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## The 2014 flooding disaster in Croatia – Experiences and lessons learned




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## Introduction

*May 2014 flooding in Croatia was the worst since the flooding of Zagreb by Sava River in 1964*



- Over the last few years there has been an apparent increase in the frequency and magnitude of flooding events in Croatia, particularly in the Sava River Basin (2010, 2012, three times in 2014)
- May 2014 Flood
  - Lower Sava River - discharge 6000 cms, 50% higher than historical max (1000-yr => “Millenium Flood”)
  - water levels significantly higher than historical maxima
  - two dike breaches upstream of the border with Serbia, causing catastrophic flooding of the Lower Posavina area
  - 2 fatalities, economic damages > 200 mil eur

# Sava River Basin

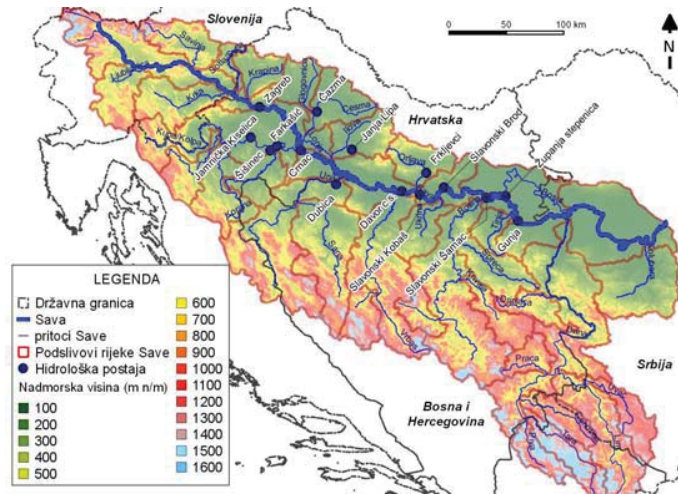
River Sava L=512 km in HR

A=97.713 km<sup>2</sup> total

A=25.375 km<sup>2</sup> in HR

26% of Danube River Basin

45% of the area of HR

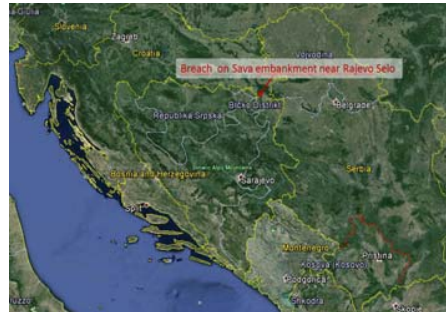


## Flood Protection System “Middle Posavlje”



Retentions Lonjsko polje, Mokro polje, Odransko polje  
 – natural floodplains – capacity 1.8 billion m<sup>3</sup>, area 58.800 ha

May 17, 2014:  
Two dike breaches  
in Lower Posavina, just  
upstream of the border with  
the Republic of Serbia



## Flood of May 2014 – Croatia's Losses

- 2 casualties
- 9000 people evacuated
- material losses:
  - 7500 houses and 19 public buildings flooded
  - damages to property 160 mil eur
  - damages to infrastructure 30 mil eur
  - damages to agriculture (8500 ha) 8 mil eur
- flood protection (costs of defense and repairs) > 10 mil eur
- government expenses > 22 mil eur
- total damages > 230 mil eur

## Lessons Learned

- Existing flood protection system is vulnerable, and the population has become more aware of this fact
- “Low probability” events are likely to happen
- Operative flood defense and crisis management were satisfactory, but can be improved
- Humanitarian assistance was outstanding
- Better international cooperation is needed (coordination by ISRBC and bilateral commissions)

## Flood Risk Management Planning

- Directive 2007/60/EC on the assessment and management of flood risks (EU Floods Directive, FD) entered into force on 26 November 2007.
- This Directive requires Member States to assess if all water courses and coast lines are at risk from flooding, to map the flood extent and assets and humans at risk in these areas and to take adequate and coordinated measures to reduce this flood risk.
- The flood risk management plans (FRMP) must set out appropriate objectives for the management of flood risk within the areas covered by the plan. The objectives must focus on reducing the adverse consequences of flooding for human health, the environment, cultural heritage and economic activity.
- National FRMP's are due by the end of 2015.
  - Croatia's FRMP is an integral part of its River Basin Management Plan (RBMP).
  - Croatia's Draft RBMP with FRMP was completed and published for public review in April 2015. Formal public consultations will follow.

## International FRM Planning

- International Commission for the Protection of the Danube River (ICPDR) - preparing the first FRMP for the Danube River District
- International Sava River Basin Commission (ISRBC) - preparing the first FRMP for the Sava River Basin
- Objectives:
  - Avoidance of new risks
  - Reduction of existing risks
  - Strengthening resilience
  - Raising awareness
  - **Solidarity principle**

## Solidarity principle

- The solidarity principle is very important in the context of flood risk management. In the light of it countries should be encouraged to seek a fair sharing of responsibilities, when measures are jointly decided for the common benefit, as regards flood risk management along water courses.
- FD stipulates that in the interests of solidarity, flood risk management plans established in one Member State shall not include measures which, by their extent and impact, significantly increase flood risks upstream or downstream of other countries in the same river basin or sub-basin, unless these measures have been coordinated
- Instrumental to the efficient application of the solidarity principle is transboundary cooperation. Establishing efficient bilateral cooperation with all neighbouring countries, including common actions on transboundary rivers during flood and ice defence is an effective tool to reducing downstream impacts of floods.

## Conclusions

- Croatia:
  - Need for detailed assessment and strengthening of the existing flood protection infrastructure
  - Needs to intensify investments in the flood risk management (EU funds, international loans)
- Generally/Regionally:
  - Importance of flood risk management planning in line with the EU Floods Directive, including coordinated international-level planning and future implementation of joint or coordinated measures emphasizing solidarity principle
  - Importance of improved flood risk management (prevention, protection, response and recovery) and implementation of measures on the economy
  - Avoiding/reducing flood disasters will protect regional economies and contribute to improving the overall security