

**Workshop on transboundary flood risk management
22-23 April 2009, Geneva**

SESSION 3: Joint flood risk management planning and implementation: Case studies

**Transboundary flood risk management
in the Sava river basin
- present status and future needs -**



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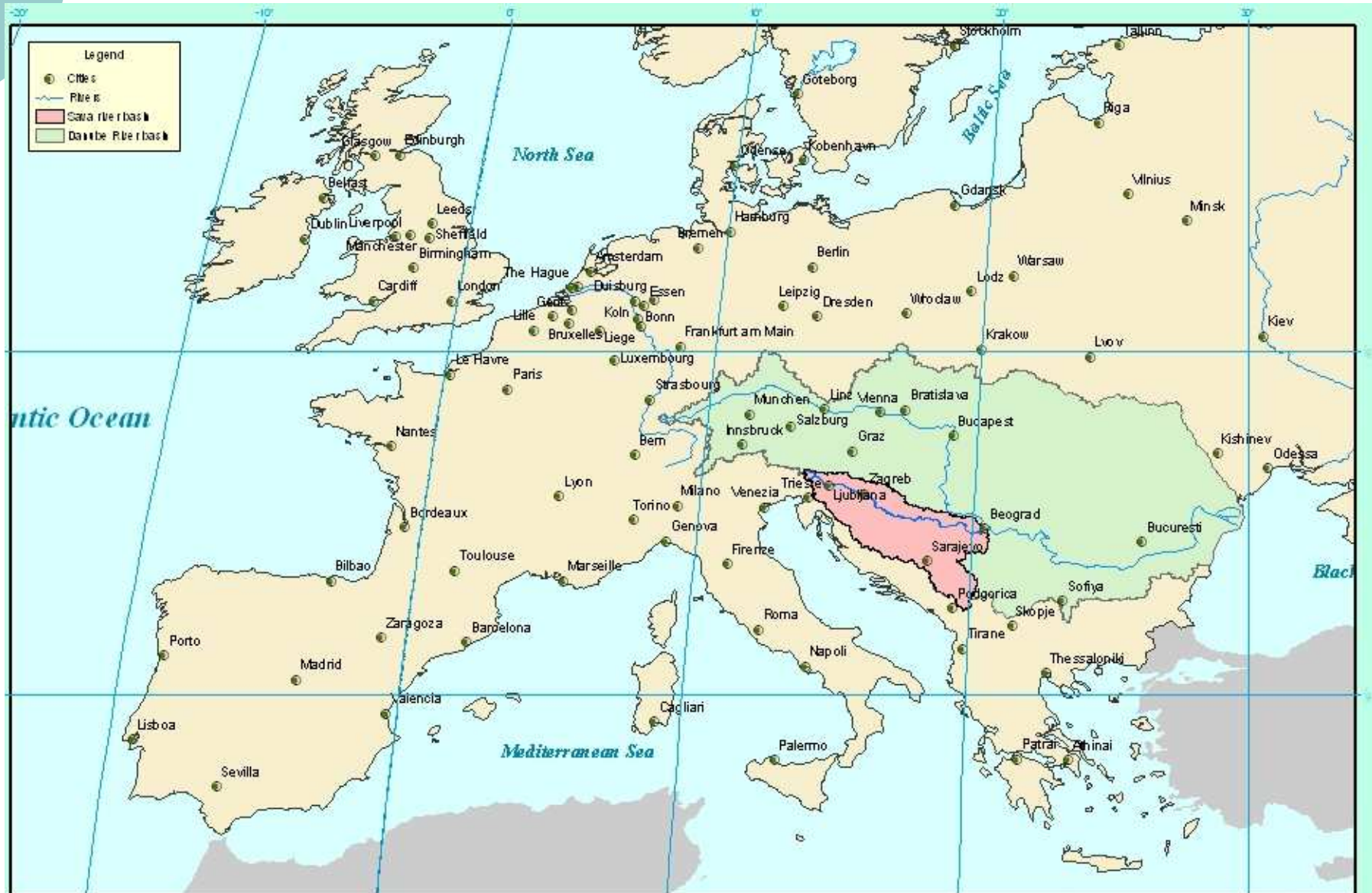
- ❑ About the Sava river basin
- ❑ Floods in the Sava river basin
- ❑ Institutional responsibilities
- ❑ Framework Agreement on the Sava River Basin (FASRB)
- ❑ International Sava River Basin Commission (ISRBC)
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- ❑ Activities and achievements of ISRBC FP PEG
- ❑ Protocol on flood protection
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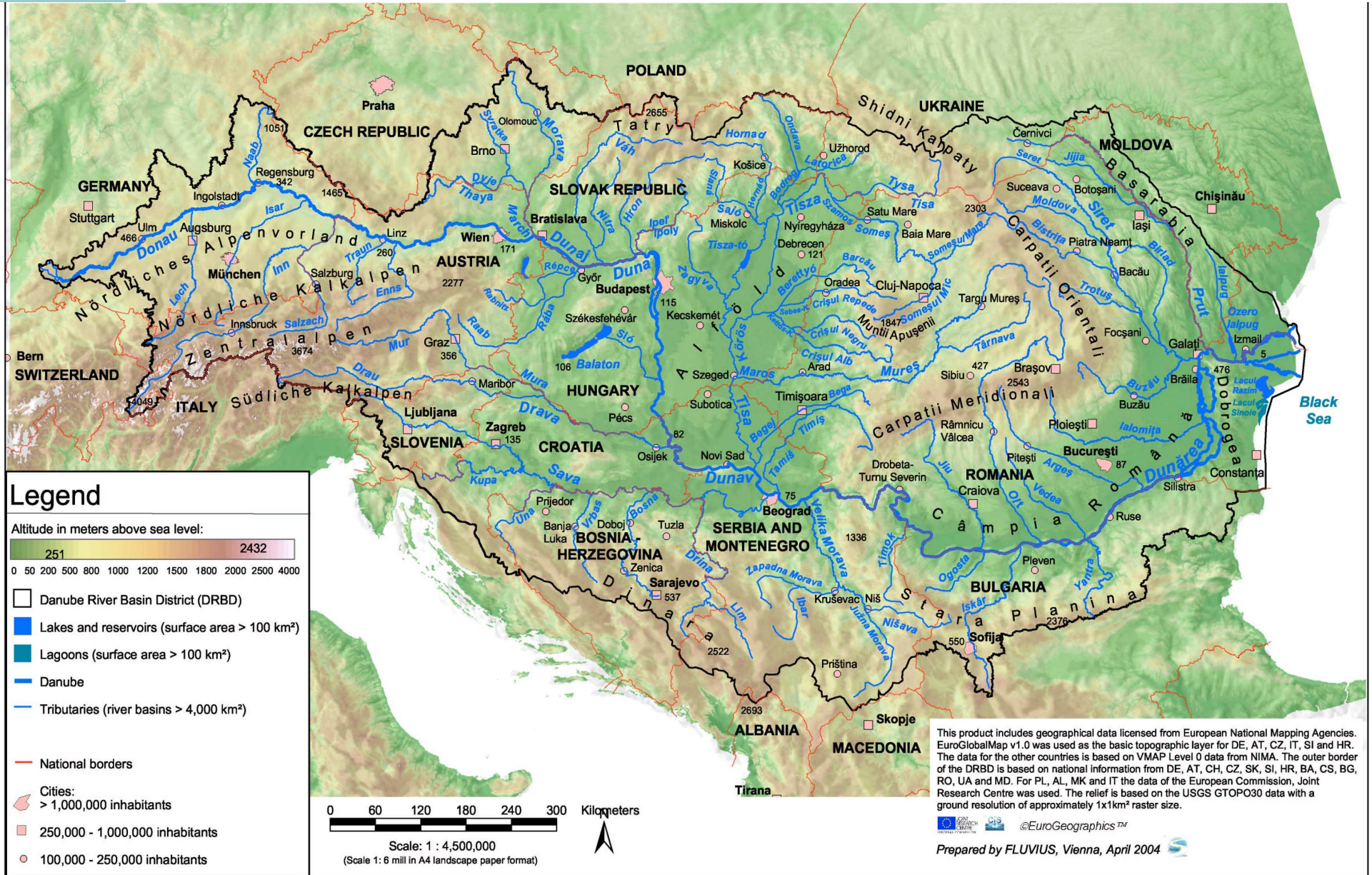
Basic facts on the Sava river basin

- River in southeast Europe
- Right side tributary of Danube – the second largest tributary by river basin area (97,713 km²), and the largest by discharge (average 1500 m³/s at the mouth)
- Sava river course is ~950 km long
- More than 30 first and second order tributaries >1000 km²
- River basin altitude 60 – 2860 m.a.s.l
- Very asymmetrical river basin - 78% belongs to the right, southern part (mountains and hilly areas)

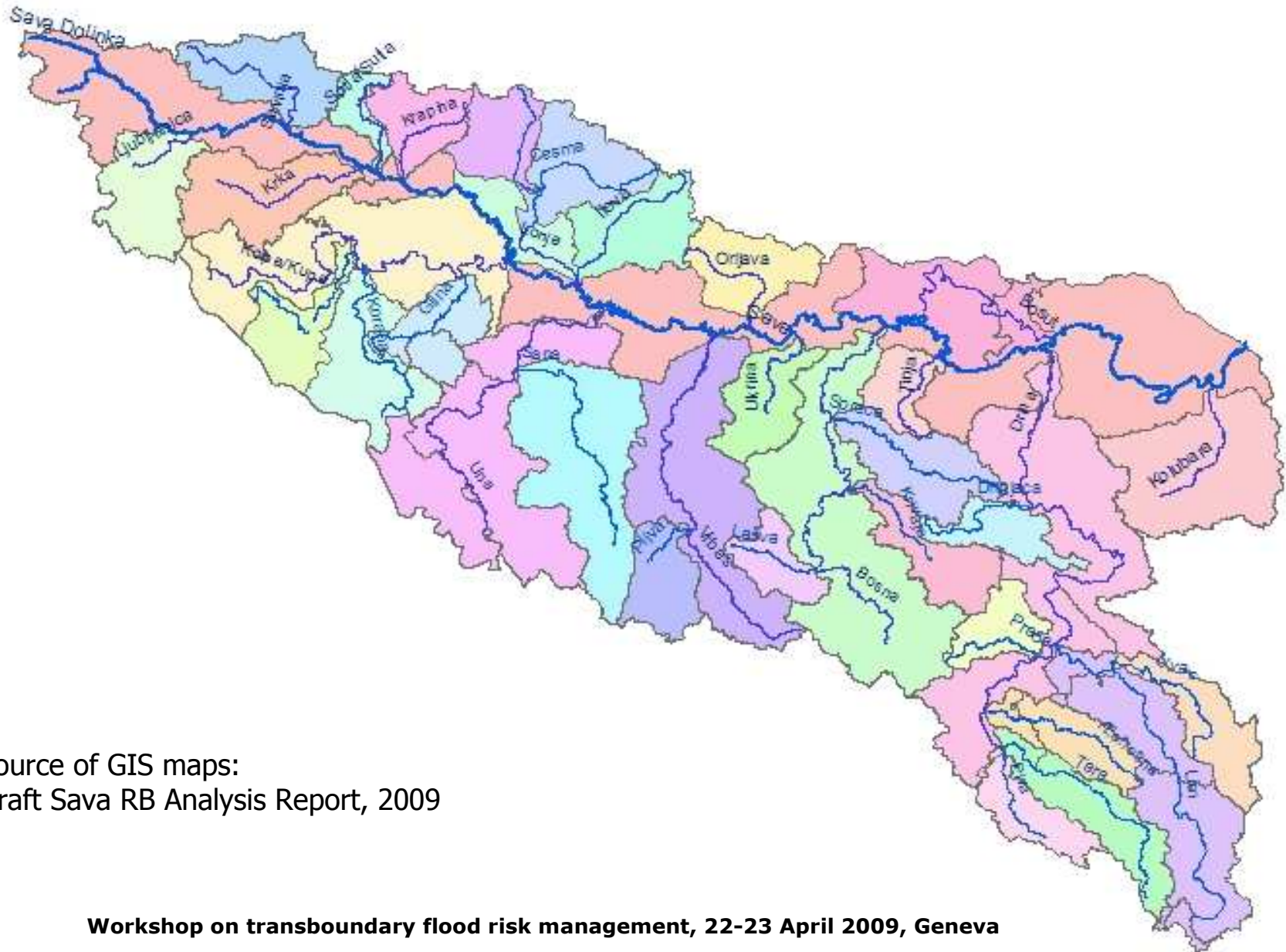
Geographical position



Part of the Danube river basin (12%)



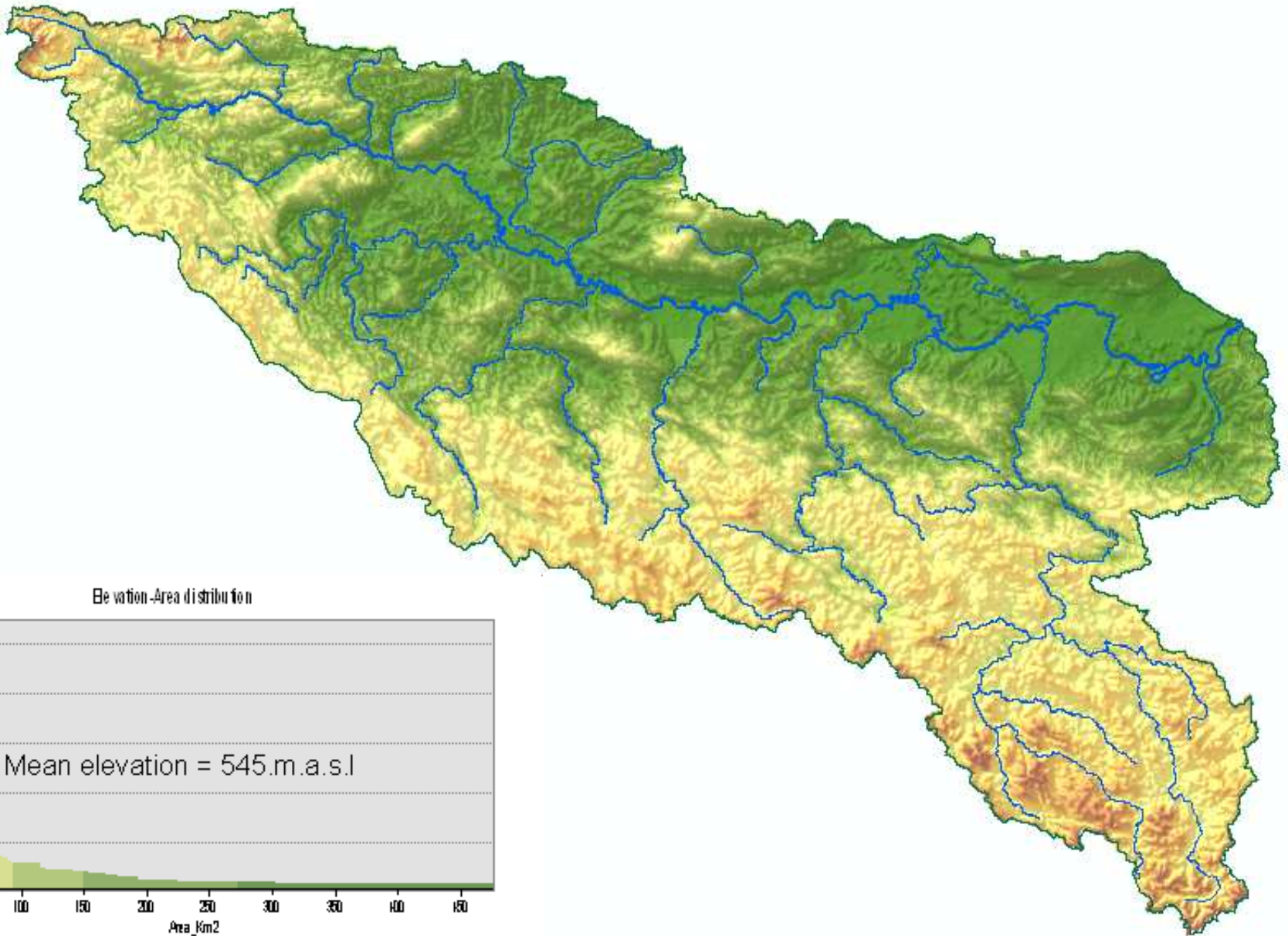
Sub-basins in the Sava river basin



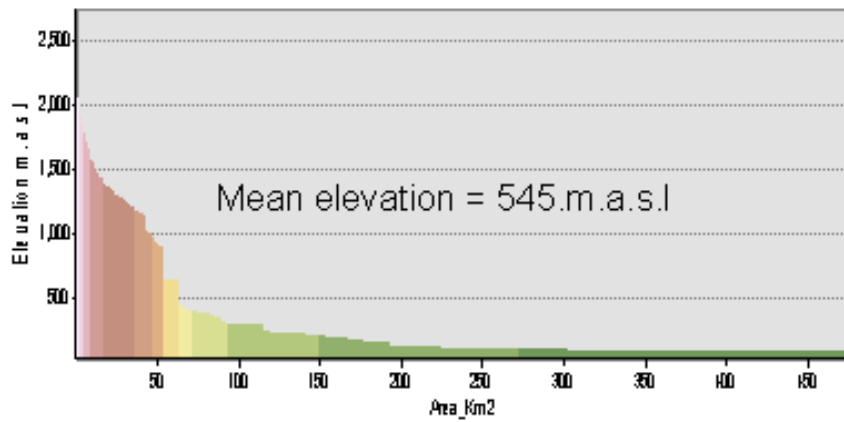
Source of GIS maps:
Draft Sava RB Analysis Report, 2009

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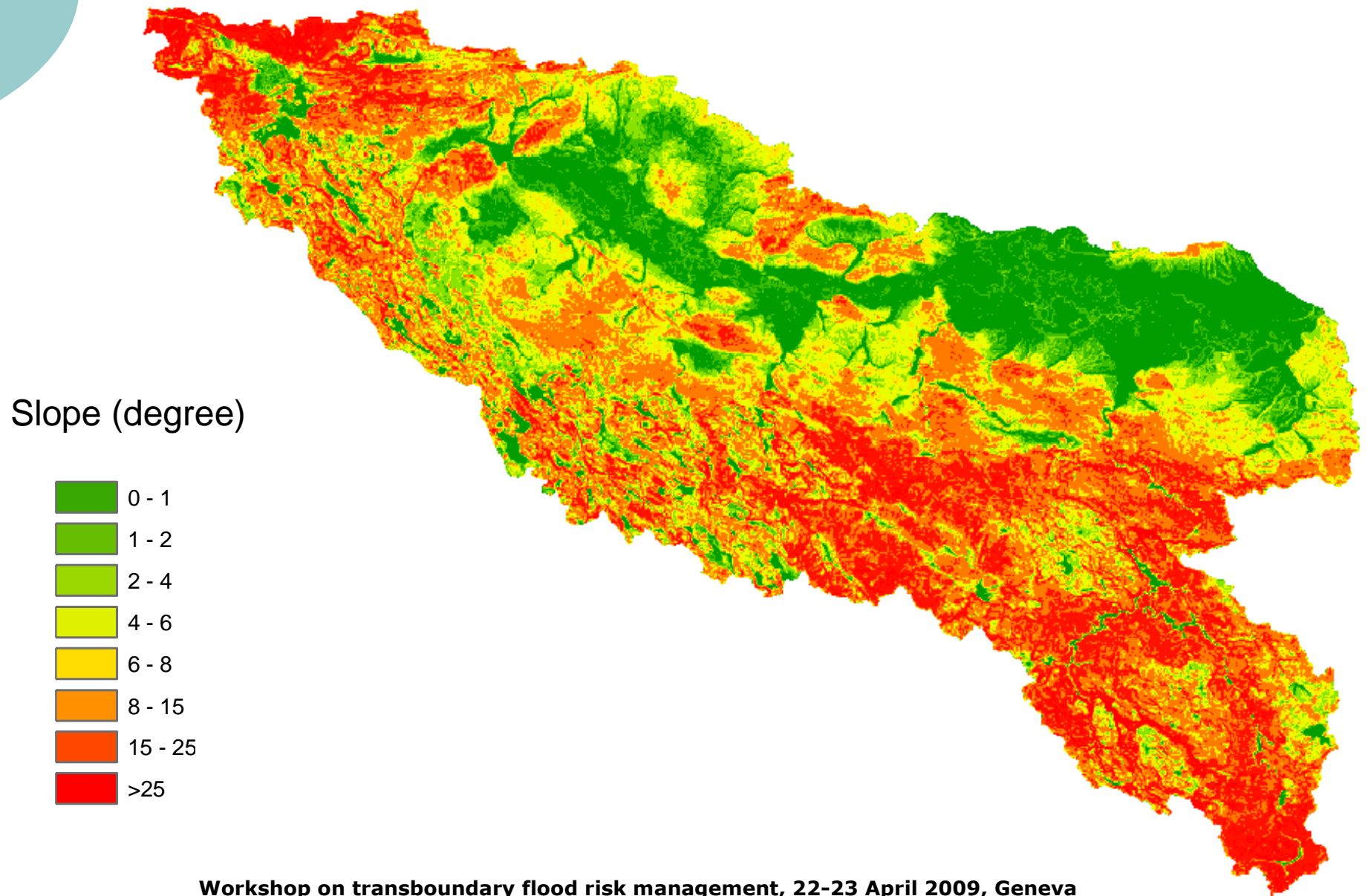
Topography



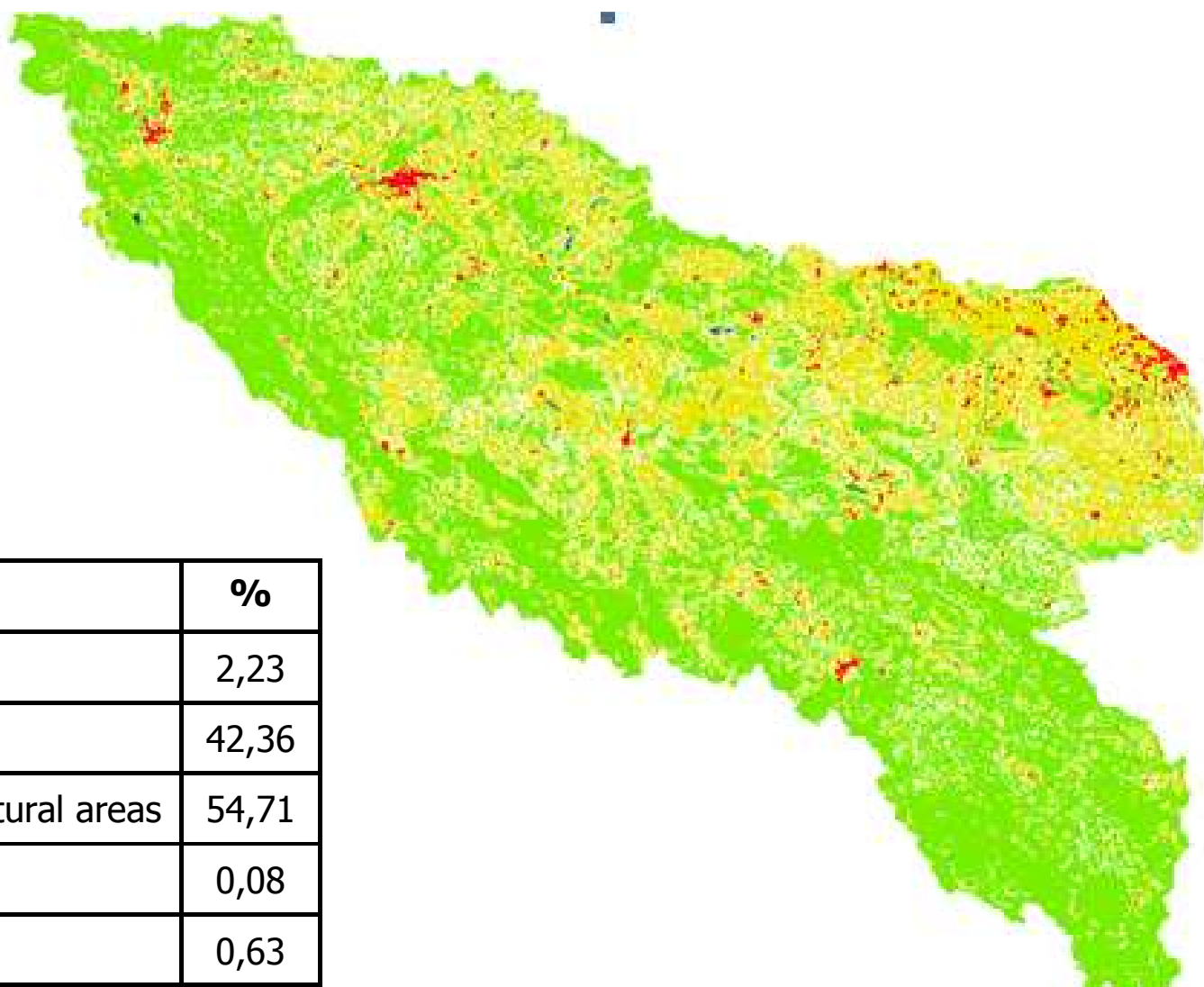
Elevation-Area distribution



Terrain slope



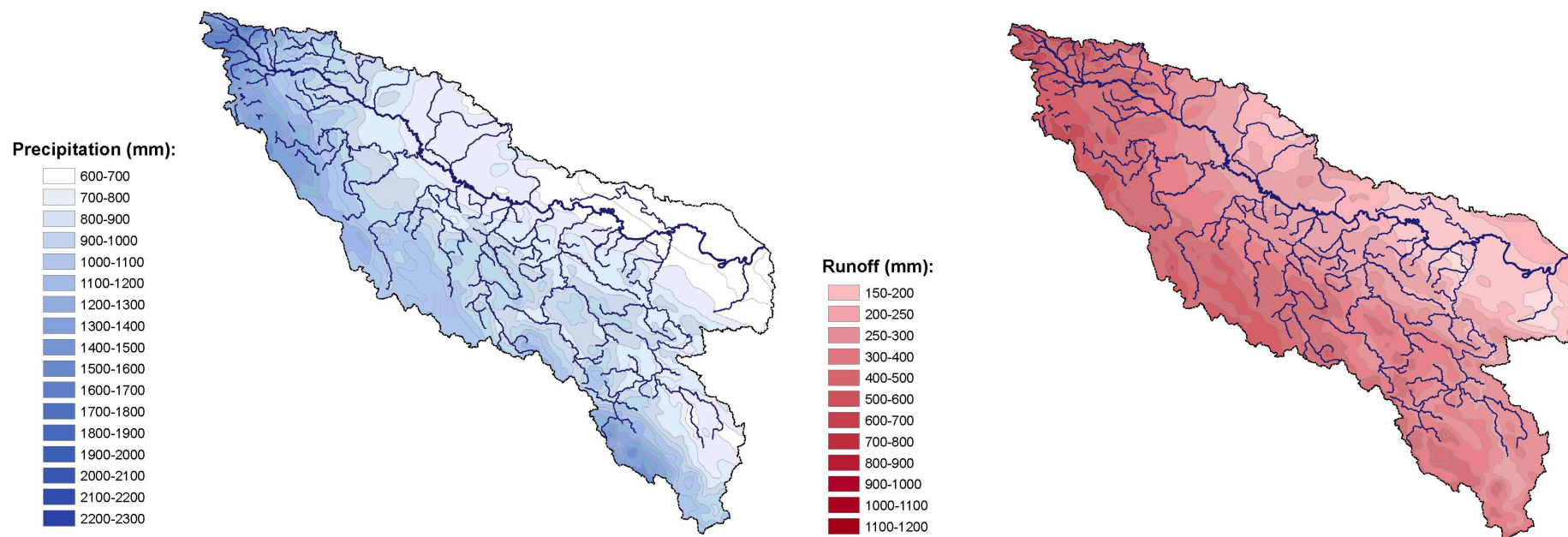
Land cover



Land class	%
Artificial surfaces	2,23
Agricultural areas	42,36
Forests and semi natural areas	54,71
Wetland	0,08
Inland water	0,63

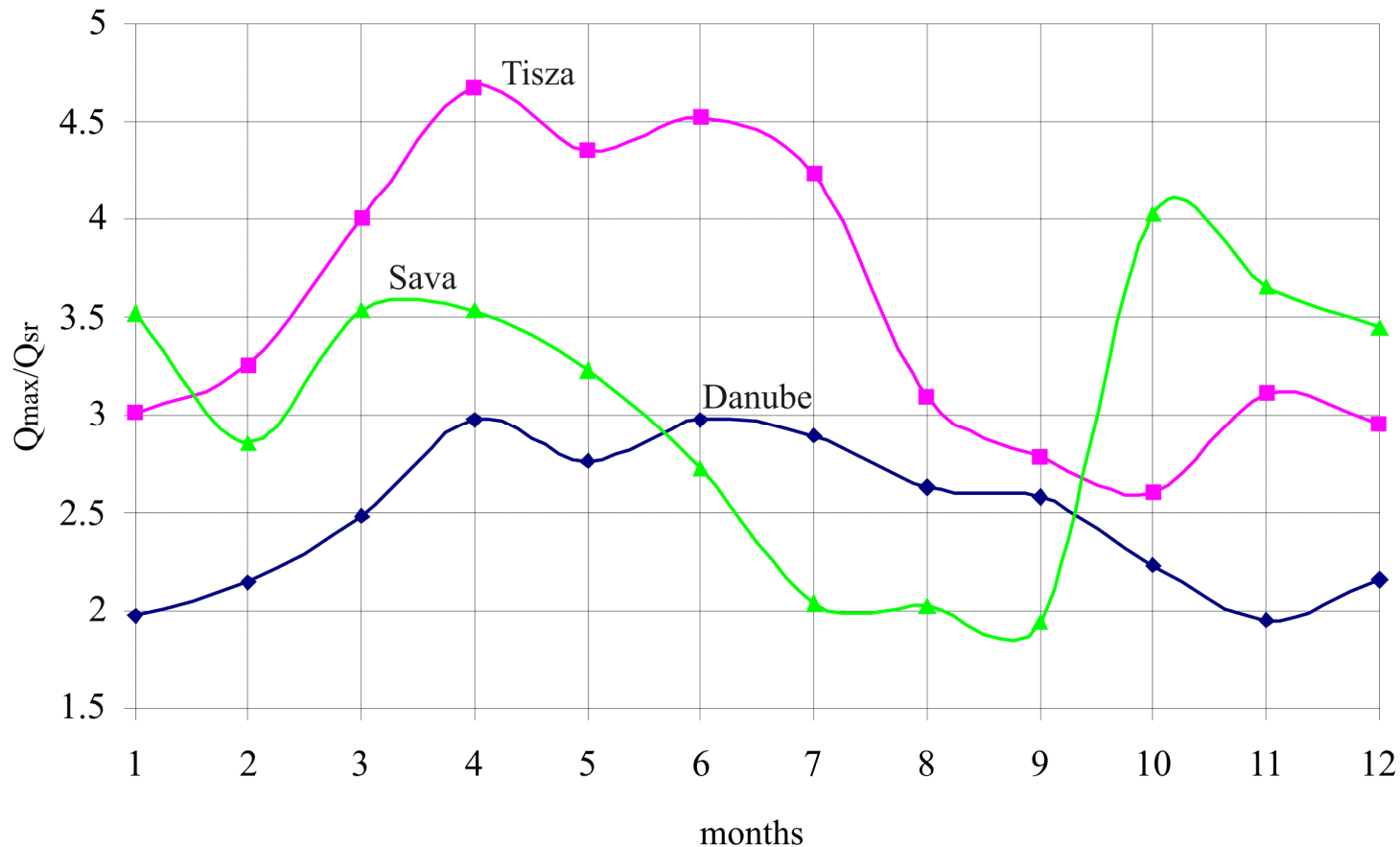
Climate, precipitation and runoff

- **Alpine climate** (upper SRB)
- **Moderate continental climate** (right tributaries)
- **Moderate continental (mid-European) climate** (left tributaries)

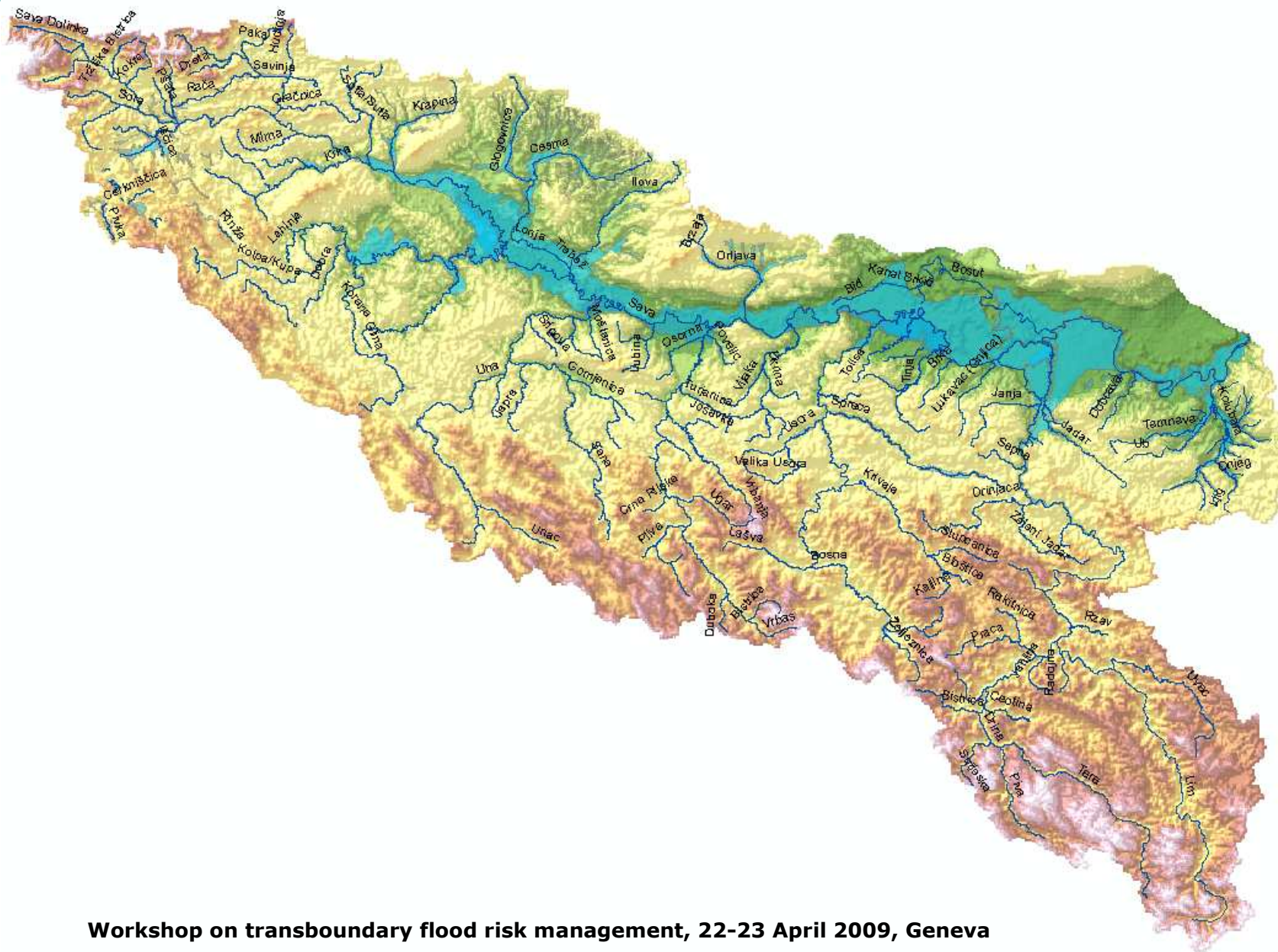


Origin of floods

- Floods in the Sava Basin usually appear in spring and autumn
 - Spring floods result from snow melting – long duration
 - Autumn floods are caused by heavy rainfalls – extremely high flows



Approx. flood prone areas



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Sava river floods



Zagreb, 1964



Belgrade

1981
2006



Torrent floods



Upper part
(Slovenia)
September, 2007

Not a transboundary issue!

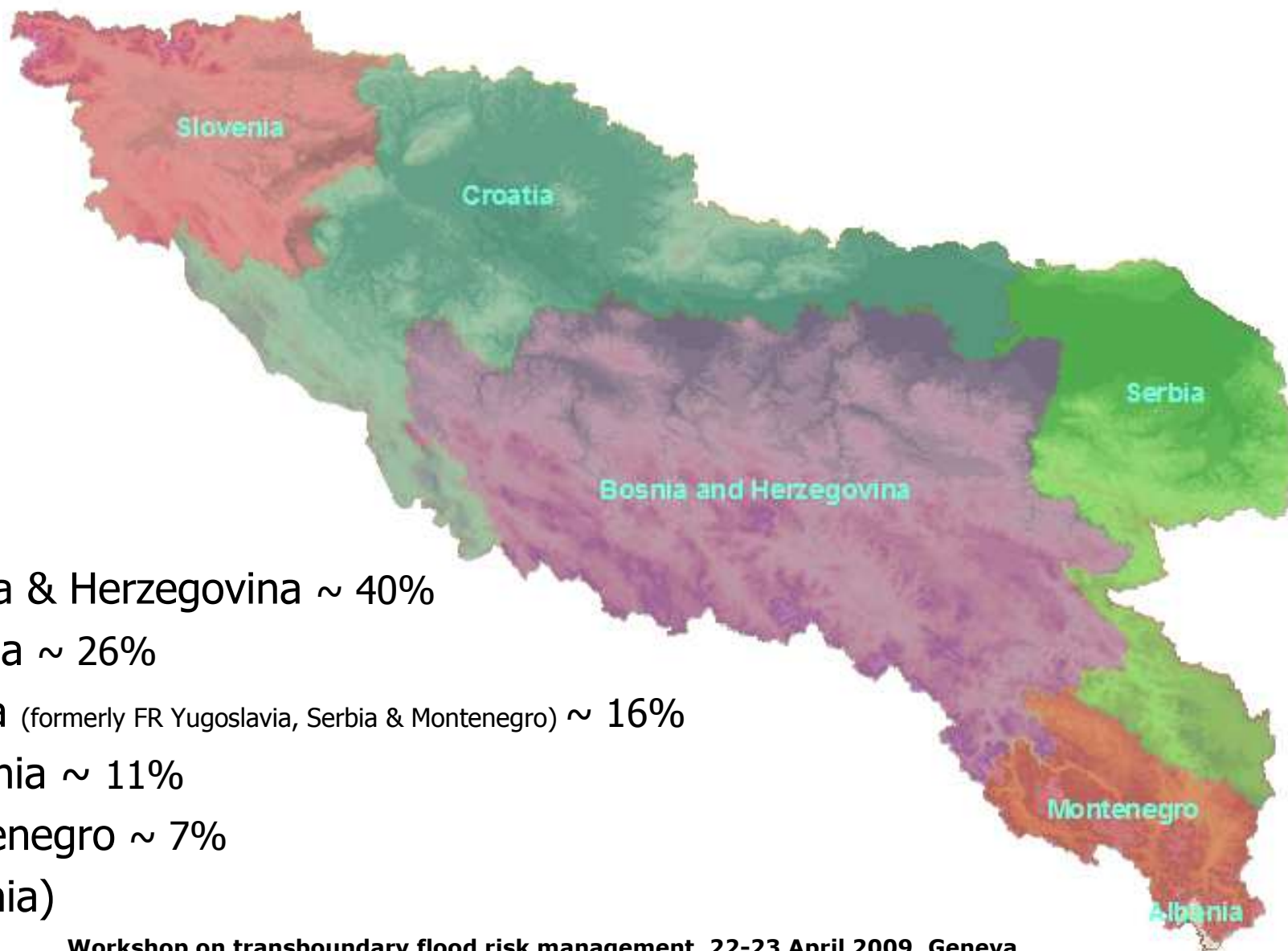


Institutional responsibilities in the past

- o National river basin in former Yugoslavia
- o **SRB flood protection plan** (UN-funded Study for the Regulation and Management of the Sava River Basin in Yugoslavia, Polytechna - Hydroproject, Prague & Carlo Lotti, Rome, 1972)
 - different solutions for upper, middle and lower Sava
 - no harm rule
- o Partially implemented (reservoirs were not built, retentions in the middle Sava partially completed)



Institutional responsibilities – after 1991



- ❑ Bosnia & Herzegovina ~ 40%
- ❑ Croatia ~ 26%
- ❑ Serbia (formerly FR Yugoslavia, Serbia & Montenegro) ~ 16%
- ❑ Slovenia ~ 11%
- ❑ Montenegro ~ 7%
- ❑ (Albania)

Institutional responsibilities – after 1991

Share of the Sava countries territory belonging to the SRB

	SI	HR	BA	RS	ME	AL
Total country area [km²]	20.273	56.542	51.129	88.361	13.812	27.398
Share of national territory in the SRB [%]	52,8	45,2	75,8	17,4	49,6	0,59

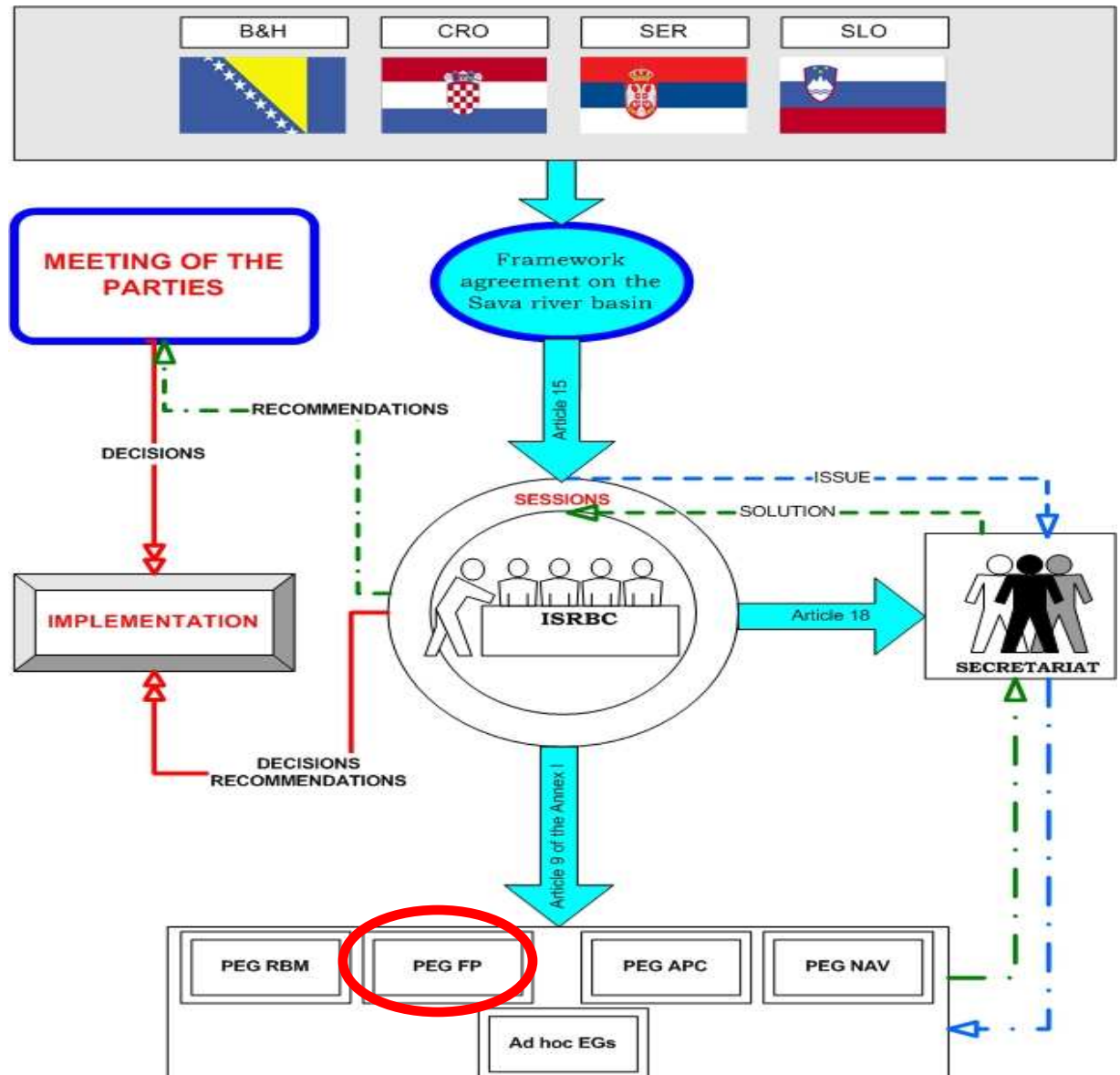
Bilateral agreements on water resources management



International Sava River Basin Commission

EXPERT GROUPS

- **Permanent** (dealing with the key issues addressed by FASRB)
 - River Basin Management
 - Accident Prevention & Control
 - **Flood Prevention**
 - Navigation
- **Ad-hoc** (dealing with specific issues and tasks)
 - Legal
 - Financial
 - Hydrological and Meteorological issues
 - GIS
 - RIS (River Information Services)
- **Task**
 - Sediment management





ISRBC activities

1. Development of joint/integrated **plans** for the SRB
2. Establishment of **integrated systems** for the SRB
3. Preparation and realization of **projects**
4. Harmonization of **regulation** (national → EU)
5. Creation of additional **protocols** to the FASRB
6. Cooperation and **public participation**



PEG for Flood Prevention

PROTOCOL ON FLOOD PROTECTION TO THE FRAMEWORK AGREEMENT ON THE SAVA RIVER BASIN

- Preparation started in June 2007
- Draft finished in February 2009
- Sent to parties for final consideration
- Possible signing date: Sava Day, June 2009
- Ratification: ?

Protocol on flood protection (1)

Scope and objectives

- Sustainable flood protection in the SRB with aim to prevent or limit flood hazard and to reduce or eliminate detrimental consequences of floods
- Floods caused by:
 - **natural phenomena** (high flows of rivers and torrents, ice jamming), and
 - **artificial impacts** (water discharge from reservoirs and retentions induced by dam collapsing or inadequate handling, changes in river basin, riverbeds and floodplains)

Grounds and principles of cooperation

- Directive 2007/60/EC, Action Program for Sustainable Flood Protection in the Danube River Basin and good practices in cooperation.
- “No harm rule” in implementation of measures, works and activities on flood protection.

Protocol on flood protection (2)

Activities

- Preparation of the *Program for development of the Flood Risk Management Plan in the Sava River Basin*
- Undertaking of *Preliminary Flood Risk Assessment*
- Preparation of *Flood Maps*
- Development of *Flood Risk Management Plan in the Sava River Basin*
- Establishment of the *Flood Forecasting, Warning and Alarm System in the Sava River Basin*
- Exchange of information significant for sustainable flood protection
- Implementation of all measures and activities of mutual interest, originating from planning documents or activities above or other mutually agreed measures and activities.

Protocol on flood protection (3)

Flood Forecasting, Warning and Alarm System

- Joint or harmonised System for the Sava River Basin
- Parties shall jointly undertake all necessary actions for establishment of the System – ISRBC shall coordinate the activities
- Parties shall ensure regular maintenance and performance control

Information exchange

- Exchange of information through the warning and alarm system or any other appropriate manner in line with the agreed procedure – only floods that induce or may induce **transboundary** impact
- Timely exchange of meteorological and hydrological data, analyses and information important for flood protection, in line with the agreed procedure and through the HMS and institutions responsible for flood protection
- Information on changes of regulations and plans

Protocol on flood protection (4)

Flood defence emergency situations and mutual assistance

- Establishment and maintenance of preparedness for flood emergency measures - including the measures for transboundary impact mitigation (mutually agreed upon in the FRMP)
- Assistance on request
- Parties shall agree in details on all necessary actions and activities in the FRMP.

Public information and consultation

- Public information on the implementation of the Protocol
- Enable efficient public information concerning the PFRA, Flood Maps and FRMP and foster active participation of the interested public in process of development, review and up-date of these plans.



Planned activities

- **Development of integrated systems**
 - **SAVA GIS**
 - Implementation **requires considerable financial resources**, through:
 - Co-financing by the Parties
 - Internationally funded project(s)
 - **Monitoring, Forecasting and Early Warning System**
 - Establishment **requires considerable financial resources**, either through co-financing by the Parties or through internationally funded project(s)
 - Application to be prepared and submitted to the SEE TCP
- **Flood mapping**
 - Searching for possible funding source



Challenges / possible obstacles

- **Differences between the countries**
 - Status with respect to EU integration process
 - Eligibility for approaching funds
 - Level of economic development (financial resources)
 - Level of the EU WFD and EU FD implementation
 - Organizational structure in decision-making process
 - Awareness of the public
- **Financing**
 - Priority projects / strategic studies
 - Establishment of integrated systems



Conclusions

- **FASRB** appears to be a **good framework** for Integrated Transboundary Flood Risk Management
 - By scope
 - By vision of transboundary cooperation (principles, mechanism)
- **Many focal points/institutions** and **good inter-sectoral coordination and communication** within a Party needed due to broad scope of the FASRB
- **Protocol on flood protection is necessary** to regulate specific issue addressed by the FASRB
- Involvement of **expert group** is very important for realization of regular activities, not only as a support to the Secretariat, but also as a link to other experts of the Parties
- **Political commitment** and support at high political level is crucial for launching new projects



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