



## **Mine action after the floods** **regional synergy in emergency response,** **technology development and capacity** **building**

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Responding to environmental challenges with a view  
to promoting co-operation and security in the OSCE  
area, Prague, 10-12 September 2014

Impact of flooding, torrents and landslides  
on minefields, responding of Mine Action  
Centres of Bosnia and Herzegovina,  
Croatia, Serbia and HCR Centre for  
testing, development and training Ltd.



## Bosnia and Herzegovina

- Flooded area: 831.4 km<sup>2</sup>
- > 35 landslides inside and in the immediate vicinity of the minefields, suspected hazardous area (SHA)
- 37.48 km<sup>2</sup> of suspected hazardous area (SHA) in 33 areas under direct impact of torrents and landslides
- 80.2 km<sup>2</sup> of new potentially hazardous area (Northern Bosnia and Herzegovina)
- Shifting of landmines and UXO detected and documented



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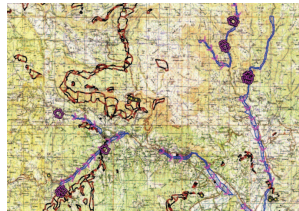
## Regions with heavy impact on minefields



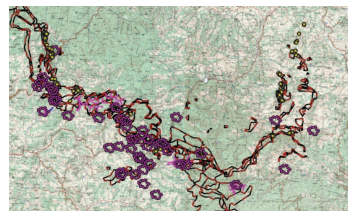
Brčko

Olovo


Šetići, river Sapna



Travnik



Travnik - Seljublje







Legend for lines: blue – flood, black/red – minefield, magenta – influence of flood,  landslide

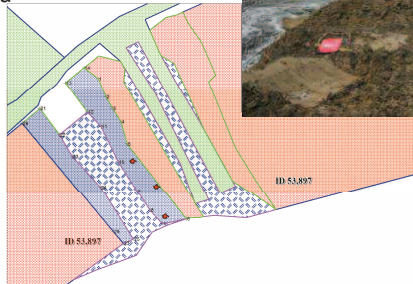
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## Outcomes of project should assist BH MAC urgent demining of afflicted areas

-  Hazardous area moved by torrent
-  Urgent demining
-  Hazardous area – urgent reconstruction works
-  Founded landmines PROM-1
-  Hazardous area
-  Safe area



Urgent demining 14.06.2014, embankment of channel at Vučilovac

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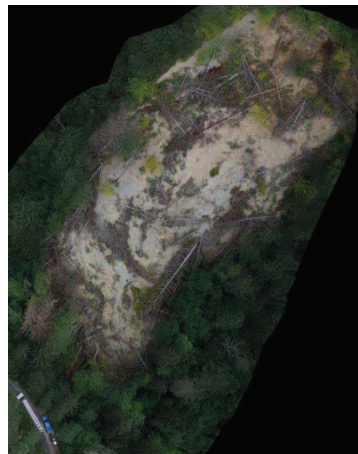
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## Typical landslides in suspected hazardous areas, aerial images



Završje, 29.08.2014



Olovske luke, 27.08.2014

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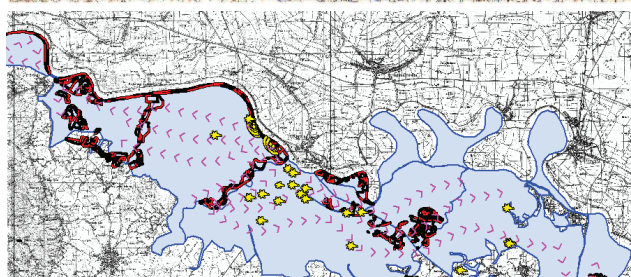
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## Torrents over suspected hazardous areas



Region near Šamac, map



Region near Šamac, legend:  
flooded area - light blue,  
direction of torrents >>>  
yellow arc – breach of water brake,  
yellow star – explosive remnants of war.

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## Croatia

Floods and shifting of land impacted 2.4 km<sup>2</sup> of suspected hazardous area, but shifting of landmines is not expected.



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## Serbia

Floods in Serbia impacted suspected hazardous areas and minefields:

- 17.3 km<sup>2</sup> of high risk area
- 40 km<sup>2</sup> of medium risk area
- 106 km<sup>2</sup> of low risk area

but shifting of landmines is not expected.



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## Regional initiative and actions

- **May-June 2014, three regular meetings of the Regional Mine Action Centers of Bosnia and Herzegovina, Republic of Croatia and Republic of Serbia was held.**
- *Information about the danger of mines and UXOs, caused by weather conditions (floods and landslides) that affected the areas of the three countries, were exchanged.*
- *The team of experts to assess the damage and develop projects for the immediate rehabilitation of the areas affected by the natural disaster in the region has been established .*
- *The expert team will make an assessment, concept and an action plan, as well as a list of requirements to support the plan, including the involvement of relevant institutions and academic community.*

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## The Project

- Croatian Mine Action Centre - Centre for Testing, Development and Training Ltd. (HCR-CTRO) was invited to propose activities and conceptual solutions.
- The outcome is project „Mine action after the floods regional synergy in emergency response, technology development and capacity building”.
- Project proposal was accepted 11 June 2014 by Directors of three regional mine action centers.
- Ministry of foreign affairs and European Integration of the Republic of Croatia recognised the contribution of the project for co-operation and security in the region and decided to grant its realisation. (One year project, 527000 Euro, 92.5 person/months.)

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## Project Goals

Provide support to urgent actions (urgent demining, assessment of status of minefields) of Mine Action Centers by aerial re-survey and by establishment of regional information network for mine action after natural disaster.

Develop initial models for spatial estimation of new hazardous risk caused by the shifting of landmines and unexploded ordnance (UXO) to wider areas which had not been mine suspected before the disaster.

Apply the initial models on the landslides and flooded areas and provide newly approved data and information for remarking and definition of revitalization projects in the first three to six months of project duration.

Support post-disaster recovery activities of the MACs, so that they continue with implementation of mine action projects.

Develop and validate recommendations and standard operating procedures for mine action after the natural disaster, disseminate achievements to the mine action community.

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## Airborne survey from remotely piloted aerial systems and from helicopter



Multirotor remotely piloted aerial system , 8 engines (Gearheo)



Multirotor remotely piloted aerial system, 4 engines (RMA)



Helicopter is foreseen for survey of rough terrain and for very large areas

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## Post-flood mine action pillars

### EMERGENCY RESPONSE 3 MONTHS

- Nontechnical survey with 2 remotely piloted airborne systems (RMA, Gearheo), helicopter (CTRO)
- 2 experts on landslides and torrents terrain (GFUNSA)
- Development of DOF, DTM of landslides (CTRO)
- BH MAC deminers lead terrain teams

### TECHNOLOGY DEVELOPMENT 12 MONTHS

- Detection of changes of landslides
- Hydrological analysis of shifting of land and mines
- Assessment of changes of risk due to shifting of mines and UXO
- Danger maps of new areas outside suspected hazardous area
- Implementation of aerial survey in the mine action centres (GFUNSA, CTRO, FGUNIZ)

### CAPACITY BUILDING 12 MONTHS

- Regional system for multipurpose multisensor aerial survey (CTRO)
- Airborne survey system (BHMAC)
- 2 surveyors for airborne mine action, training course, 3 months of practice
- Mine Action regional information system for natural disasters

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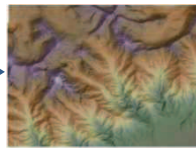
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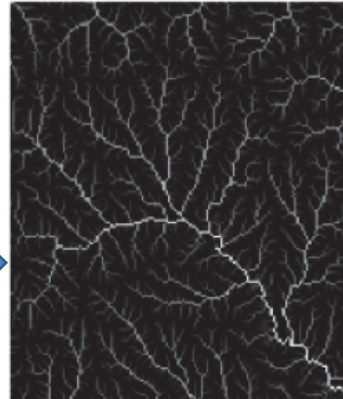
## DOF and DTM for hydrological analysis produced from aerial images



New digital ortho-photo (DOF) map of a landslide developed from an aerial image



New digital terrain model (DTM) of the landslide



New map of the river basin is made from DTM because of the changes in the relief

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## Expected outcomes

- New digital ortho photo maps (DOF) and digital terrain models (DTM) produced, in three months, for minefields affected by flooding, torrents and landslides, presenting the new state after the natural disaster. This will be immediately forwarded to BH MAC with the aim of informed prioritization of demining projects.
- System established and initial HCR-CTRO team trained for multisensor aerial survey from a remotely piloted aerial system, which will be continuously available and ready for immediate reaction, on nonprofit basis, in case of natural disaster in the region.
- System established and initial BHMAL team trained for aerial survey from a remotely piloted aerial system for immediate reaction in case of natural disasters.
- Regional mine action data repository established, where all the persons involved in rescuing operations within the region can find all accurate and updated risk information related to the area of interest.

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## Expected outcomes

- Scientific and expert resources mobilized and their efforts harmonized to support mine action after natural disaster in Bosnia and Herzegovina, Croatia and Serbia and their actions focused in space and time in accordance with the priorities defined by MACs.
- Mixed teams of the scientific institution and mine action centers trained in the joint use of the very advanced methods and technologies for non – technical survey in harsh environment and assessment of new safety risk after the natural disaster.
- Recommendations and standard operating procedures developed for mine action after a natural disaster.
- New facts, experience and technology provided of mine action after natural disaster, which will be used for advancement of the strategy for humanitarian mine action in Bosnia and Herzegovina, Croatia and Serbia.
- Lessons learned in the frame of project will be disseminated at Workshop – Kick-off meeting (Sarajevo, 15-16.09.2014), at Mine Action Symposium (Zadar, last week in April 2015).

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## Gratitude

Support of the Republic of Croatia Ministry of Foreign and European Affairs for this regional project is deeply acknowledged.

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## Gratitude to the OSCE mission for:

- **Efforts and contribution for the entire positive environment:**
- *Strengthening cooperation within the country and regional cooperation in recovery activities and mitigation effects of future natural disasters;*
- *Governance in recovery process and community cohesion enchareging;*
- *Human rights, gender and human security promotion;*
- *Education*

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Mine action after the floods, regional synergy in  
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Thank you. Questions ?

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