MONITORING DATA AND EXISTING INFORMATIONS IN CROATIA

Prof. dr. sc.

Ognjen BONACCI

FACULTY OF CIVIL ENGINEERING AND ARCHITECTURE
SPLIT UNIVERSITY, SPLIT, CROATIA
obonacci@gradst.hr

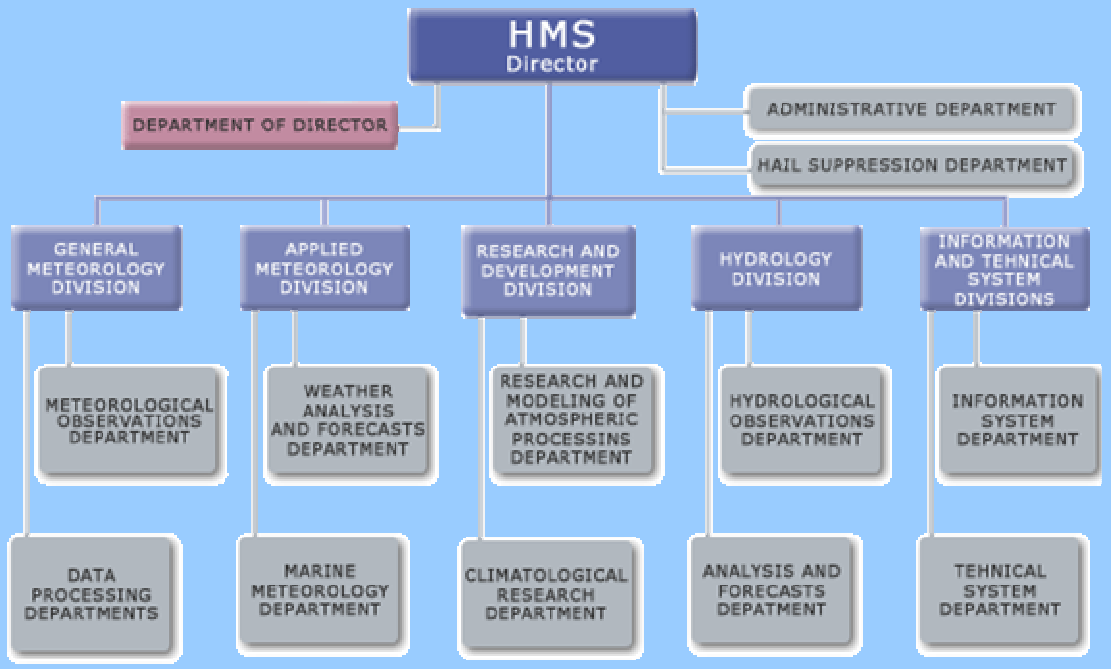
METEOROLOGICAL AND HYDROLOGICAL SERVICE

http://meteo.hr/index_en.php

MONITORING DATA: ACQUISITION AND PUBLICATION
&
DOCUMENTATION
hydrological, hydrogeological and climatological data

Meteorological and hydrological institute of Croatia (HMS) is fundamental institution for meteorology and hydrology in Croatia. It is founded by decree of Government of People's Republic of Croatia (NRH) on 27th of August 1947. Until Croatia became independent state, i.e.. till 1991., HMS operates as republic institution, and after that as state one. HMS, in the name of state of Croatia perform international cooperation after 1992., when Croatia becomes member of World Meteorological Organisation (WMO).

ORGANIZATIONAL CHART OF THE HMS



The number of employees increased to reach a stuff of more than 440.
The Institute internal organisation and its scope have been constantly changing and adapting to the increasingly demanding requirements set on hydrological and meteorological services to meet the demands of economy, traffic and environment.

Croatian Geological Survey

is the major scientific institute in the field of Earth Sciences and Geological Engineering in the Republic of Croatia.

Department of geology

Department of hydrogeology and engineering geology

Department of mineral resources

http://www.hgi-cgs.hr/new/en/index.html

HGI-CGS
Sachsova 2
P.O.Box 268
HR-10000 Zagreb, Croatia
T: +385 1 6160 888
F: +385 1 6144 718

International cooperation

OneGeology - Digital Geological Map of the World

1 : 1 000 000

Geological Map of Europe 1 : 1 000 000

Geochemical Atlas of Europe (FOREGS-EGS)

Heavy metals in soils developed on the Drava alluvial sediments (Slovenia-Croatia 2007. – 2008.)

Peloids of the Adriatic Sea (Slovenia-Croatia 2007. – 2008.)

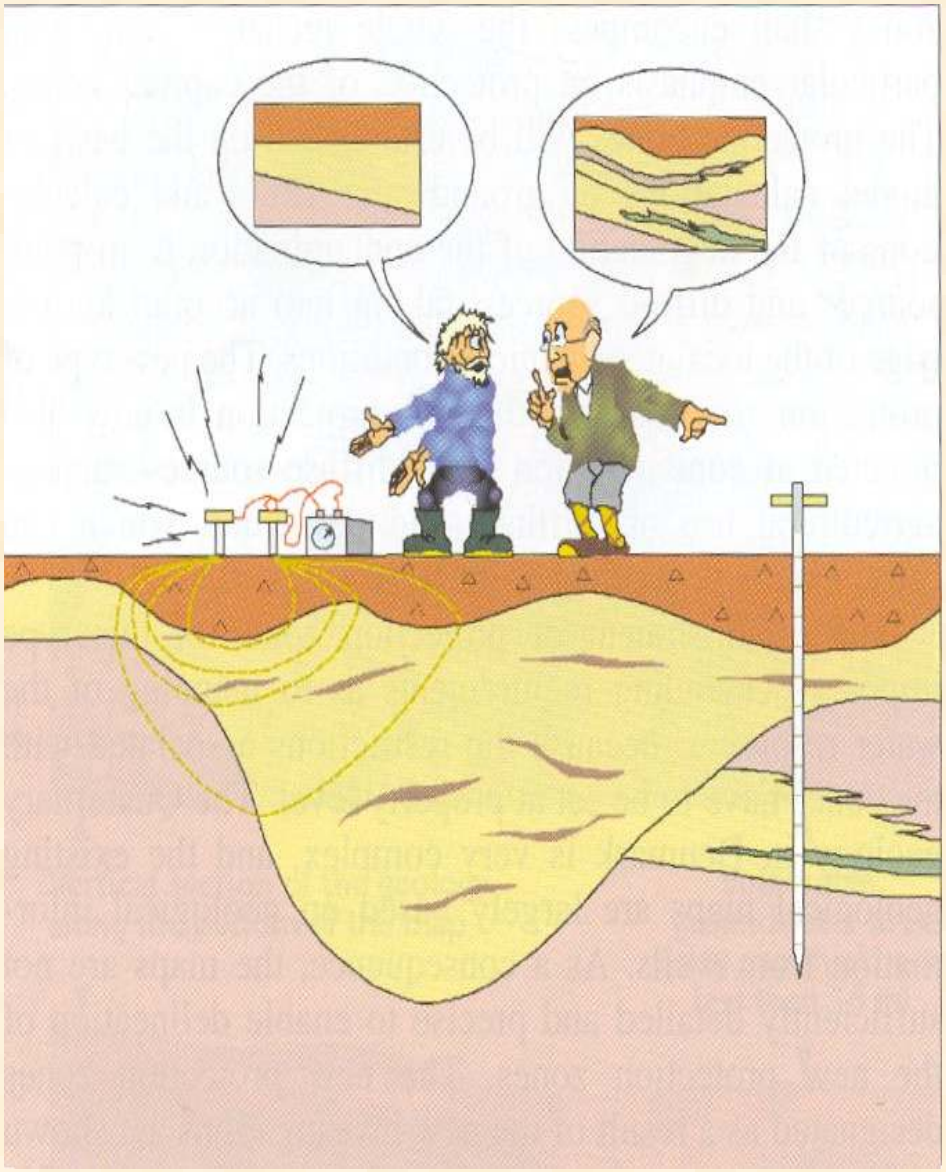
Discharge
Water level
Groundwater level
Water temperature
Chemical composition
Suspended sediment yields
Biota
Tracing
etc

Progress in karst hydrology and hydrogeology is limited by a lack of data. In karst terrains processes are highly variable in space and time, and this variability exists at all scales. Data collection over a large range of scales is difficult and expensive. At the same time there is a growing tendency to minimise fieldwork in karst hydrology and hydrogeology. Investors realise that time is money and there is no more time-consuming process than fieldwork. As a result, especially karst hydrologists and hydrogeologists are asked to solve problems with computer models, remote sensing etc, rather than by direct field observations. This could be very dangerous intention.

MODELS & MODELING

- Karst hydrology and hydrogeology need all kinds of models and modelling, as well as the new scientific approaches, methods and technologies. In the same time it should be profoundly aware that they are only a useful tool but not a panacea.
- For complex karst systems, no single model can be all-embracing, so different models may be needed for different purposes, including explanation, prediction and control.
- Complex systems often behave unpredictably, so we need to study scenarios (that is, to ask "what- if" questions).

MEASUREMENTS-BOUNDARY CONDITIONS-MODELS

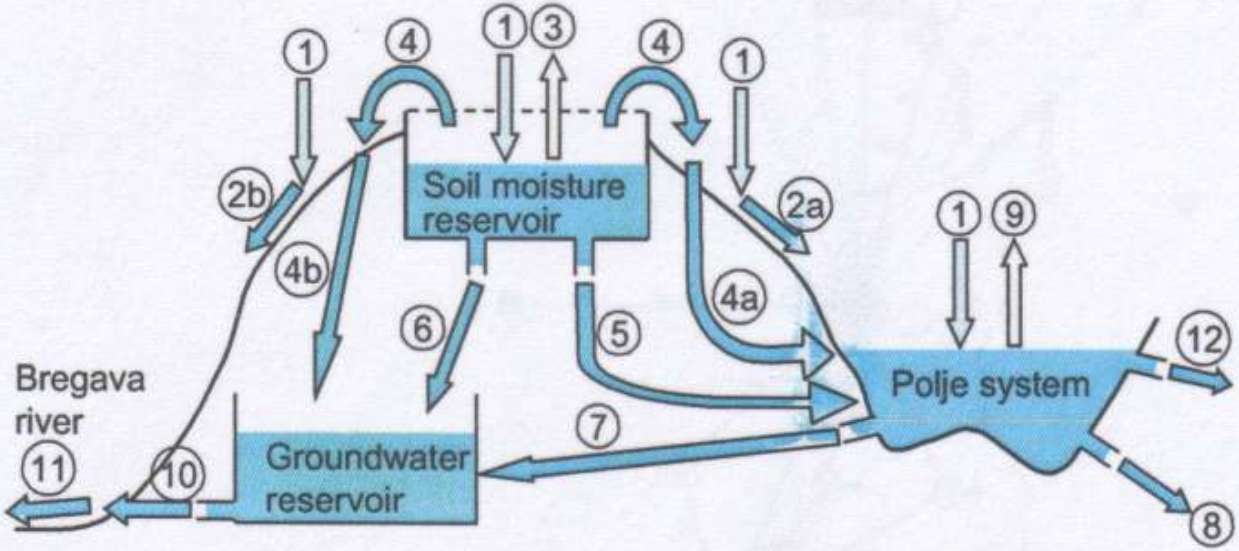


Great debate

Is modelling more than fashionable indoor sport?

EGU General Assembly, Vienna April 2008

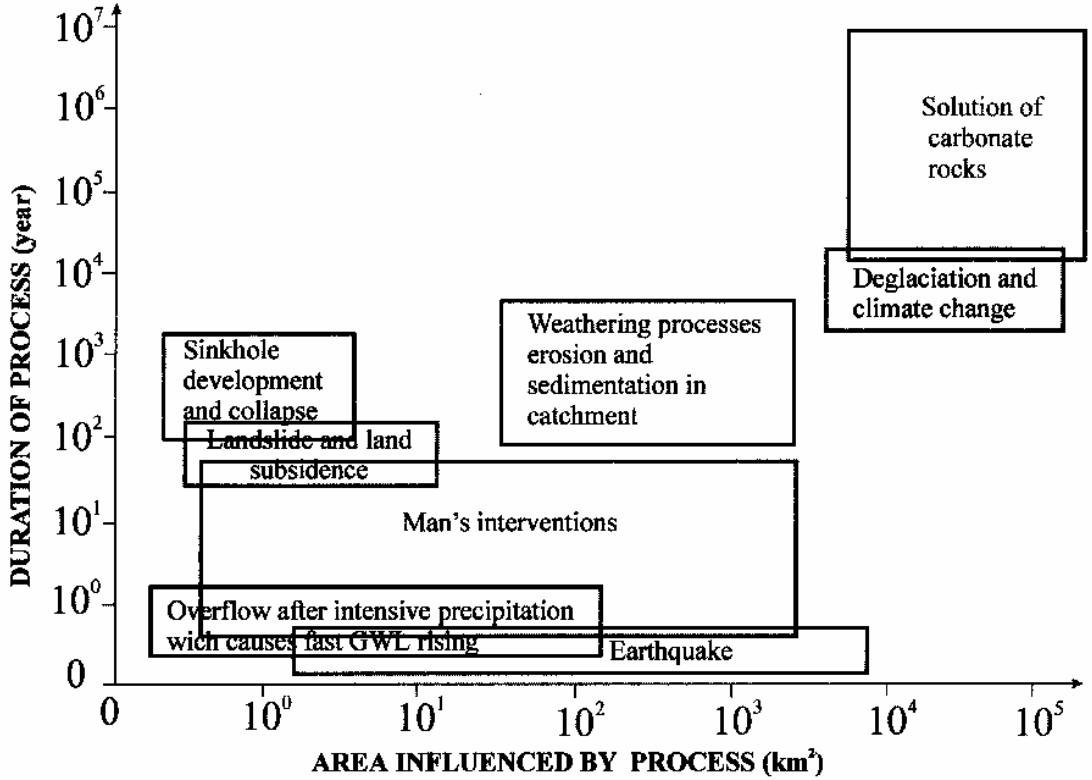
(K. Beven)



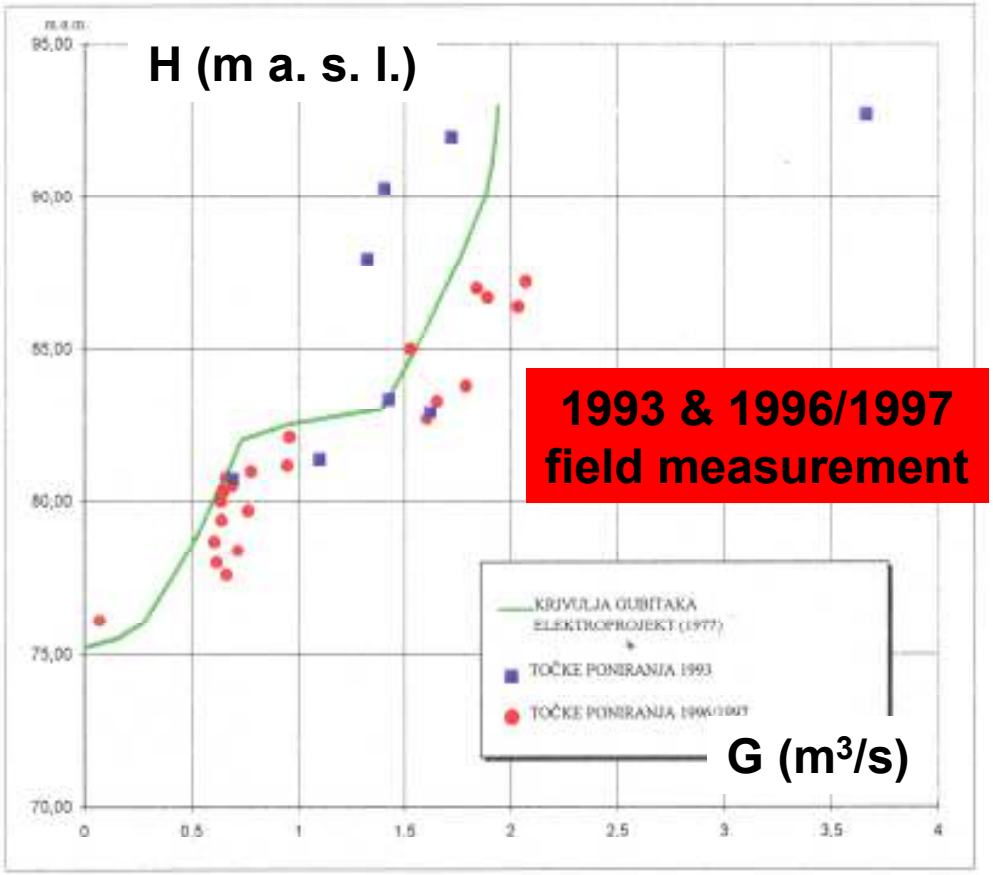
1. Rainfall
2. Direct flow
3. Evapotranspiration
4. Quick flow
5-8. Groundwater fluxes
9. Lake evaporation
10. Spring discharge
11. River flow
12. Diversion tunnel flow

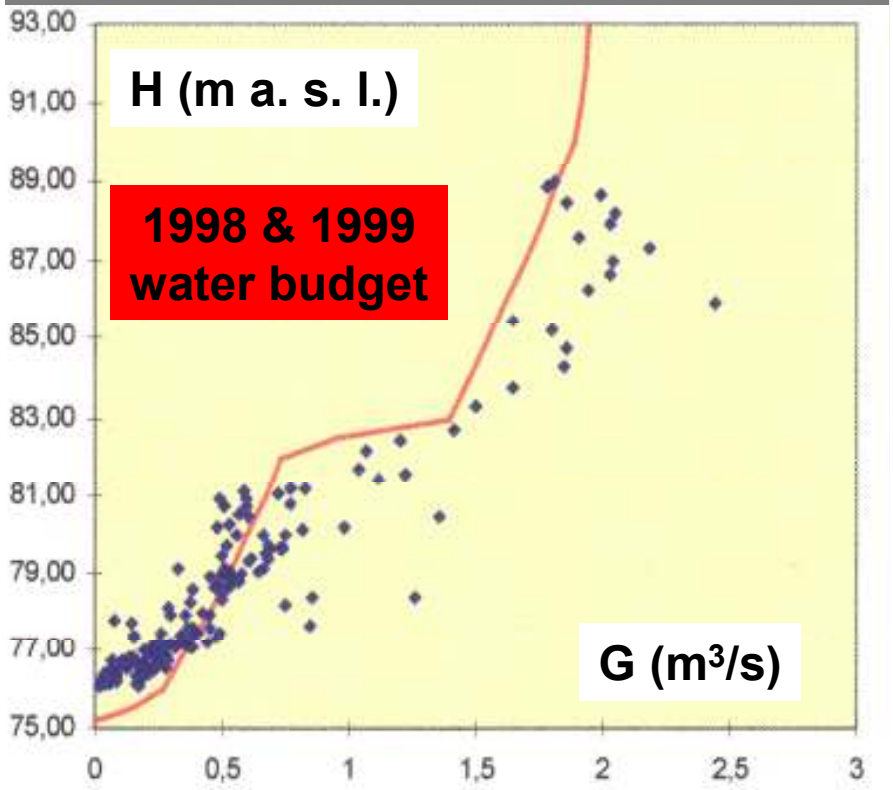
Figure 5 Schematic of the conceptual model.

The catchment areas in karst vary according to the groundwater levels, i.e. change with time. The position of the watershed line depends upon the groundwater levels which change in time. In some situations at very high groundwater levels (after heavy rainfall) fossil and inactive channels and springs are activated in the karst underground causing the inter catchment overflow and/or redistribution of the catchment areas.



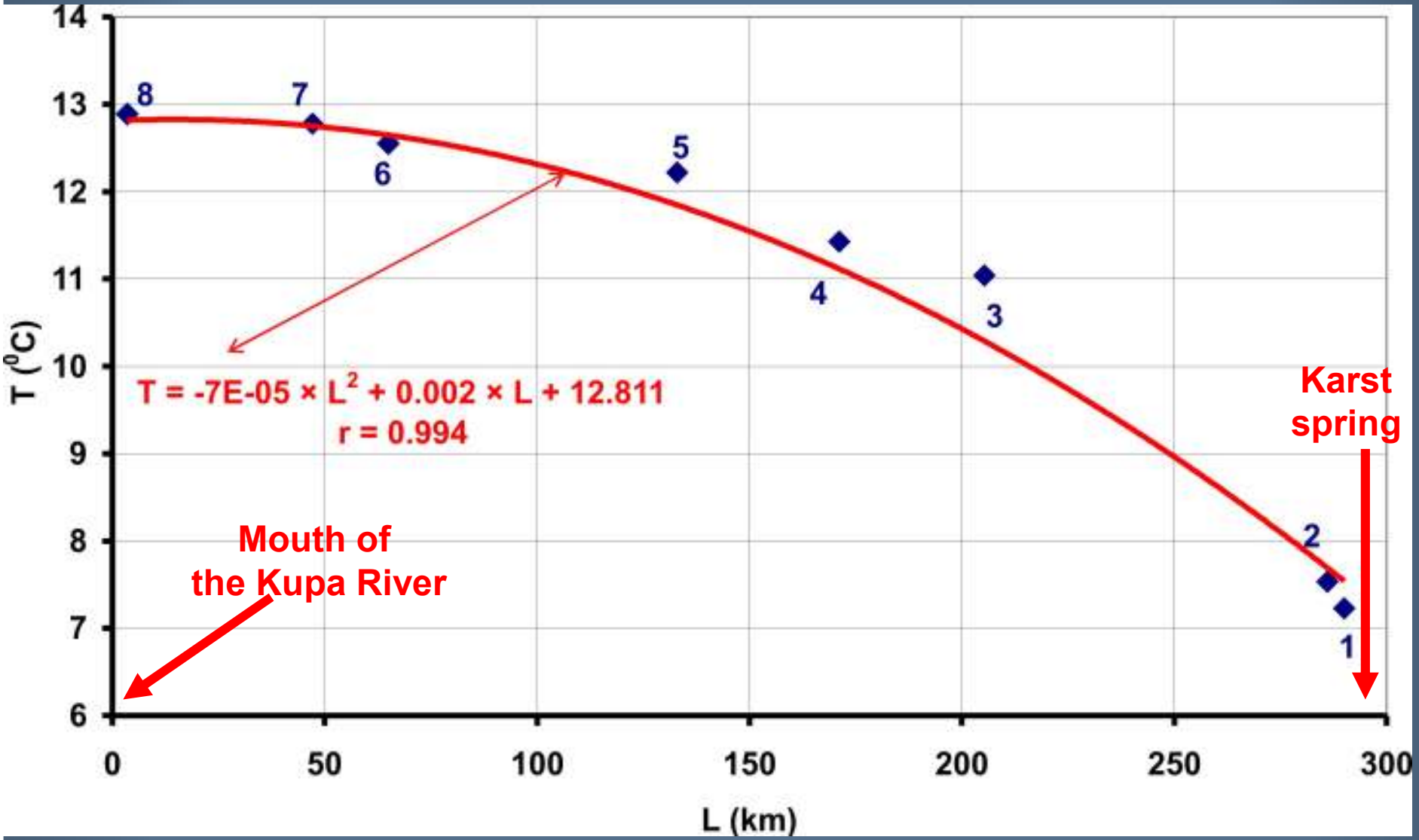
TIME AND SPACE SCALE EFECTS OF DIFFERENT FACTORS
WHICH CAN CAUSE THE CHANGES OF THE CATCHMENT IN KARST





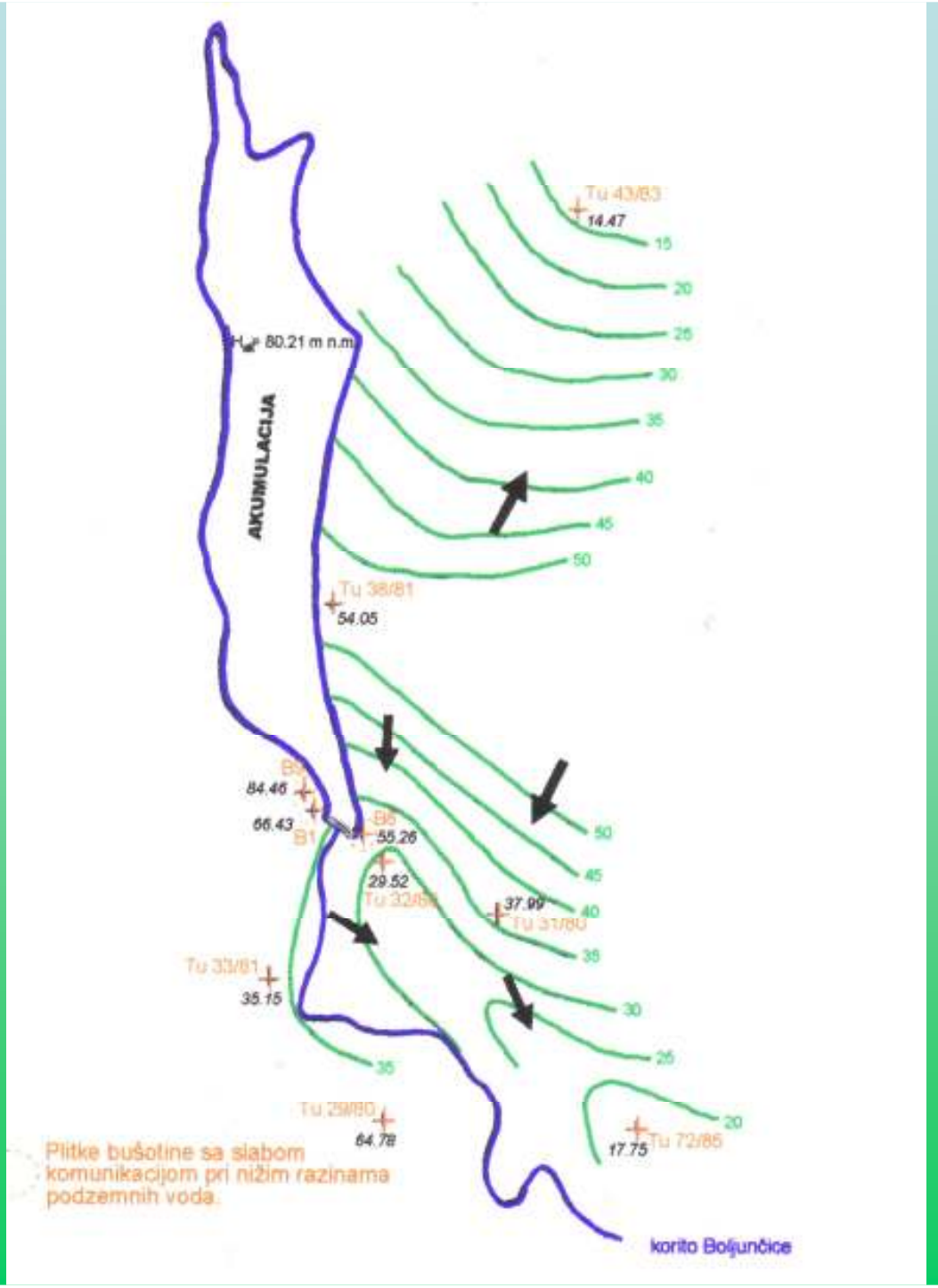
Relationship between water level in the Boljunčica reservoir H (m a. s. l.) and water losses G (m^3/s) from the reservoir determined in two periods using two different methods

Water temperatures along the Kupa River



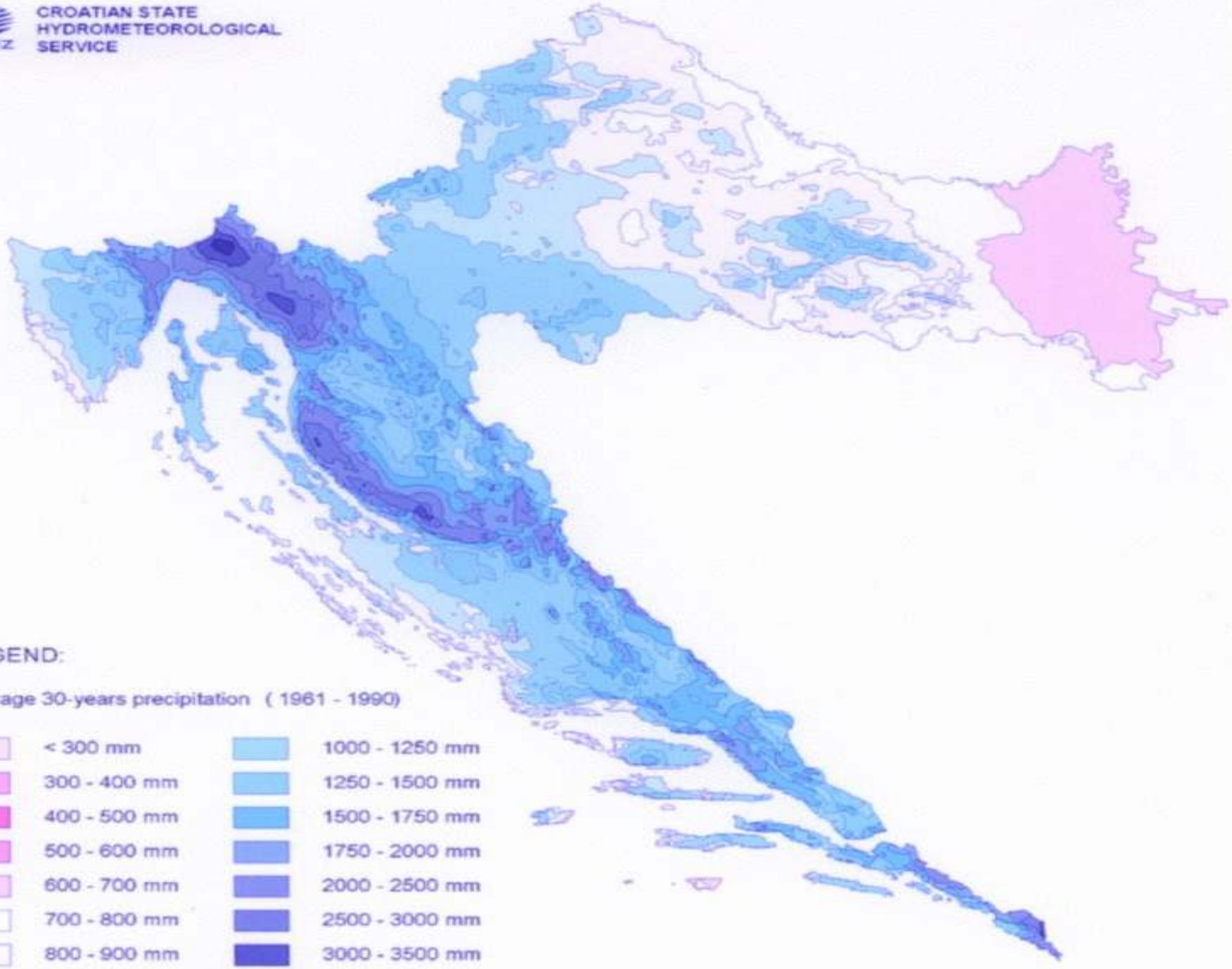
18 Feb. 1999
H_{res} = 80.21 m a. s. l.

Isopiestic lines of groundwater level during low water

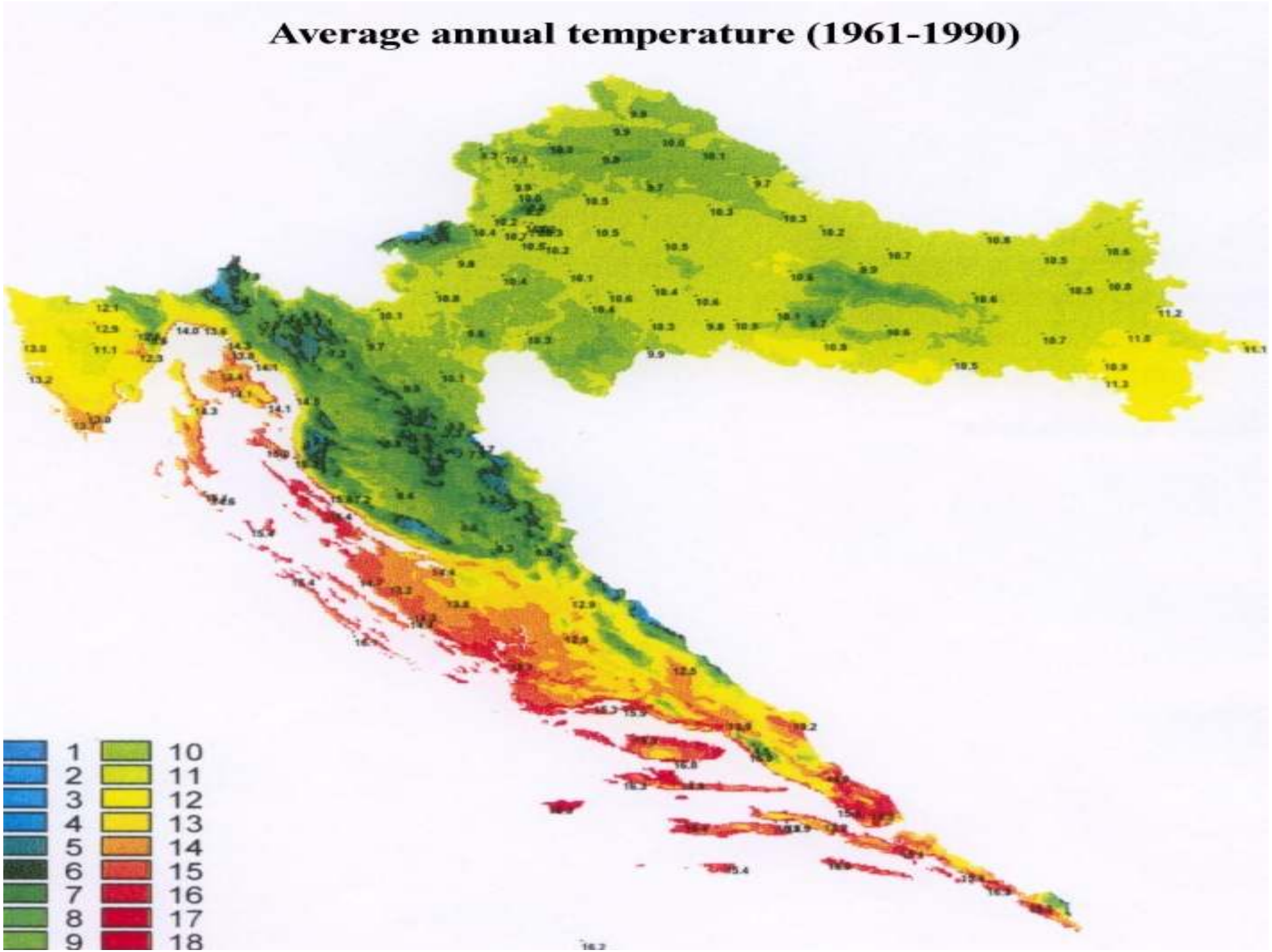


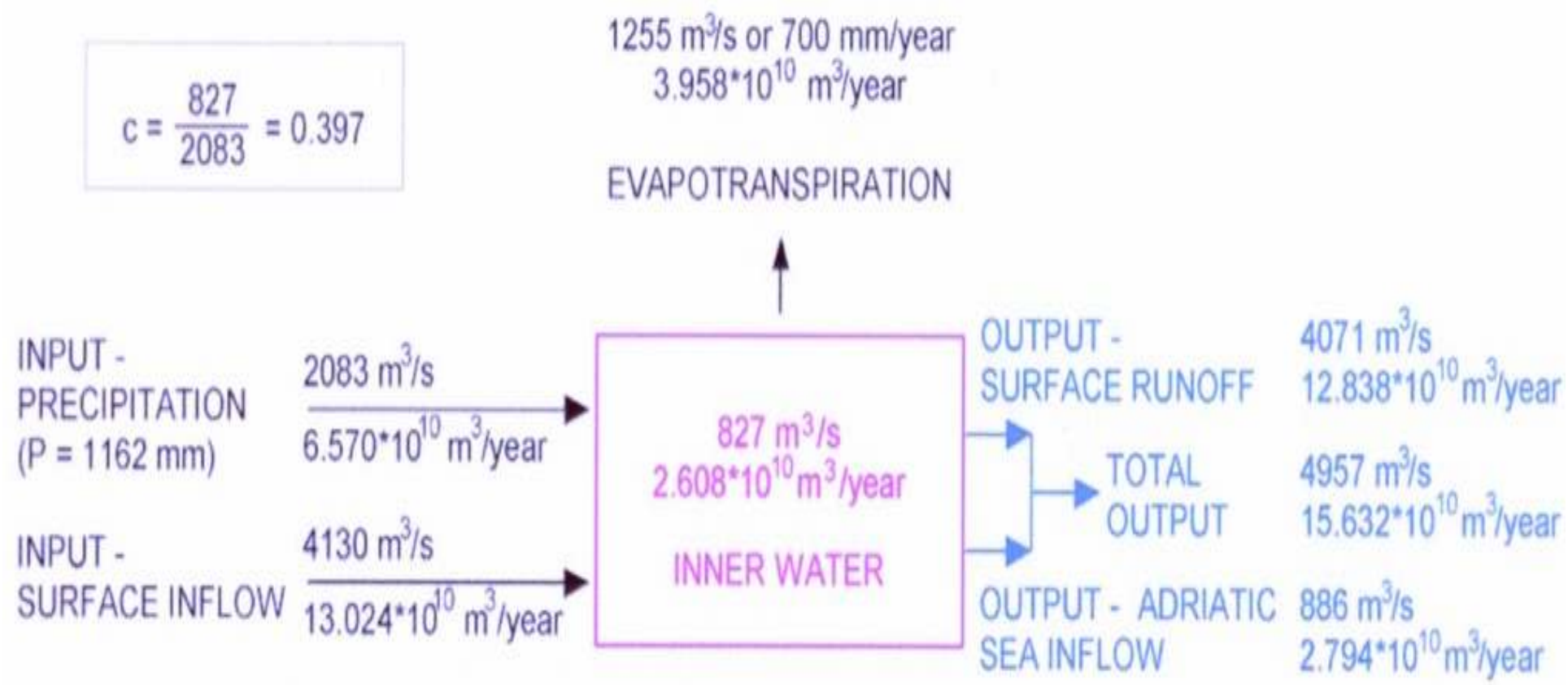
CROATIAN STATE
HYDROMETEOROLOGICAL
SERVICE

DHMZ



Average annual temperature (1961-1990)




$c = \frac{827}{2083} = 0.397$
1255 m³/s or 700 mm/year
3.958*10¹⁰ m³/year
EVAPOTRANSPIRATION
INPUT - PRECIPITATION (P = 1162 mm)
2083 m³/s
6.570*10¹⁰ m³/year
INPUT - SURFACE INFLOW
4130 m³/s
13.024*10¹⁰ m³/year
827 m³/s
2.608*10¹⁰ m³/year
INNER WATER
OUTPUT - SURFACE RUNOFF
4071 m³/s
12.838*10¹⁰ m³/year
TOTAL OUTPUT
4957 m³/s
15.632*10¹⁰ m³/year
OUTPUT - ADRIATIC SEA INFLOW
886 m³/s
2.794*10¹⁰ m³/year


817
2338
5
8
376
4071
532
886
451
430
LEGENDA:
376 Vlastite (unutrašnje) vode (m3/s)
817 Ulaz u Hrvatsku (m3/s)
886 Izlaz iz Hrvatske (m3/s)