

Academic solidarity with geopolymer

Renovation of the areas in Croatia, Bosnia and Hercegovina
and Serbia caught by the floods

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Introduction

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1. working on R&D of geopolymer lightweight aggregate for constructive and non constructive application
2. fly ash based binders

Geopolymer lightweight aggregate



Introduction 2

Representing an Interest group that consist of *chemical* and *civil* engineers, people within *fly ash industry* and others interested on the topic of geopolymer and cement-free binders

In the region of Croatia, BIH and Serbia we have:

- **raw materials** (fly ash from 5 thermo plants)
- chemical and concrete **laboratory** in Zagreb
- **facility** to mix and pack binders

Timeline and the area of floods

- 13.05.2014 was the start of massive rains
- for example: in less than 24h fall 120 l/m² of rain in Belgrade



NASA's satellite Aqua photos

05.2013

05.2014



Floods in numbers

	CROATIA	BOSNIA AND HERCEGOVINA	SERBIA
Residential buildings affected by the floods	3.900	100.000 *	5.000
Residential buildings no more suitable for living	413	N/A	1.800
Evacuated people	11.000	1.000.000 *	> 30.000
Estimated damage	65 million €	1.3 billion € **	260 million € **

* unofficial data

** European Bank for Reconstruction and Development

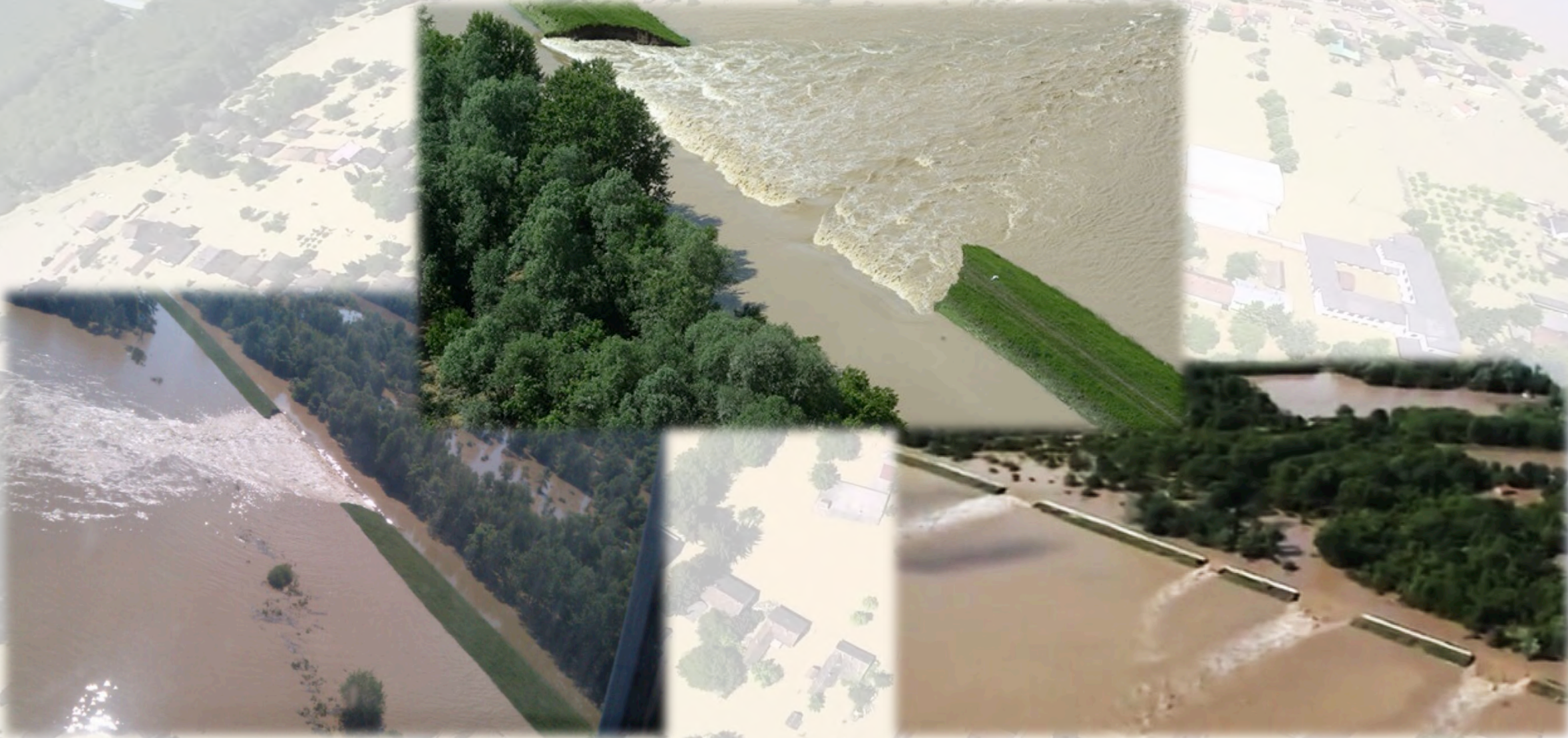
Floods in pictures



Floods in pictures



Floods in pictures



Floods in pictures



Floods in pictures



Floods in pictures

- City of Dobož, BIH
- population: 77.223
- Bosna river
- **Flooded** entirely in **6 minutes**



Floods in pictures



Floods in pictures



Floods in pictures

- In Croatia and Serbia around 5000 people do not have homes to go back to
- In BIH the situation is even more severe



Recovery project

Depending on how badly infrastructure and builds are damaged, there are **3** possible outcomes for restoration process:

- 1. Rebuild**
 - 2. Reconstruct**
 - 3. Repair**
- } **3R**

3R needs ***binder material***

Proposal

- We have propose to Croatian president and leadership, to start the renovation of areas hit by the floods with the fly ash on **3** different ways:

- 1. Mineral additive type 1** (non-puzzolan reaction, adding to concrete for better properties)
- 2. Mineral additive type 2** (as a puzzolan reaction, replacing and lowering the share of cement in concrete)
- 3. Geopolymer binder** (cement free)

Characteristics of the project

- Non-profit project
- Financed from the EU solidarity fund
- Financed from the Croatian humanity fund
- Supported by the governments and politicians

Characteristics of the project 2

The intention is to:

- Help the people with the returning to safe and renew homes
- Achieve the reconstruction in the most **eco-friendly** manner (lower CO2 footprint, recovery of the “waste” called fly ash, etc...)
- Show on a global scale that geopolimer is a material of the present, not only future
- Bring the geopolimer closer to every day usage

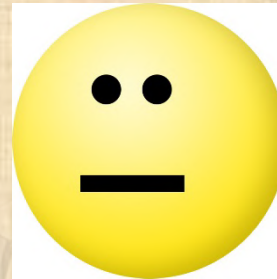
And in a way win a small battle in getting closer to standardization of geopolimer binders.

What dose it need to work?

1. Idea




2. Consent of designs makers



3. Synergy of geopolymer community



An aerial photograph of a village completely inundated with floodwater. The houses, trees, and roads are mostly submerged, with only the roofs and tops of trees visible above the water level. The water is a murky, brownish-yellow color. The sky is a pale, overcast blue.

Thank you for your attention!

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