHOD

- 2001 – 2005 EU projects
- Development of new methods around the world

→ **DECREE, 2009**

- Gap between MESP and interdisciplinarity; theory and practise

4. DECREE OF EAF

Pursuant to the third paragraph of Article 71 of the Waters Act (Official Gazette of the RS, Nos. 67/02, 110/02 – ZGO-1, 2/04 – ZZdrl-A, 41/04 – ZVO-1 and 57/08), the Government of the Republic of Slovenia issues the

D E C R E E on the criteria for determination and on the mode of monitoring and reporting on ecologically acceptable flow

(OG RS No. 97/2009)

22 articles:

I. GENERAL PROVISIONS
II. CRITERIA FOR DETERMINATION OF EAF
III. THE MODE OF MONITORING AND REPORTING ON EAF
IV. SUPERVISION
V. PENAL PROVISIONS
VI. TRANSITIONAL AND FINAL PROVISIONS

I. GENERAL PROVISIONS (Articles 1- 4)

Article 2 (Application)

- use of surface water

Article 3 (Exceptions)

This Decree shall not apply to the special use of water

- from springs in the case of own supply of drinking water
- as a result of which a HMWB is determined

BUT if a legally valid water permit comprise the determination of flow values (BM, MF or EAF), this should be considered as EAF under this Decree.

Article 4 (Meaning of terms)

MF, MMF,
Irreversible / Reversible water abstraction
The length of water abstraction
Dry and wet season

II. CRITERIA FOR DETERMINATION OF EAF (Articles 5-10)

Article 5 (Determination of EAF)

- characteristics of water abstraction,
- hydrological, hydro morphological and biological properties of watercourses and
- the information on protection arrangements

Article 6 (Hydrological elements)

- MF, MMF: How? Where? When?
  → Standards

Article 7 (Determination of EAF on the basis of hydrological elements)

$$EAF = f * MMF$$

f factor is defined in relation to:

1. Irreversible or reversible WA

HPP, drinking water, irragation

2. The length of river section with reversible WA

Short term WA:

L ≤100 m for F ≤ 100km^2

L ≤ 500 m for F > 100km^2

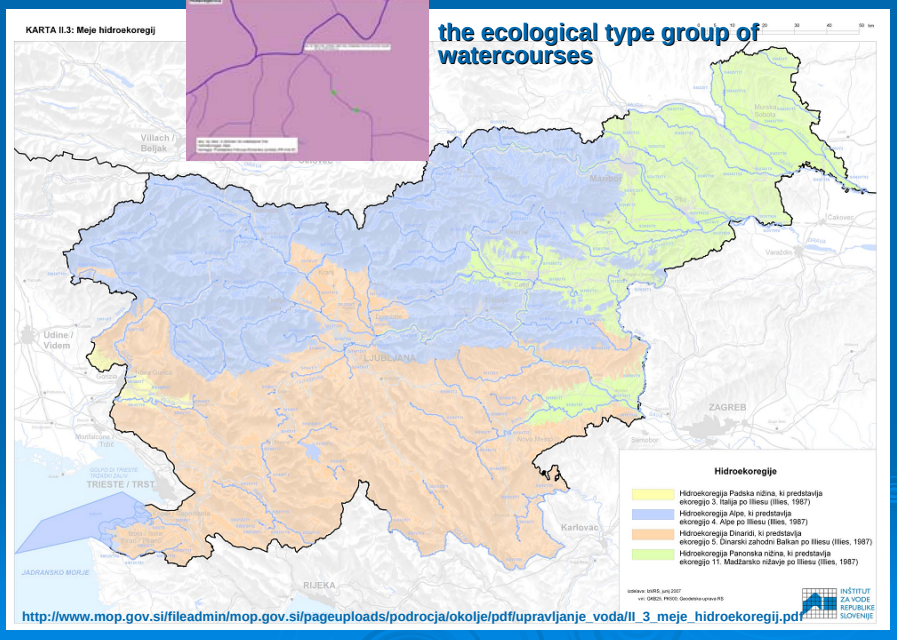
3. The quantity of abstracted water, defined with reference to the value of the MF at the abstraction site,

Large-scale WA: Qi> MF

4. The ratio between the MF and MMF

if the ratio between the MFand MMF at the abstraction site exceeds 20, the factor f shall be multiplied by 1,6 for watercourses in ecological type 1 and 2

5. The ecological type group of watercourses



http://www.mop.gov.si/fileadmin/mop.gov.si/pageuploads/podrocja/okolje/pdf/upravljanje_voda/II_3_meje_hidroekoregij.pdf

Eco type	Catchemnt area				
	< 10 km²	10-100 km²	100-1.000 km²	1.000-2.500 km² and sQs(1) < 50 m³/s	> 2.500 km² or sQs(1) > 50 m³/s
Point WA					
1(2)	0,7	0,7	0,5	0,4	
2(2)	0,7	0,5	0,4	0,4	
3	0,5	0,4	0,3		
4					0,3
Short WA all year or long WA in dry period					
1(2)	1,2	1,2	1,0	0,8	
2(2)	1,2	1,0	0,8	0,8	
3	1,0	0,8	0,7		
4					0,7
Long WA in wet period					
1(2)	1,9	1,9	1,6	1,3	
2(2)	1,9	1,6	1,3	1,3	
3	1,6	1,3	1,1		
4					1,1

Article 8 (Study for the determination of EAF)

- EAF may be determined on the basis of a study, submitted by an initiator or applicant for water right.
- The study shall be examined by IzVRS
- The requirements for the preparation of a study are laid down in Annex 3

11 Chapters:

- Description of the intended encroachment
- Justification for a different determination of EAF
- Characterisation of the watercourse
- Definition of the micro location(s) within the section under consideration
- Description of the status of surface WB and the status at the abstraction site
- Description of hydromorphological characteristics
- Review of the sources of pollution upstream
- Review of other uses
- Proposal of the environmental objectives
- Expert opinion on the value of EAF

✓ flows shall be provided that do not deteriorate but ensure good chemical and ecological potential of surface waters;

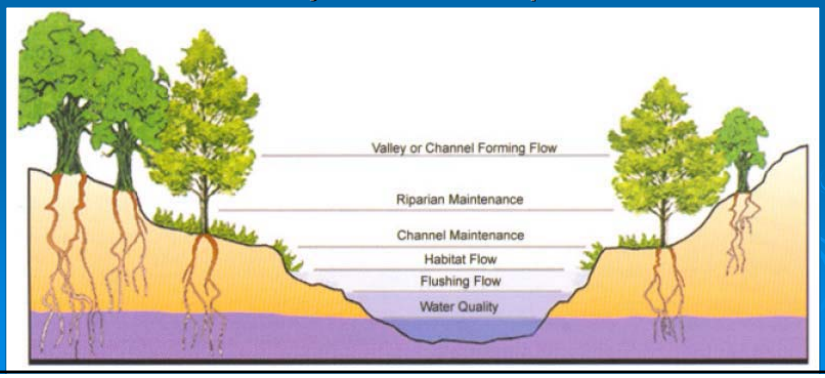
✓ flows shall be provided that preserve the size, shape and structures in the streambed;

✓ flows shall be provided that preserve habitats, i.e. the inundation flows removing silt and organic detritus;

✓ minimum acceptable flows shall be provided that preserve the aquatic and riparian ecosystems;

✓ optimum flows shall be provided that ensure mesohabitats for the target groups and target species of organisms,

✓ natural seasonal flow dynamics shall be provided.



Article 9 (Determination of EAF in relation to the protection arrangements)

- The value of EAF may changed according to the opinion of the impact of water use on the fish status and according to the nature protection policies

Article 10 (Exceptions to the determination of EAF)

- The value of EAF shall not be determined for point abstractions for HPP: the water right holder should ensure sufficient water enabling fish migration at the abstraction site at all times of the year.

III. THE MODE OF MONITORING AND REPORTING ON EAF (Articles 11-13)

Article 11 (Exceptions to the determination of EAF)

- The EAF, shall be valid in all annual periods, except in situations when the natural flow at the abstraction site is lower than the EAF.

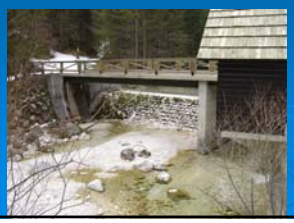
Article 12 (The mode of monitoring the EAF)

- Facilities for WA must be designed that not to allow WA when the flow at the abstraction site falls below the EAF.

  OR
- the water right holder must ensure daily or continuous monitoring of flow or water level

Article 13 (The mode of reporting the EAF)

- The water right holder shall describe the mode of monitoring the EAF in the Rules of Procedure applying to the operation and maintenance of water facility
- On request, the water right holder shall send the data to the Ministry or the inspector responsible for waters or to the water protection supervisor.



IV. SUPERVISION

Article 14

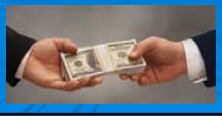
Supervision of the implementation of the Decree shall be carried out by inspectors responsible for waters and water protection supervisors in accordance with the regulations governing water.

V. PENAL PROVISIONS

Article 15

A fine of between EUR 4,000 and EUR 125,000 shall be imposed for misdemeanours on legal entities if they:

use water in such a way that the EAF is not ensured in compliance with this Decree



VI. TRANSITIONAL AND FINAL PROVISIONS (16-22)

Article 16 (Water rights with EAF)

• If a legally valid water permit, concession contract, concession instrument or design documentation, on the basis of which a legally valid building permit or operating licence is granted, comprise the determination of flow values, defined as a biological minimum, minimum flow rate or EAF → shall be considered EAF under this Decree.

• If the flow value referred to in the preceding paragraph is higher than the value of EAF under this Decree, the authority shall determine the value of EAF in accordance with this Decree.

Article 17 (Water rights without EAF)

• A lower value of EAF shall be determined in the case of WA for the production of electric power by SHP and if necessary for the preservation of 85 % of average annual production of electricity by the SHP concerned, defined as an arithmetic mean of annual electricity generation values within the observation period

Article 21 (Adjustment of f factors)

The values of f factor shall be reviewed for the first time by the end of 2014 at the latest and thereafter every six years.

5. CONCLUSIONS

- Because of biodiversity of Slovenian watercourses it is imperative that ecological balance should be protected: structure and function
- In last 18 years there has been strong efforts to improve ecological characteristics of the Slovenian running waters: with determination and assurance of EAF
- WFD – EAF – RBMP
- Advantages
- Disadvantages
- Improving methodology

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