Water Resources Management issues in Bosnia and Herzegovina

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2. Historical developments: towards IWRM
3. The challenge for water resources management
4. Water Resources Management issues in B&H
5. Conclusions - Basic characteristics of water management and goals in B&H

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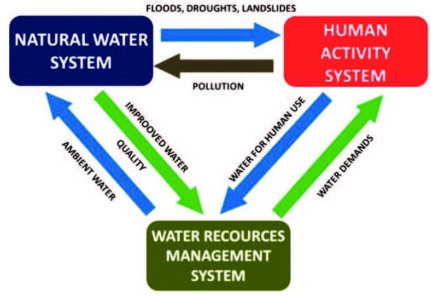
1. What is IWRM?

- Given that there is no unique definition of the term Integrated Water Resources Management, the **Global Water Partnership (GWP**) definition is often used, by which ***term Integrated Water Resources Management (IWRM) is a process that promotes the coordinated development and management of water, land and other related resources in order to maximize emerging economic and social wealth in an equitable manner, without compromising the viability of vital ecosystems*** (GWPs, 2004).

This approach to IWRM enables the **management and development** of water resources in a balanced and sustainable manner, considering **social, economic and environmental factors and interests**.



Floods: new concepts emerge - old problems remain, (O. Bonacci, 2017)

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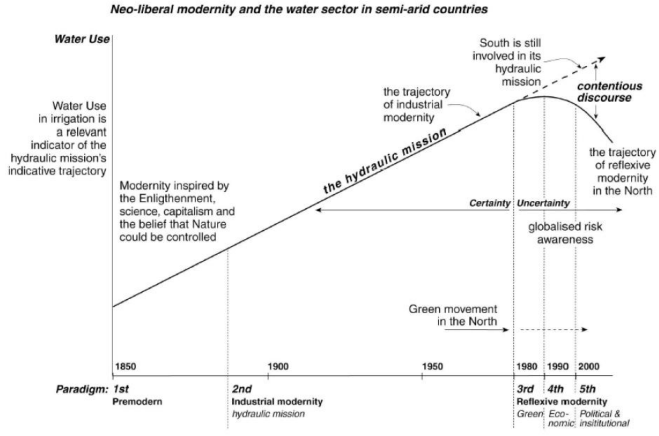
2. Historical developments: towards IWRM



The evolution of water resources management according to Allan (2003), with the five water management paradigms, (*Principles of Integrated Water Resources Management, Pieter van der Zaag and Hubert H.G.Savenije, UNESCO-IHE Delft, October 2014***)**

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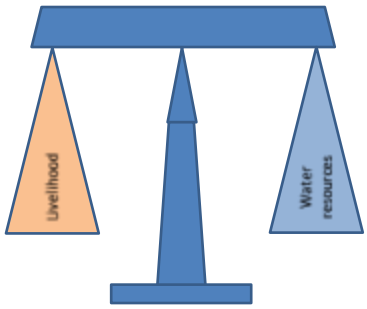
3. The challenge for water resources management

The overall issues….

- Water resources are under preassures
- Population are under water stress
- Overexploitation
- Rise of water pollution
- Ecosystem protection
- Space and time water variability
- Risk management (floods, drought, …)
- ……



Balancing the use of water resources as a basis for the livelihoods of a growing population in the world and the protection and conservation of water resources to maintain its functions and characteristics.

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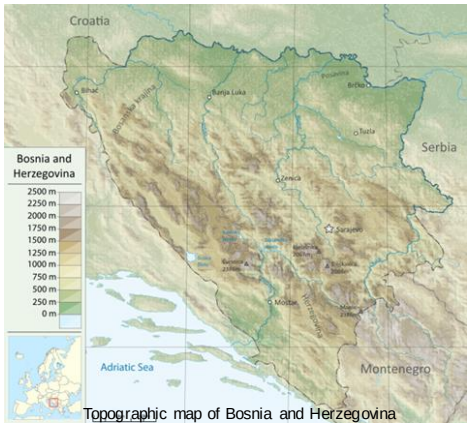
4. Water Resources Management issues in B&H

4.1.Natural features of B&H



Topographic map of Bosnia and Herzegovina

Bosnia and Herzegovina is located in South-East Europ at the Western Balkans peninsula. Total area of the country is 51.209,2 km^2, of which 51.197 km^2 is land and 12,2 km^2 is the area of the sea.

Due to the location of Bosnia and Herzegovina in the southeast of Europe and the central part of the Balkan Peninsula, there are three climate zones: the moderate continental, the Alpine climate, and the Mediterranean climate in the coastal region.

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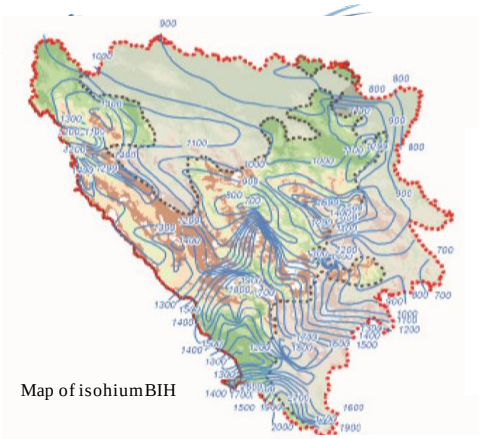
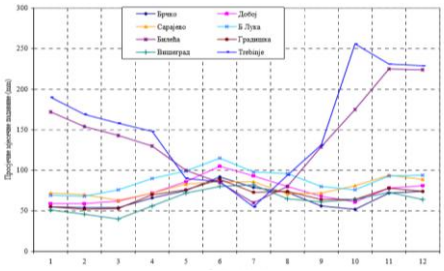
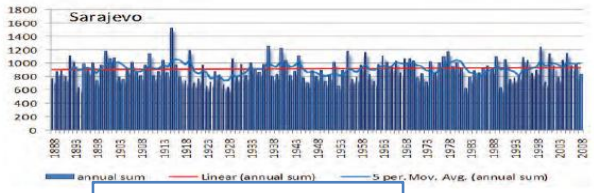


Map of isohium BIH

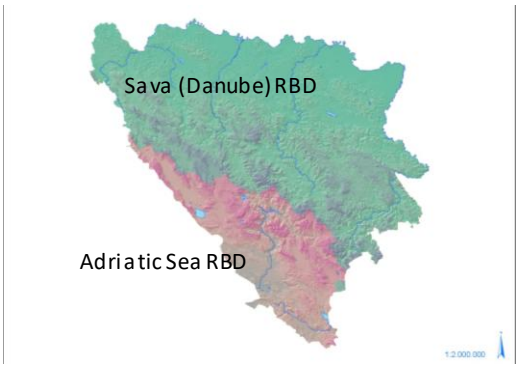


Average monthly precipitation for different parts of BH



Total annual precipitation for Sarajevo

4.2. Basic characteristics of waters of Bosnia and Herzegovina



Hydrographically, Bosnia and Herzegovina is belonging to Black (75%) and Adriatic Sea (25%) basins.

According to the World Bank report (2003), the relative annual availability of water resources per capita rank Bosnia and Herzegovina in the countries of "average water availability" between 5.000-10.000 m^3/capita.

Average yearly precipitation in the territory of BH is 1.250 l/m2 which theoretically results with average yearly potential outflow of 2.030 m3/s.

However, it is estimated that only 57% of total precipitation water (1.155 m3/s) really outflows from territory of BH (403 m3/s outflows towards the Adriatic Sea and 722 m3/s outflows towards the Sava river basin and to the Black Sea)

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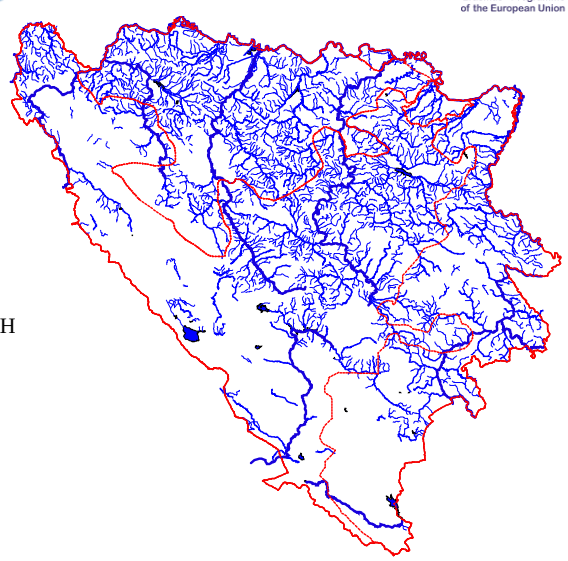
- The river network of BiH



The length of the river network is about 9000 km

Characteristic hydrological parameters for the main river basins are given in Table

Basin	Area of the basin (km²)	Length of watercourses longer than 10 km	No. of inhabitants (1991)	Average flow (m³/s)	Minimal flow $Q_{min.mont95\%}$ (m³/s)
Immediate Sava river basin	5.506	1.693,2	635.353	63	1,5
Una in BH	9.130	1.480,7	620.373	240	41,9
Vrbas	6.386	1.096,3	514.038	132	26,3
Bosna	10.457	2.321,9	1.820.080	163	24,2
Drina in BH	7.240	1.355,6	422.422	124	24,1
Black Sea Basin	38.719	7.947.7	4.012.266	722	
Neretva and Trebišnjica	10.110	886.8	436.271	402	56,5
Cetina in BH	2.300	177	79.089	31	1,8
Adriatic Sea Basin	12.410	1.063,8	515.360	433	
Bosnia and Herzegovina	51.129	9.011,5	4.527.626	1.155	

Average yearly precipitation in the territory of BH is 1.250 l/m2 which theoretically results with average yearly potential outflow of 2.030 m3/s.

The average surface runoff in BiH (l/s/km^2), according to the flows registered in the profiles of surface watercourses

Specific discharges of average and minimum water flow in Bosnia and Herzegovina

Basin	Area (km^2)	No. of inhabitants (1991.)	Average Discharge			Minimal Discharge		
			m^3/s	l/s/km^2	l/s/capita	m^3/s	l/s/km^2	l/s/capita
Black Sea	38.719	4. 012.266	722	18	0,18	118	3	0,03
Adriatic Sea	12.410	515.366	433	35	0,84	58	4,7	0,11
Bosnia and Herzegovina	51.129	4.527.626	1.155	23	0,25	176	3,5	0,04

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4.3. Historical Overview of Water Management in Bosnia and Herzegovina

Water resources management and building of the water infrastructure has century's long tradition in Bosnia and Herzegovina.

First water supply system was built in Sarajevo in 1462

The first water management facilities were mainly used for settlements water supply and for the irrigation.
According to research, there is a belief that the Romans in the first century organized at the area of Ilidža (Sarajevo) a settlement with spas, hotels and other contents that were characteristic tor that period.

Urban ager Res publicae Aquarum S..., from 1st century

Field of urban public water supply ... S, from the 1st century

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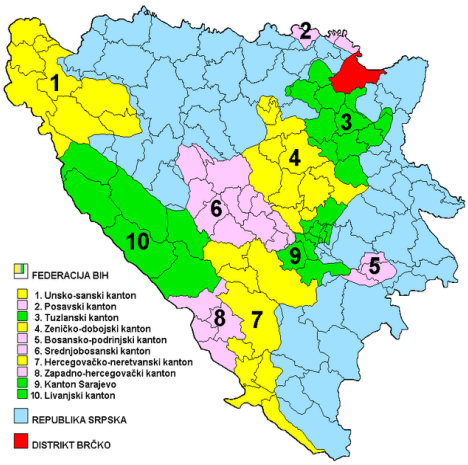
4.4. The legal framework for water management in BH

Bosnia and Herzegovina is decentralized state with two entities (Federation of Bosnia and Herzegovina and Republic of Srpska) and Brcko District. FBiH consists of 10 cantons (each canton has its Government and Constitution).
There are 16 administrative cities, 71 municipalities in FBiH and 57 municipalities in RS as the local administrative units. Brcko District is formed in 2000. as a separate administrative unit administratively under direct sovereignty of Bosnia and Herzegovina



Administrative structure of BiH

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The Water Law of 2006 defined the basic territorial unit for water management, watershead (district). FBiH two watershaed are defined- the watershaed of the Sava River and the watershaed of the Adriatic Sea. RS two watershaed are defined - the watershaed of the Sava River and the watershaed of the Trebišnjica river

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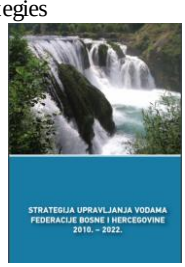
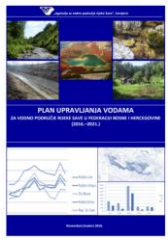
4.5. Legislation and water sector policies

The basic legal act in the field of water is the Water Law, which regulates the water management within the territory of the Federation of Bosnia and Herzegovina (FBiH) i Republika Srpska (RS).

The purpose of the Water Law is to ensure integrated water management with the aim of achieving good water status and preventing its degradation, achieving sustainable water use, ensuring fair access to water, promoting social and economic development, ensuring protection from harmful effects of waters, public participation in decision-making, fulfillment of the undertaken international obligations, etc. - Water Management Strategies







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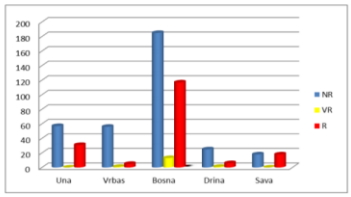
Water Management Strategies developed for the FBiH and RS levels
Water Management Plans for BIH are prepared

The water management strategy includes in particular:
1. assessment of the situation in the field of water management,
2. goals and directions of water protection, protection against harmful effects of water and sustainable use of water,
3. priorities for achieving water management goals,
4. an assessment of the resources needed to implement the program and deadlines for achieving the objectives,
5. necessary activities to implement obligations under international treaties relating to water management.

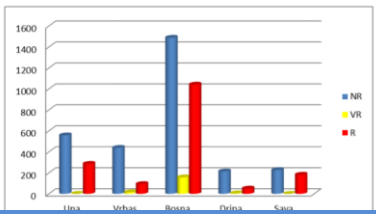
For the implementation of the Strategy, Water Management Plans are being prepared for the Sava River Basin District and the Adriatic Sea Basin District.

Tabela 11. Procjena rizika od organskog zagađenja

R.br.	Podsliv	NPR		VPR		PR		Ukupno	
		Br. VT	Dužina (km)	Br. VT	Dužina (km)	Br. VT	Dužina (km)	Br. VT	Dužina (km)
1	Una	57	557,23	0	0	31	285,72	88	842,95
2	Vrbas	56	438,32	1	14,48	5	92,85	62	545,68
3	Bosna	185	1488,44	13	156,96	117	1041,56	315	2683
4	Drina	25	213,3	1	4,4	6	49,86	32	267,6
5	Sava	18	226,08	0	0	18	182,13	36	408,21
	Ukupno	341	2923,37	15	175,84	177	1652,12	533	4747,44



Slika 4. Klase rizika od organskog zagađenja po broju vodnih tijela



4.6. Some results from WRBM Plan

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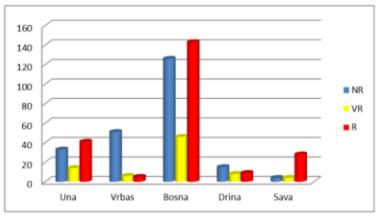
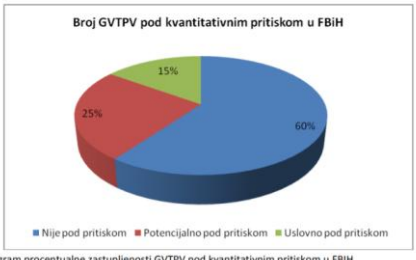
Slika 24. Ekološki status vodnih tijela određen na osnovu rezultata monitoringa u periodu 2011-2013.godina



Slika 7. Klase rizika od zagađenja nutrijentima po broju vodnih tijela



Sl. 57 Dijagram procentualne zastupljenosti GVTPV pod kvantitativnim pritiskom u FBiH

Slika 25. Hemijski status vodnih tijela određen na osnovu rezultata monitoringa u periodu 2011-2013.godina

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5. Conclusions - Basic characteristics of water management

Today's state of the water legislation of Bosnia and Herzegovina has distinct specifics that distinguish it from national water systems of neighboring countries, or the countries of Southeastern Europe.

According to existing legislation the key competences for water resources management in BiH are distributed at the following levels:

- level of Bosnia and Herzegovina;
- level of Entities and Brčko District;
- level of cantons (only in FBiH);
- level of local administration (cities and municipalities).

The boundary of the entities, as well as the cantonal boundaries, disintegrated river basins.
It has a negative impact on the integral and sustainable water resources management across the entire territory of the state.

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5. Conclusions - Basic characteristics of water management

Although complicated and complex due to the political system, water resources management planning in Bosnia and Herzegovina can be called flexible and interactive at Entity levels.

This planning directs development towards potential resources but leaves enough space for the implementation of adaptive solutions. First, water resources are analyzed, the scope of needs is roughly considered, defining possible conflicts of interest of stakeholders, protection and regulation of waters; define potential conflicts of interest in the water using activities, use of space; define priorities in conflict situations.

One can say that this type of planning is characteristic for the countries of regulated market economies, due to the wide range of ownership relations. This type of planning has to be elastic, oriented to the development and allocation of capital towards resources, while not imposing unnecessary rigid restrictions, proved to be the only possible in a country like BiH.

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Thank you for attention!

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