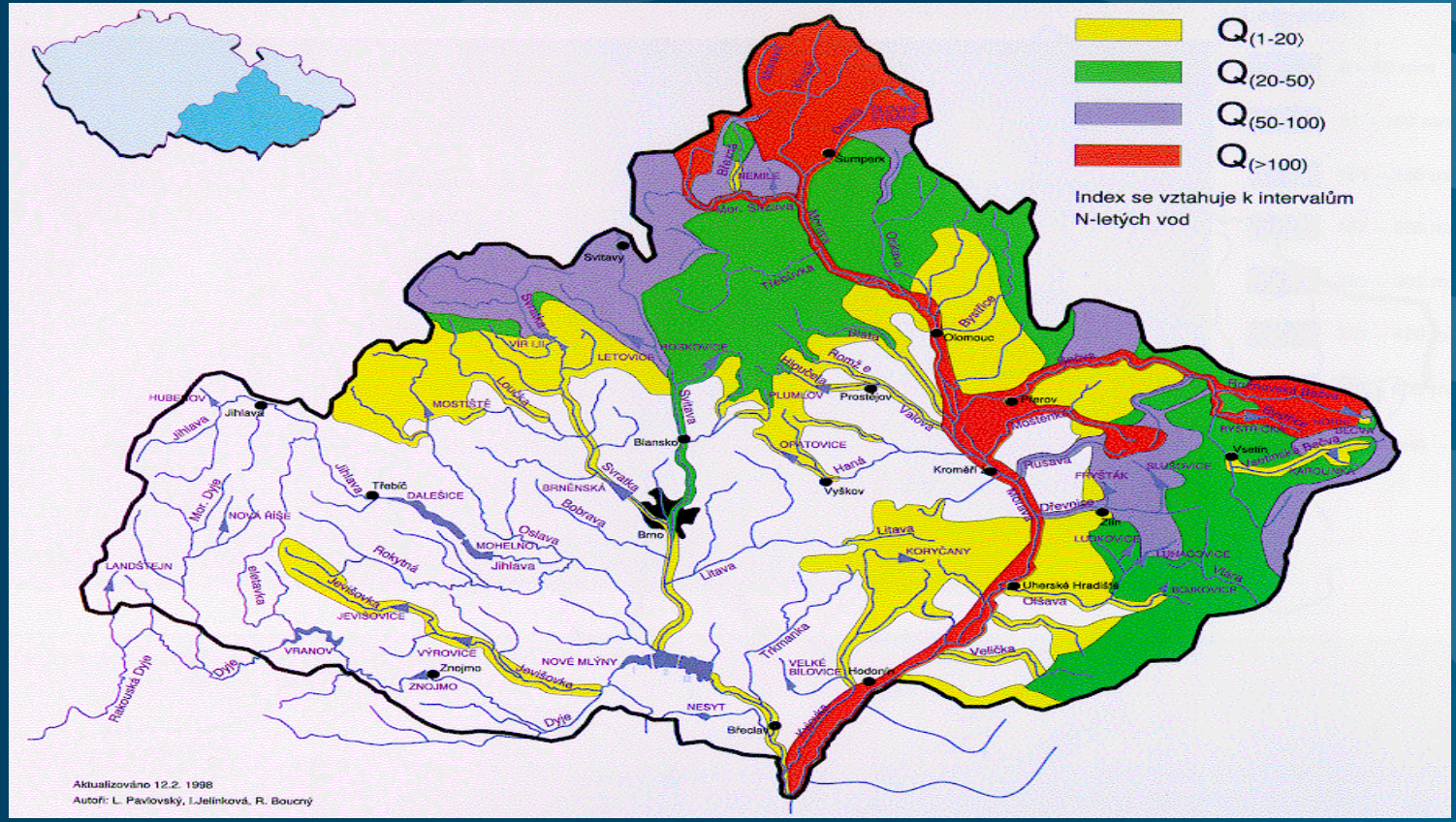
JASPERS Networking Platform Best Practices in Flood Risk Management

Case study in Modelling

Flood July 1997

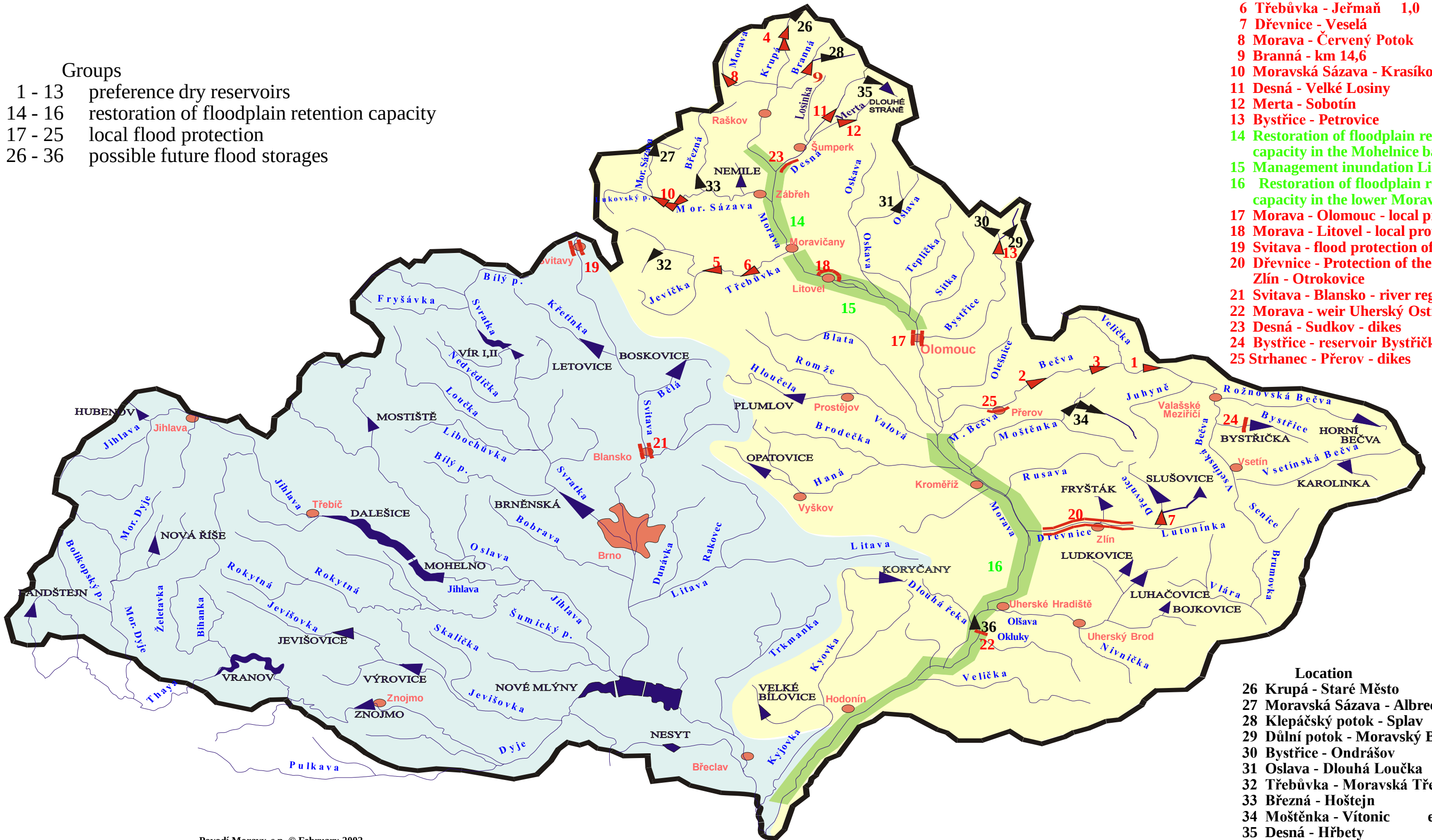


Conception of flood protection measures in River basin A (preference measures are in color in legend)

Review of possible retention storages in River basin A

Groups

1 - 13	preference dry reservoirs
14 - 16	restoration of floodplain retention capacity
17 - 25	local flood protection
26 - 36	possible future flood storages



Legend

Location	Retention volume (mil. m^3)
1 Bečva - Teplice	38 - 95
2 Bečva - Osek	35
3 Bečva - Hranice	20
4 Krupá - Chrastice, Staré Město (2x)	2,5
5 Třebůvka - Vranová Lhota	4,7
6 Třebůvka - Jeřmaň	1,0
7 Dřevnice - Veselá	2,5
8 Morava - Červený Potok	1,5
9 Branná - km 14,6	1,5
10 Moravská Sázava - Krasíkov (3x)	3,0
11 Desná - Velké Losiny	5,0
12 Merta - Sobotín	2,4
13 Bystřice - Petrovice	2,2
14 Restoration of floodplain retention capacity in the Mohelnice basin	
15 Management inundation Litovelské Pomoraví	
16 Restoration of floodplain retention capacity in the lower Morava river	
17 Morava - Olomouc - local protection	
18 Morava - Litovel - local protection	
19 Svitava - flood protection of Svitavy	
20 Dřevnice - Protection of the agglomeration Zlín - Otrokovice	
21 Svitava - Blansko - river regulation	
22 Morava - weir Uherský Ostroh	
23 Desná - Sudkov - dikes	
24 Bystřice - reservoir Bystřička - dam reconstruction	
25 Strhanec - Přerov - dikes	

Location	Retention volume (mil. m^3)
26 Krupá - Staré Město	1,4
27 Moravská Sázava - Albrechtice	5,0
28 Klepáčský potok - Splav	2,5
29 Důlní potok - Moravský Beroun	10,0
30 Bystřice - Ondrášov	7,0
31 Oslava - Dlouhá Loučka	3,5
32 Třebůvka - Moravská Třebová	1,0
33 Březná - Hoštejn	2,0
34 Moštěnka - Vítonice (3x)	3,0
35 Desná - Hřbety	2,5
36 Morava - Uherský Ostroh	4,5

Proposed scenarios

- 1. scenario
  Land use change in the whole catchment
- 2. scenario
  Local protection of settlement areas by dikes
- ***3. scenario***
  Settlement areas protection by retention storages
- 4. scenario
  Use parts of future navigation channel D-O-L for flood protection purposes

Data for the Project

Topographical data

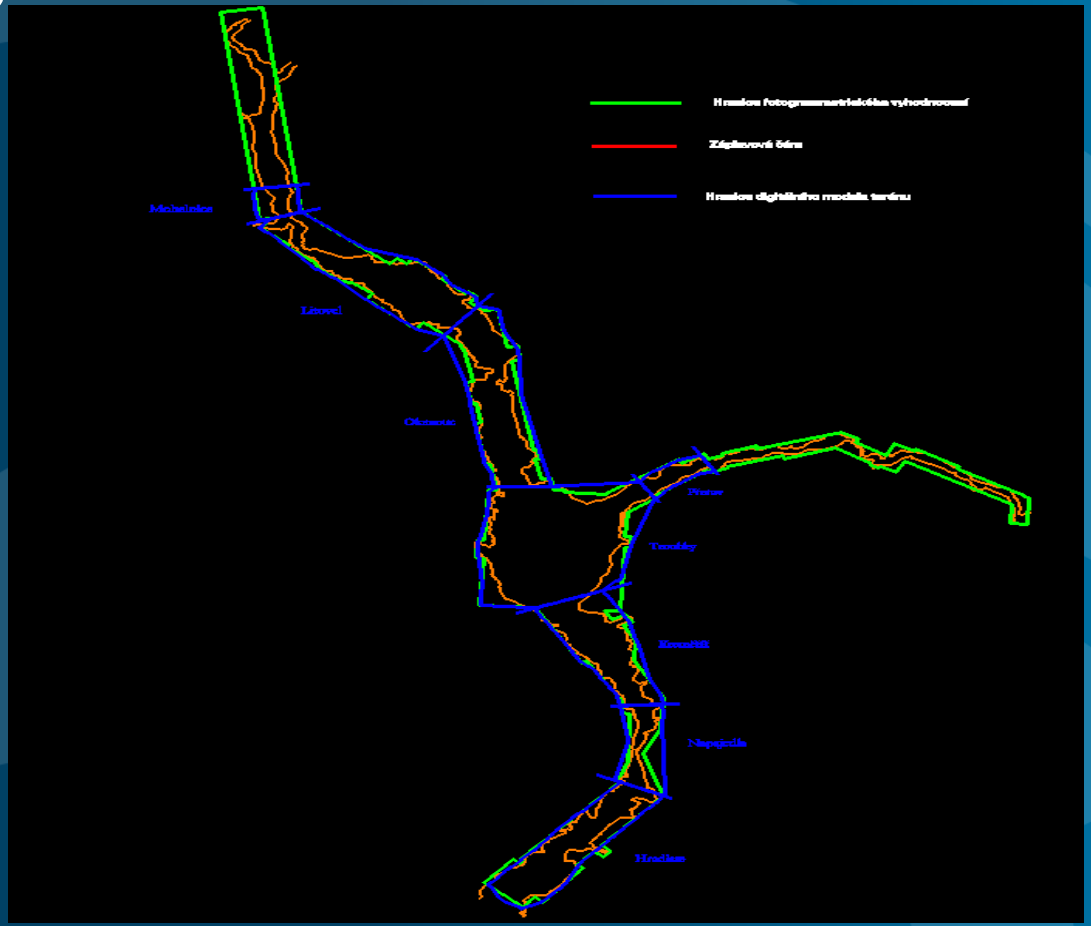
- cross-sections
- objects (weirs, bridges, culverts, etc.)
- DEM

Hydrological data - time series for period 1981 - 1986 and July 1997

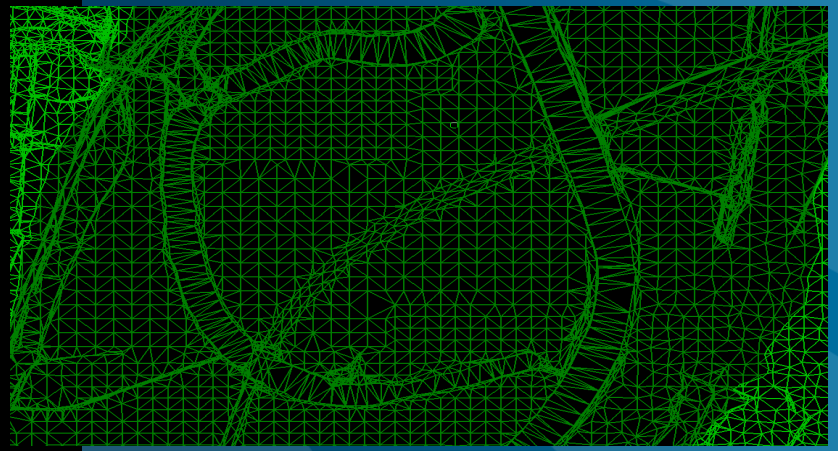
- 16 gauging stations (discharges, water levels)
- 130 rain gauging stations

Flooded area - Digital Elevation Model

- Area about 600 km^2
- Grid 35 m
- Vertical precision
  - ±0.2-0.3 m



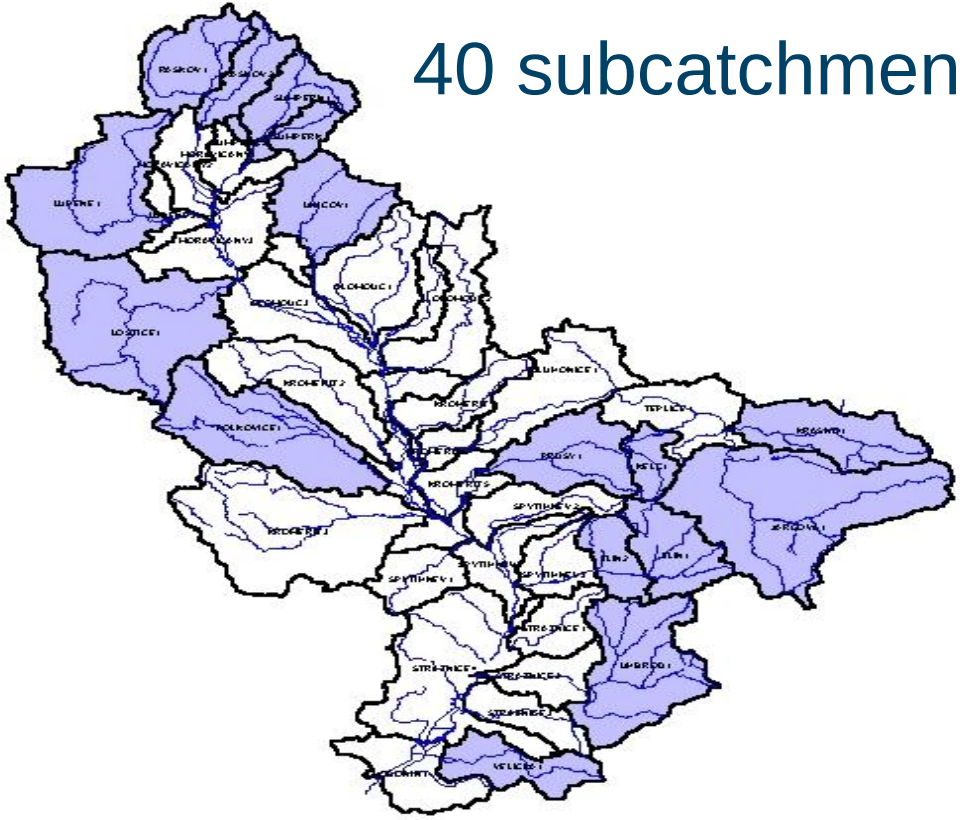
Flooded area - Digital Elevation Model



Tools used for the Project

- MIKE 11
  - HD - Hydrodynamic Module
  - RR - Rainfall-Runoff Module
  - ST - Sediment Transport Module
- MIKE GIS
- ArcView
- ATLAS DMT

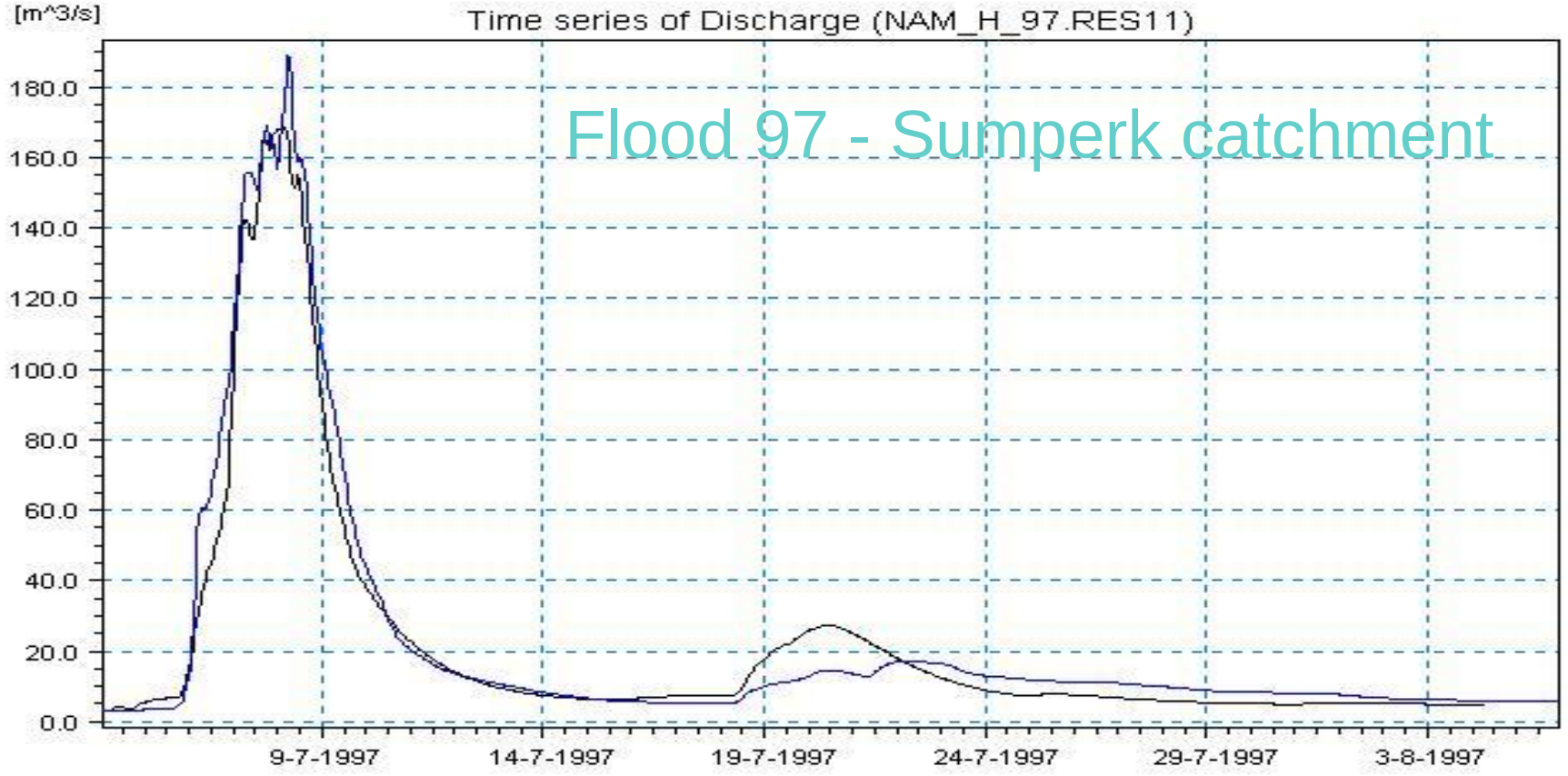
Rainfall Runoff model



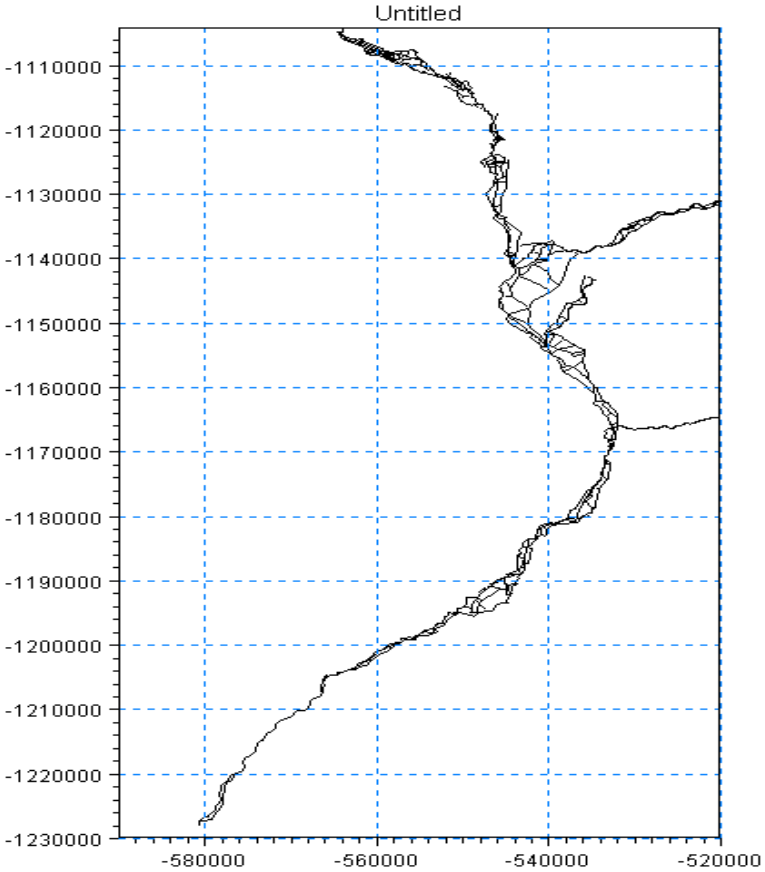
40 subcatchments

5 years calibration period (1981 - 1986)

Rainfall Runoff model



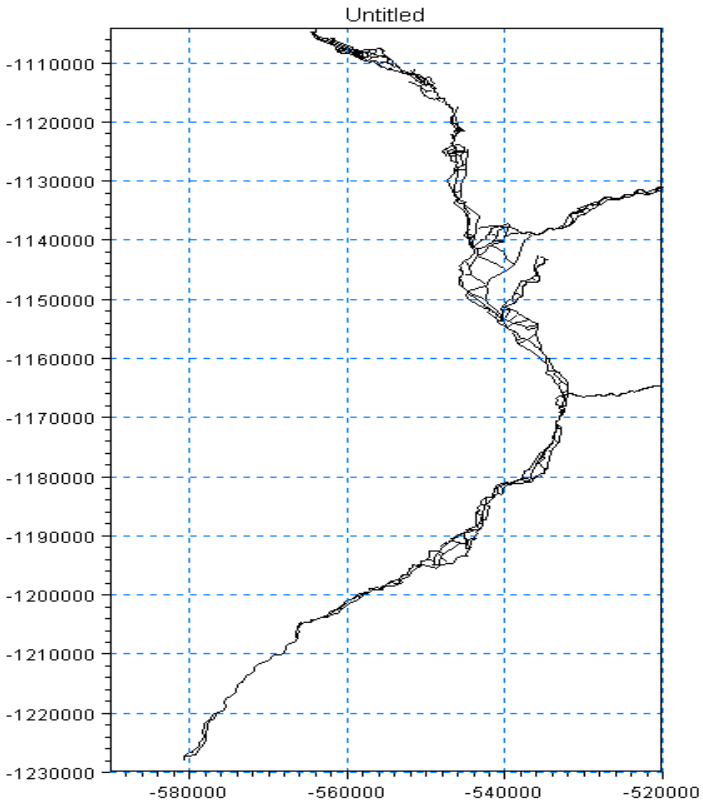
Hydrodynamic model

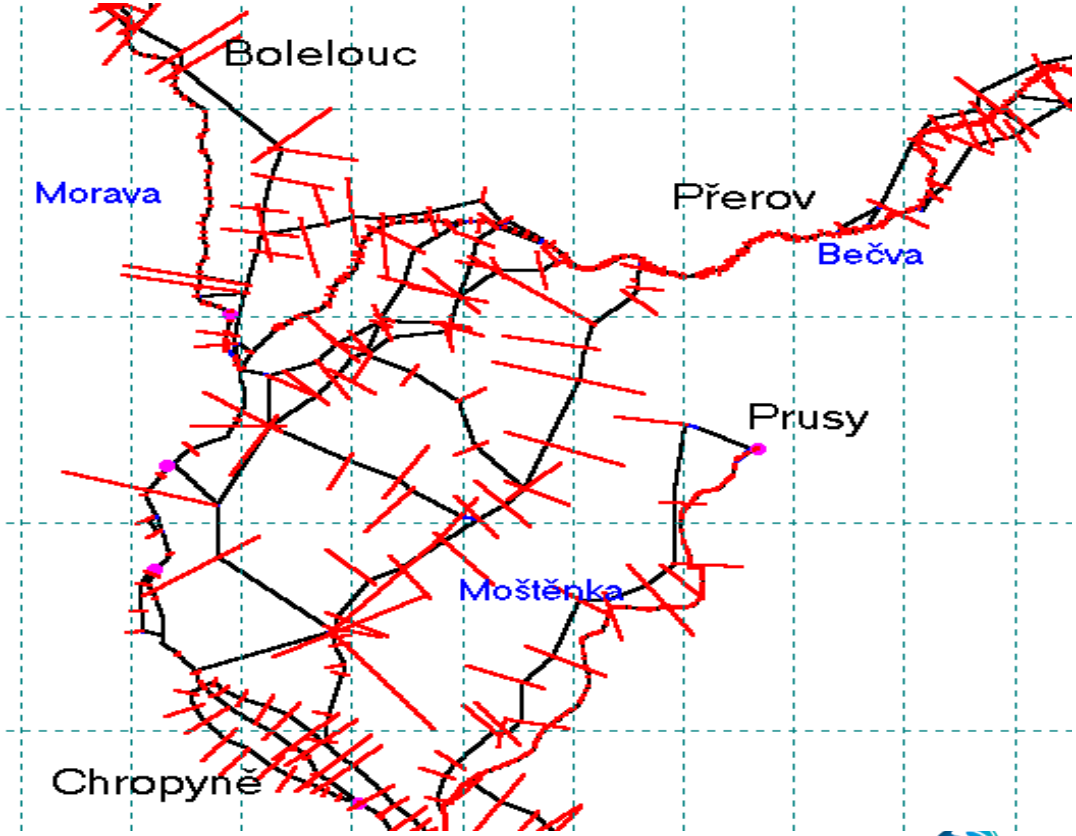


6 200 cross sections
760 branches
830 objects

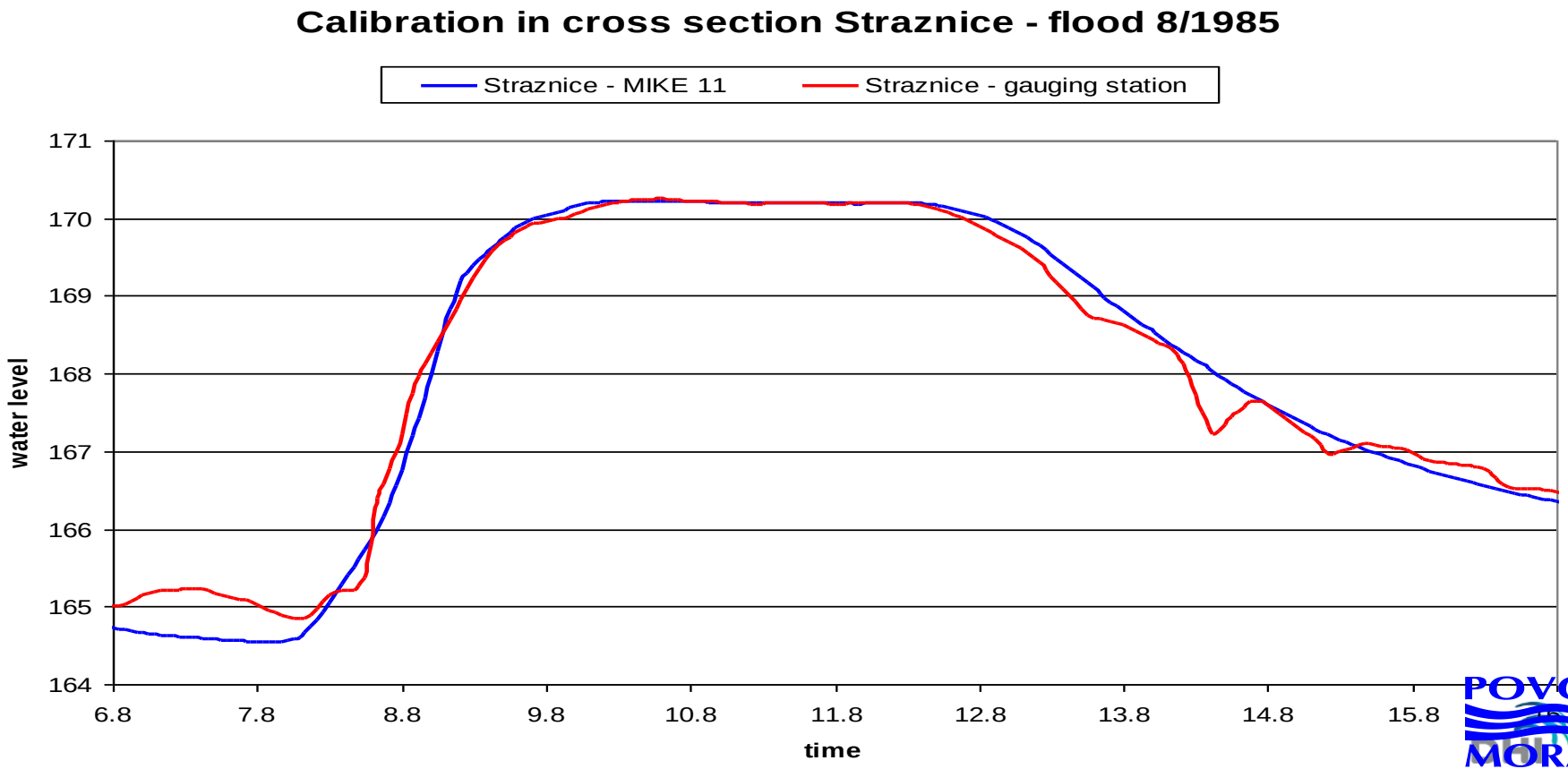
calibration on floods
August 1985
June 1986

Hydrodynamic model

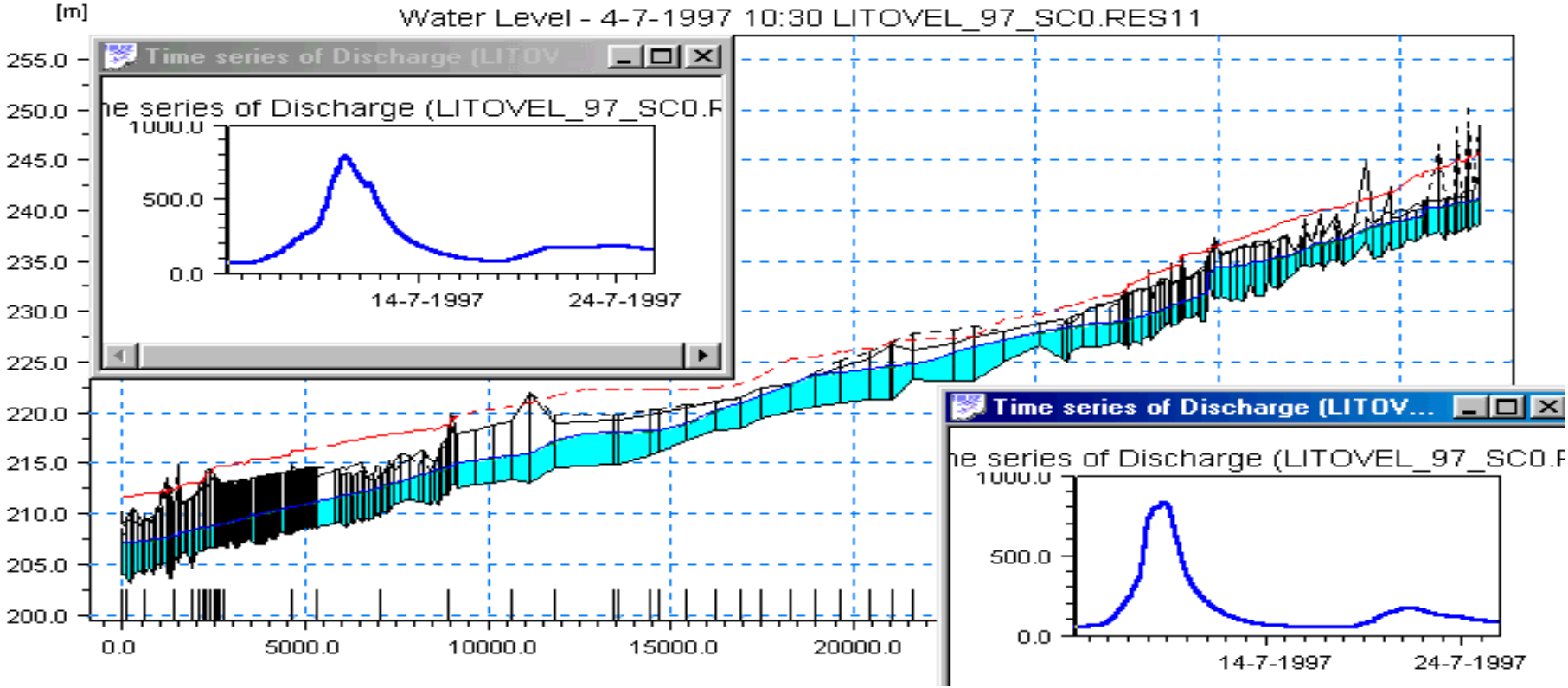




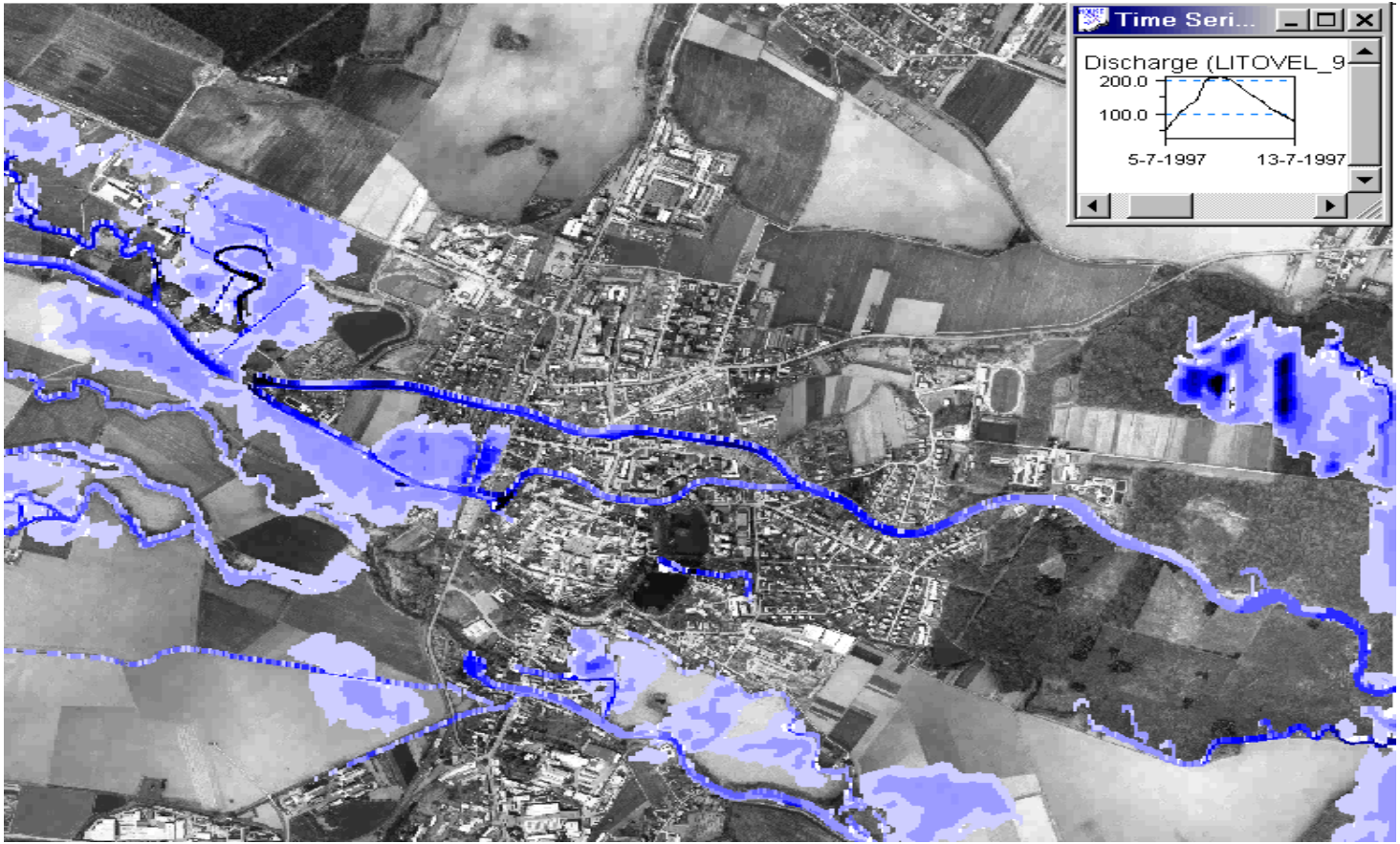
Hydrodynamic model



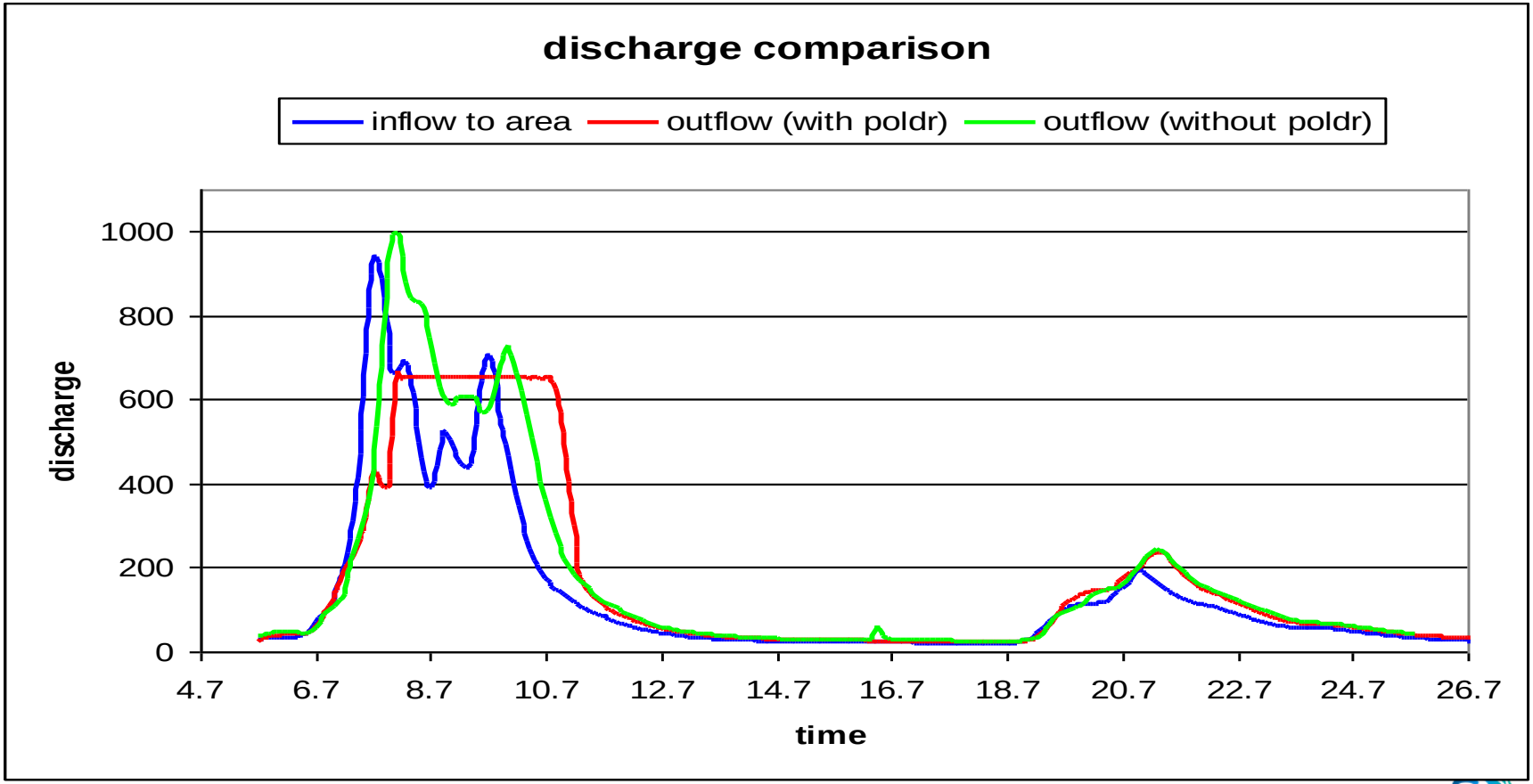
Simulation of flood July 97 - part of Morava river



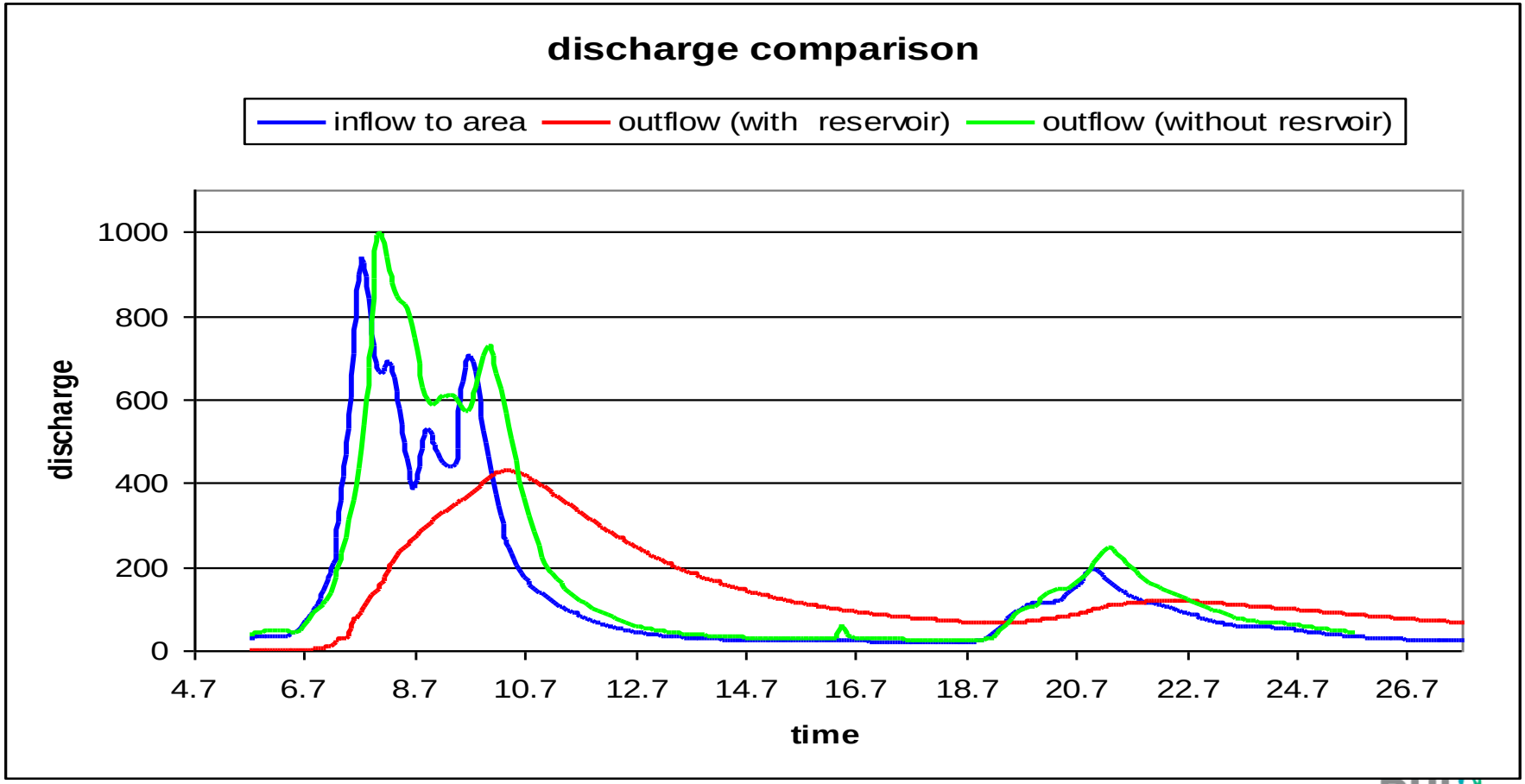
Simulation of flood 7/97 in town Litovel



3. scenario


discharge comparison
inflow to area
outflow (with poldr)
outflow (without poldr)
discharge
1000
800
600
400
200
0
4.7
6.7
8.7
10.7
12.7
14.7
16.7
18.7
20.7
22.7
24.7
26.7
time

3. scenario


discharge comparison
inflow to area
outflow (with reservoir)
outflow (without resrvoir)
discharge
1000
800
600
400
200
0
4.7
6.7
8.7
10.7
12.7
14.7
16.7
18.7
20.7
22.7
24.7
26.7
time

Thanks for your attention

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Potential Discussion points

- Modelling Approach : How suitable is the use of flood models to find the optimal solution for flood protection and or prioritisation
- Modelling System : Is it necessary to use mathematical and hydro dynamic models
- Modelling Techniques : Use of 1D or 2D approach or combination (where and why)
- Data Requirements: Type, availability, precision, reliability of input data (rainfall and gauging stations, GIS)
- Calibration : How important is global evaluation of hydraulic effect of flood protection measures
- Development : Parallel modeling, scenario testing and technical design
- What is the „life-time“ of old mathematical models?
- When and why should models and/or model results reviewed?
  - New modelling approaches
  - Data update
  - Changes in the modeled domain




For info or further questions on this presentation, or on the activities of the JASPERS Networking Platform please contact:

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