DRIN CORDA
COORDINATED ACTION FOR A SUSTAINABLE FUTURE

Enabling Transboundary Cooperation & Integrated Water Resources Management in the extended DRIN RIVER BASIN

5th Drin Stakeholders Conference

BLACK DRIM BASIN
HYDRO POWER AND FLOODING
EFFECTS AND RISKS

Author:

Marjan Glavincheski, Civil Engineer

Slavko Milevski, MSc, Civil Engineer

AD ELEM, HES Crn Drim, Struga, R. Macedonia

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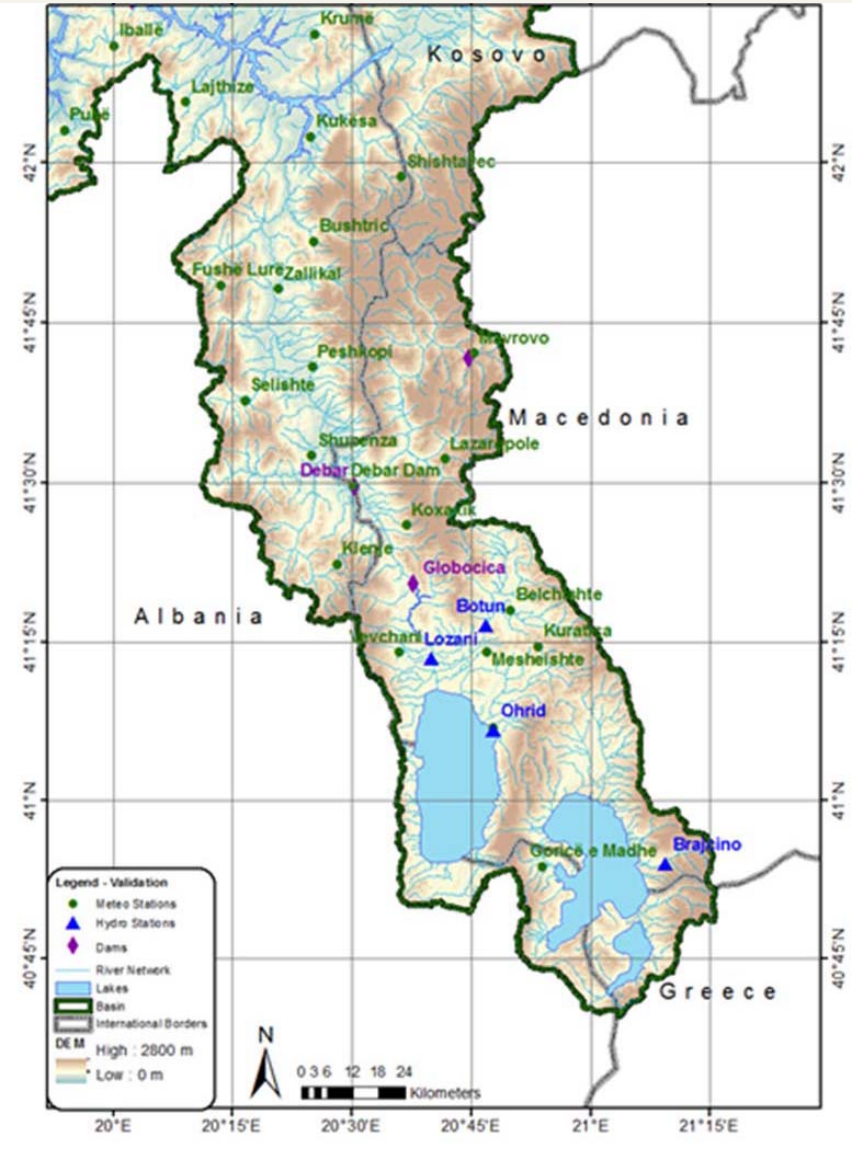
Podgorica

The Black Drim basin



Sub basin	Area km 2	% of total Drim basin area
Lake Prespa	1065	5%
Lake Ohrid	919	5%
Black Drim River	4471	22%
TOTAL	**6455**	**32%**

Sub basin	Population	% of total population in Drim basin area
Lake Prespa	46358	3%
Lake Ohrid	120122	7%
Black Drim River	305415	19%
TOTAL	**471895**	**29%**

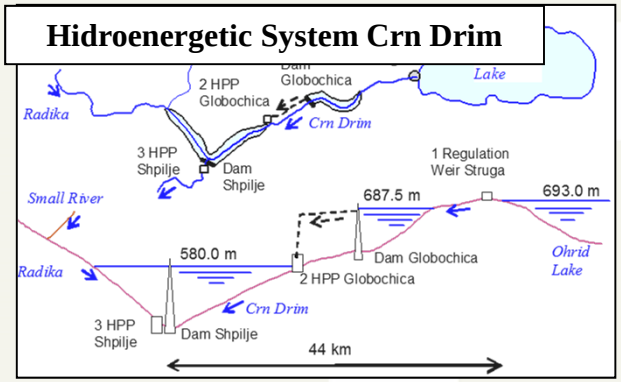
Historical records of flooding 1962-1963

Main Facilities and activities in area of Black Drim basin

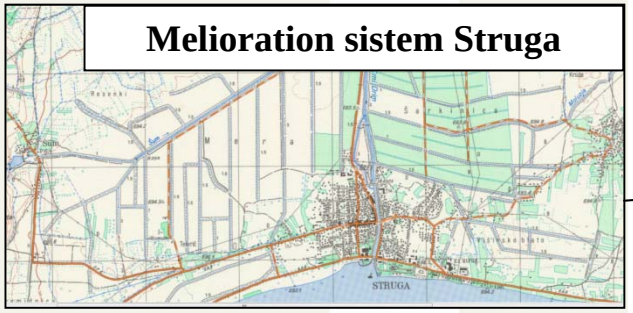
- Irrigation and melioration of Struga field with network of channel
- Melioration of Ohrid field with network of channel
- Regulation of river Black Drim from outflow From Ohrid Lake
- Diversion of river Sateska and regulation of their channel
- Reservoir Globochica
- Reservoir Spilje
- HPP Globochica
- HPP Spilje

Main Facilities and activities in area of Black Drim in last period

Hidroenergetic System Crn Drim



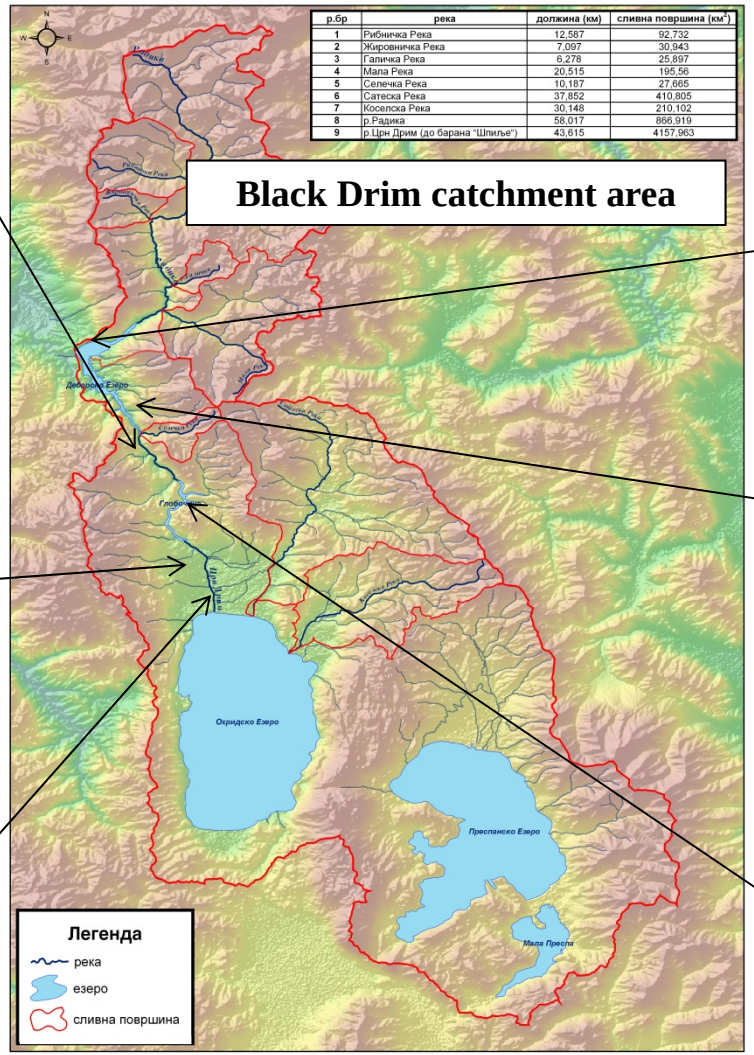
Melioration sistem Struga



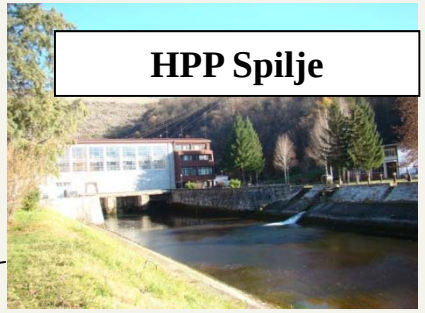
Regulated chanel of Black Drim

р.бр	река	должина (км)	сливна површина (км²)
1	Рибничка Река	12,587	92,732
2	Жировничка Река	7,097	30,943
3	Галичка Река	6,278	25,897
4	Мала Река	20,515	195,56
5	Селечка Река	10,187	27,665
6	Сатеска Река	37,852	410,805
7	Коселска Река	30,148	210,102
8	р.Радика	58,017	866,919
9	р.Црн Дрим (до барана "Шпиље")	43,615	4157,963

Black Drim catchment area

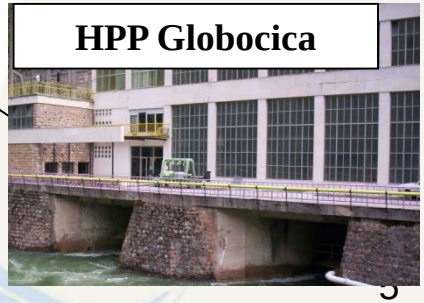


HPP Spilje

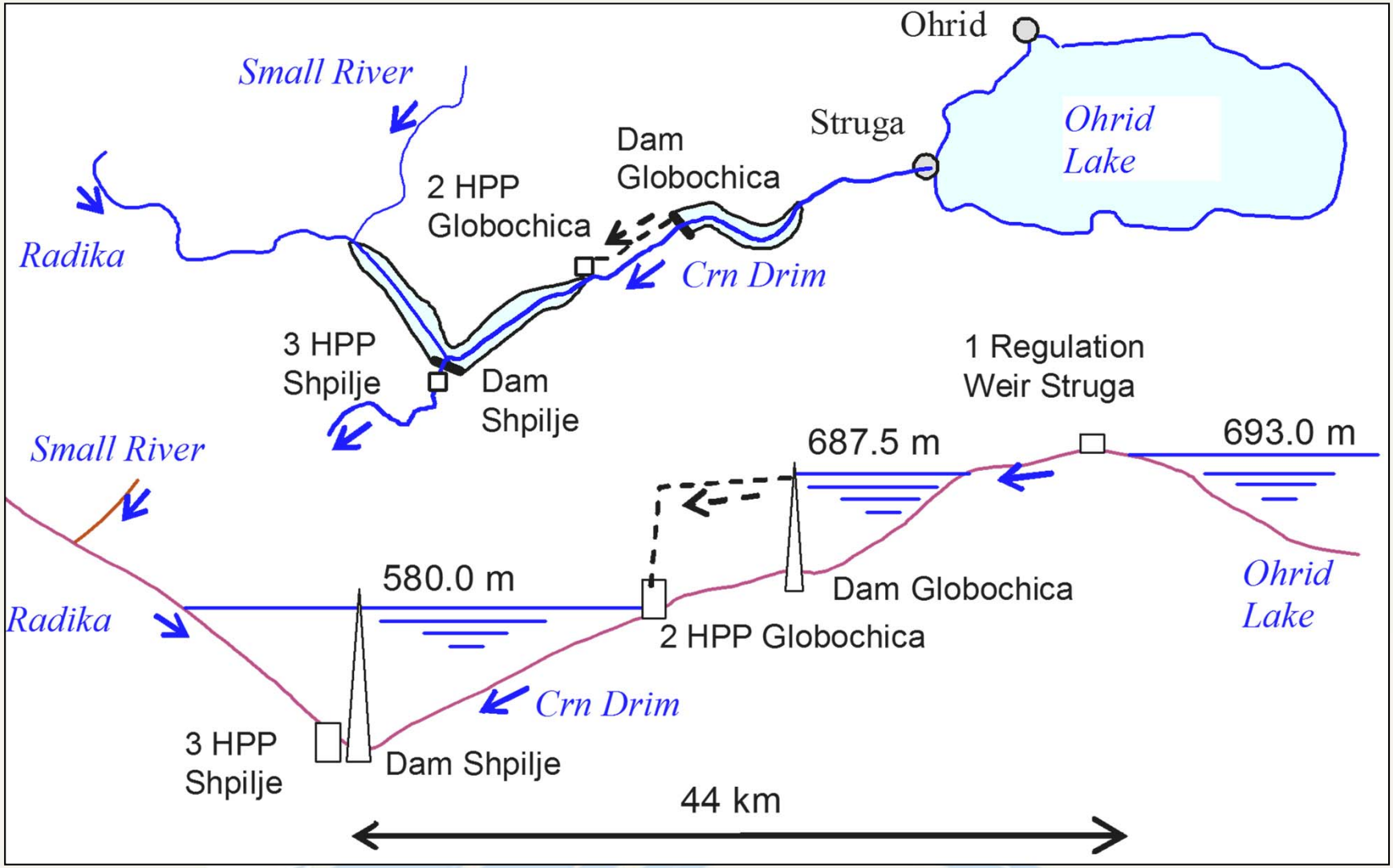


Resevoir Spilje

HPP Globocica



Hidro power System Crn Drim



HPP Globochica

DAM "Globochica"

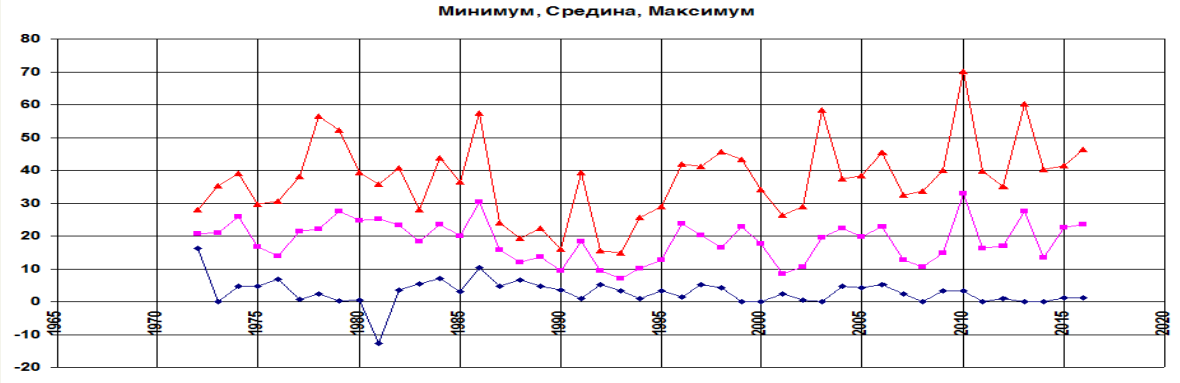
- Location: 20 km. from Struga
- Purpose: Power production
- Annual production: 200 Gwh
- Storage: 58 000 000 m3
- Height: 90.0 m
- Length: 200 m
- Spillway capacity: 1100 m3/s

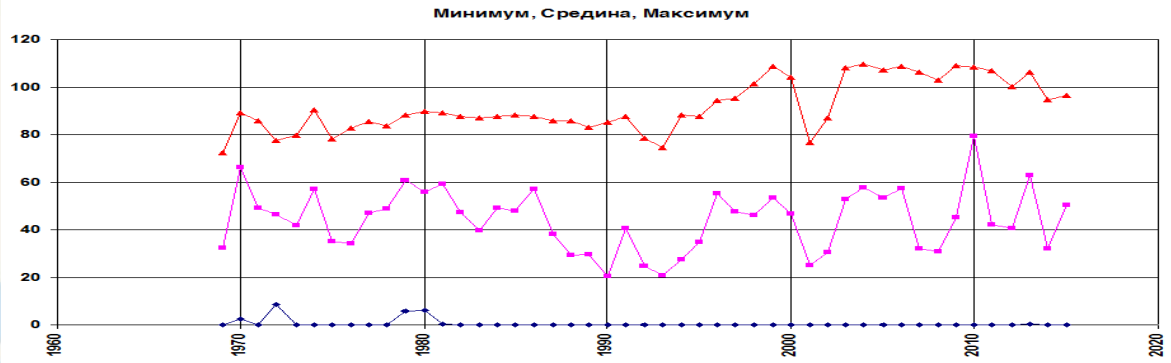
HPP Spilje

DAM "Spilje"

- Location: 8 km. from Debar
- Purpose: Power production
- Annual production: 400 Gwh
- Storage: 520 000 000 m3
- Height: 112.0m
- Length: 330m
- Spillway capacity: 2200 m3/s

Monitoring and hidrology data

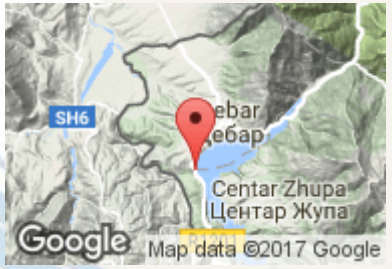




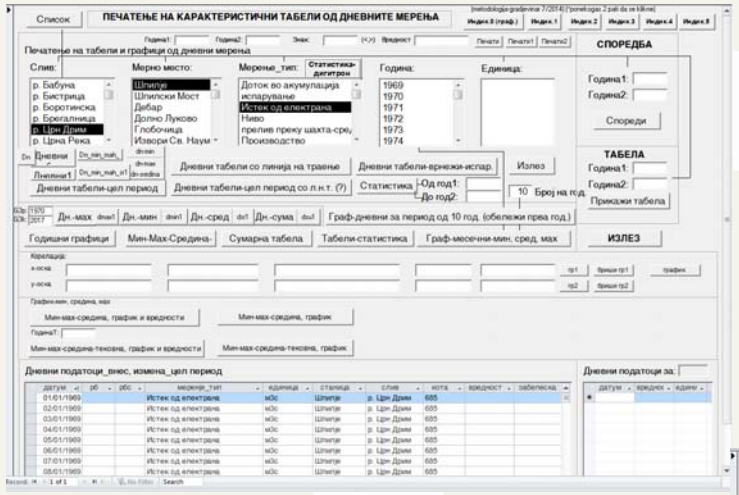
Ohrid lake outflow

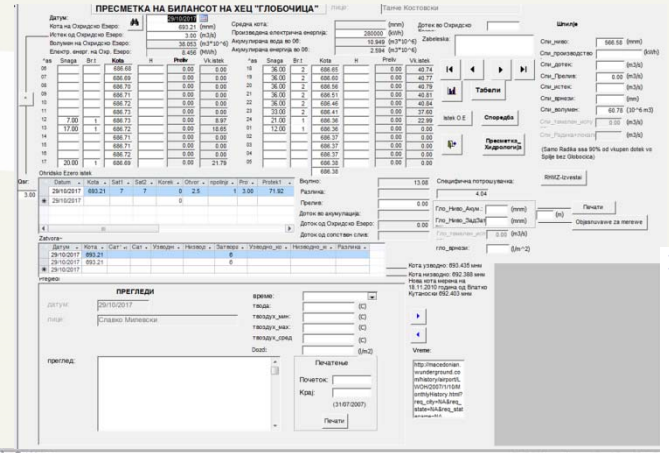
HPP Globocica outflow

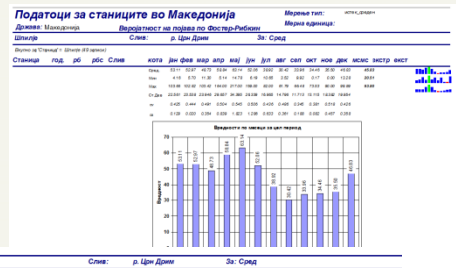
HPP Spilje outflow

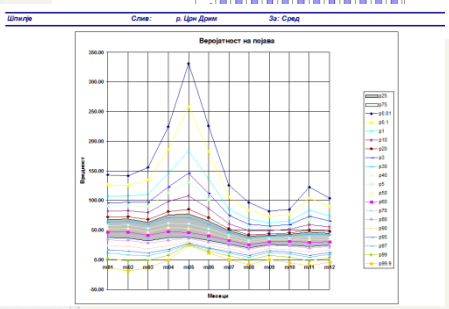


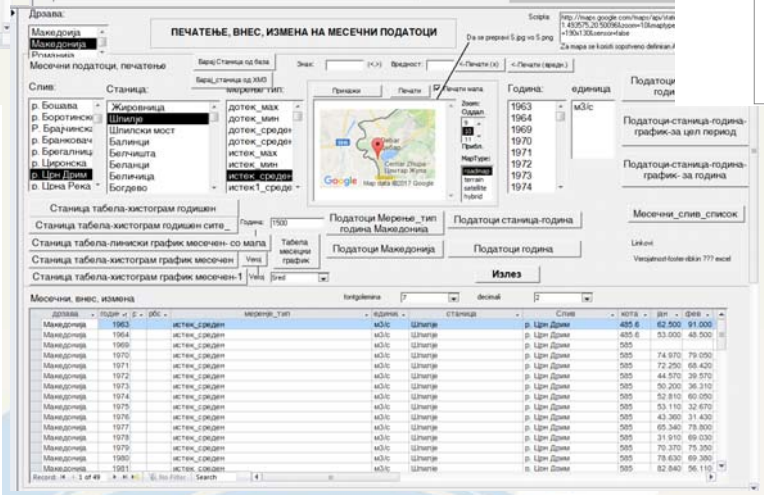
Used tools

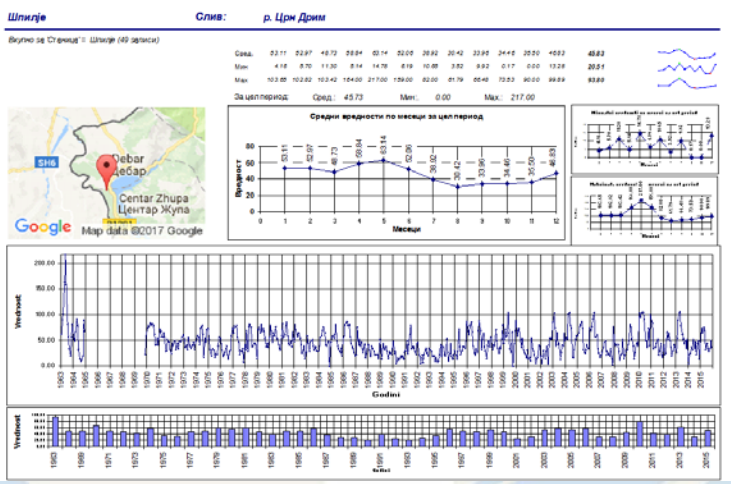

ПЕЧАТЕЊЕ НА КАРАКТЕРИСТИЧНИ ТАБЕЛИ ОД ДНЕВНИТЕ МЕРЕЊА
Печатење на табели и графици од дневни мерења
СПОРЕДБА
ТАБЕЛА
ИЗЛЕЗ
Дневни податоци_внес, измена_цел период

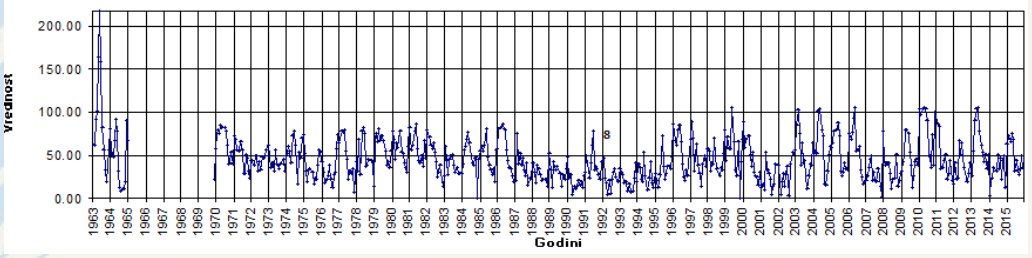

ПРЕСМЕТКА НА БИЛАНСОТ НА ХЕЦ "ГЛОБОЧИЦА"
ПРЕГЛЕДИ


Податоци за станиците во Македонија
Веројатност на појава по Фостер-Рибкин


Веројатност на појава


ПЕЧАТЕЊЕ, ВНЕС, ИЗМЕНА НА МЕСЕЧНИ ПОДАТОЦИ
Месечни податоци, печатење
Излез
Месечни, внес, измена


Шипље
Слив: р. Црн Дрим
Средни вредности по месеци за цел период
Google
Map data ©2017 Google

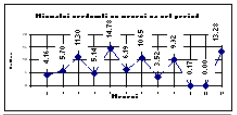

Vrednost
Godini

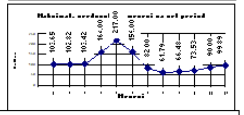
Шпилје **Слив:** **р. Црн Дрим**

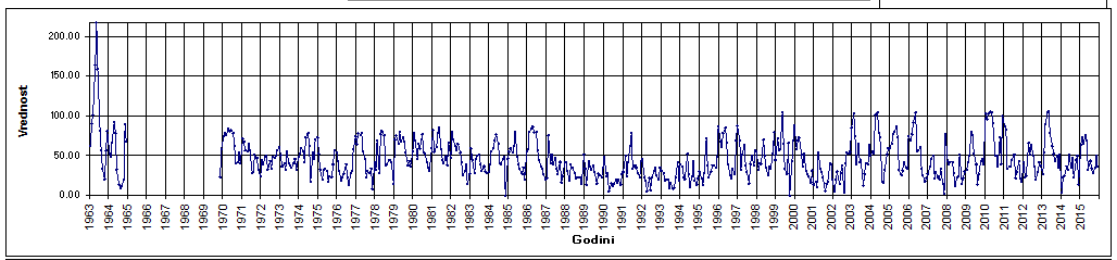
Вкупно за 'Станица' = Шпилје (49 записи)

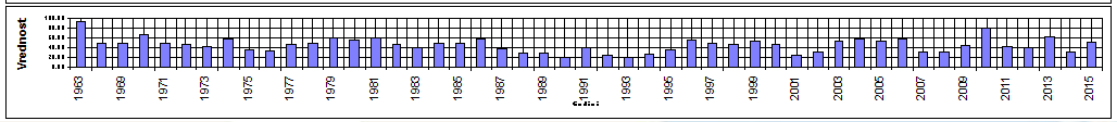
Сред.	53.11	52.97	48.73	58.84	63.14	52.06	38.92	30.42	33.96	34.46	35.50	46.83	**45.83**
Мин	4.16	5.70	11.30	5.14	14.78	6.19	10.65	3.52	9.92	0.17	0.00	13.28	**20.51**
Max	103.65	102.82	103.42	164.00	217.00	159.00	82.00	61.79	66.48	73.53	90.00	99.89	**93.80**

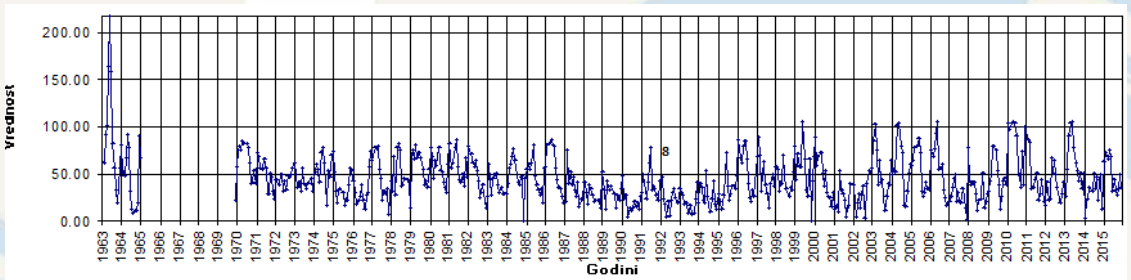
За цел период: Сред.: 45.73 Мин.: 0.00 Max.: 217.00











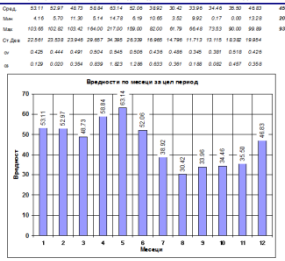
Податоци за станиците во Македонија

Мерење тип: **Мерна единица:**

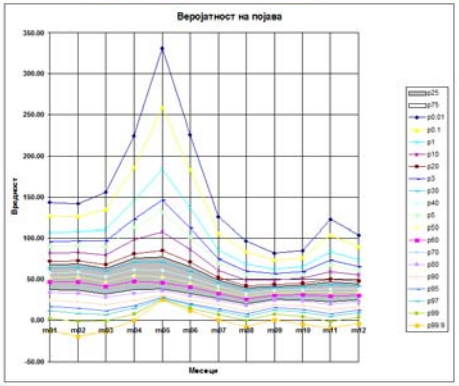
Држава: Македонија **Веројатност на појава по Фостер-Рибкин**

Шпилје **Слив:** **р. Црн Дрим** **За: Сред**

Станица	год.	рб	рбс	Слив	кота	јан	фев	мар	апр	мај	јун	јул	авг	сеп	окт	ное	дек	мсмс	экстр	екст



Шпилје **Слив:** **р. Црн Дрим** **За: Сред**



The purpose of the built objects, the collection of data and analyses, among other things, was flood protection

But what is the situation in practice

Floods in 2010

Flooded streets, yards and basements of buildings

Floods in 2010

flooded fields and arable land

Floods in 2010

large amount of trees, branches and leaves in the reservoir

Spilje reservoir (Radika part)

Floods in 2010

large amount of floating waste and plastic

Floods in 2010

flooded roads

Floods in 2010

spill of the riverbed of the river Crn Drim

Flooding in 2010

Good operation at main objects

Globocica, shaft,
Projected capcity Q=1100 m3/s

Spilje, shaft,
Projected capcity Q=2200 m3/s

Causes of flooding

Causes of flooding

irregular built passages of cannels from meliorations system

Causes of flooding

non-maintenance of the facilities along the course of the river Crn Drim

Causes of flooding

trees and other vegetation on the river Crn Drim

Causes of flooding

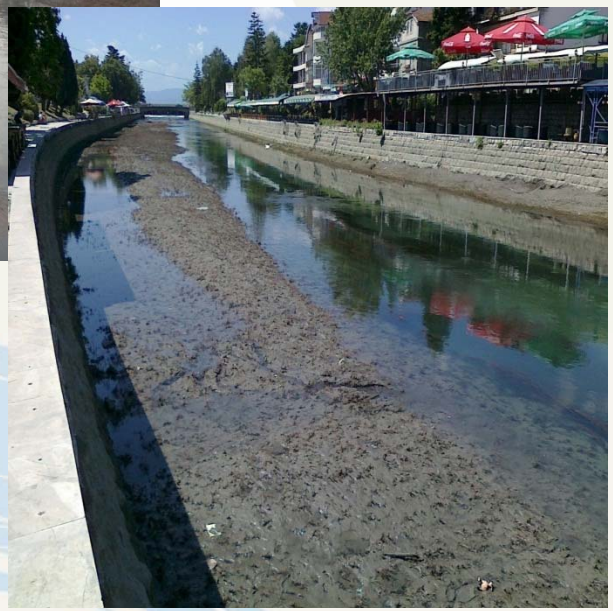
Non regulated channel of tributary of river Crn Drim, especialy natural riverbed of river Sateska

Causes of flooding

Sedimentation in Ohrid lake before inflow of river Black Drim (about 300 000 m3)

Causes of flooding

Sedimentation in River Crn Drim
(about 600 000 m3)



Directions for solving problems (material measurements)

- Bringing the river bed of the Black Drim in a projected condition (cleaning up to sludge, repair of the river bed)
- Cleaning from sediment from Ohrid Lake before the outflow of the river Crn Drim
- Regulation of the riverbed of tributaries, especially on the river Sateska
- Bringing the channel network from melioration sistem in a projected condition
- Afforestation
- Preventing the arrival of solid and plastic waste in reservoirs
- Realization of already maked projects, especially for the river Sateska

Directions for solving problems (administrative measurements)

- Making basin management plan in accordance with the Water Act
- Filling the competent institutions with appropriate and trained personnel
- providing adequate spatial and material conditions
- better coordination and consent of the competent institutions
- proper targeting of funds

Thank you for attention!!