EO INTEGRATED APPROACH FOR PLUVIAL FLOOD MANAGEMENT

Climate change more often results in disastrous events such as flash floods. This calls for a need for detailed analyses of its cause and consequences.

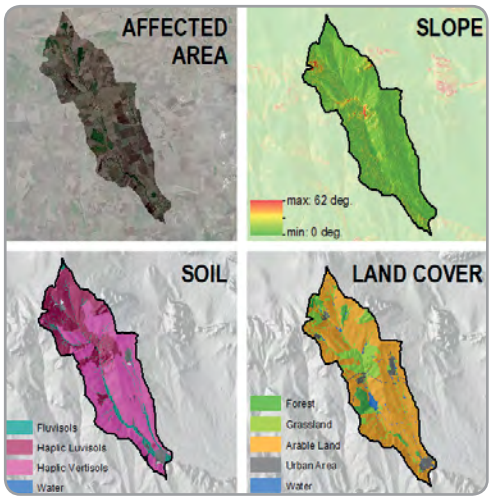
The challenge

During the last two decades, flash flood events have increased their negative impact significantly in many regions in Bulgaria. They are difficult to predict, last for a short period of time, but are causing serious damage – both casualties and financial losses. Flood risk management at local, regional, national, and European (EU Floods Directive – EU FD) level calls for an integrated spatial information before, during and after the flood in order to analyse the event and to select adequate measures for flood mitigation. Copernicus provides the required EO data, the challenge is to couple these data with local information and expertise to create a standardised service to support decision-making.

The space based solution

The pluvial floods and the extent of the damage they cause are a complex balance which needs detailed information for the territory they occur as well as its state before and after the event. Thus, the proposed solution to mitigate the impact from the disaster has several modules relying on the spatial component which Copernicus data and core services provide, updated and refined using local knowledge. The climatological module relies on data from Sentinel 3, meteorological satellites, in-situ data and meteorological radars in order to describe in detail the evolution of the event. As an outcome from the module, regions with high potential of similar events to occur will be identified. The second module describes the preconditions within the affected territory. Here, the high revisit time of Sentinel 1 and 2 is of great importance. The data from the satellites, together with the Land Core Services are used to derive specific information for the land cover/use, soil moisture, orographic details, condition of the water reservoirs etc. The possibility of using data from Copernicus contributing missions should also not be neglected.

The third module is related to the post event status of the territory. The same parameters are analysed in order to identify the flood extent and damage, but also small changes in the land cover which could be later used for detailed analyses. Here, the use of the Sentinels' data is essential. The final module is the analytical one where all the data are combined in a GIS environment and every waterway subject to flooding is analysed based on the hydrological characteristics and changes in the land cover. The detailed analyses allow identification of the area with high instance of surface runoff where specific measures should be undertaken in order to decrease the flood risk.



Refined watershed related characteristics information extracted from EO data is used to describe the preconditions.

Benefits to Citizens

The developed solution is ready to be put into operation. It provides a detailed description of the whole waterway and how its characteristics influence the effects of the flood event. This allows elaboration of a set of small waterway measures, related to better land use/cover management, rather than expensive hydrotechnical measures. Optimal land management will directly influence the

Thematic Area: CIVIL PROTECTION

Region of Application: BULGARIA

Sentinel mission used: S1 S2 S3

Copernicus Service used: CLMS

Usage Maturity Level: 3

flood risk, together with water pollution, biodiversity, soil erosion etc. Thus, the solution will support not only the flood mitigation, but also activities related to Water Framework Directive, Common Agricultural Policy, Biodiversity Strategy etc. Often activities of these EU policy instruments are implemented separately at national level. Being able to use a common solution which will support cross relation between these instruments will allow more integrated implementation which will result in decreasing the flood risk, but with measures which will have positive impact on land management, environment, biodiversity, and hence human life.

Sentinel-2 data shows not only the flooded area, but the area where the water was accumulated – thus allowing precise risk reduction measures on watershed level to be implemented.

> "The approach is filling a significant knowledge-gap on the pluvial floods' mechanism, analysis and risk-reducing measures' planning - an important contribution to the FRMP[1] update."

Rumeliya Petrova, Danube Region BD
[1]Flood Risk Management Plan of the Danube river basin

Outlook to the future

In 2016, the second planning cycle of the EU FD began. Now, when the Copernicus becomes operational the developed approach will support the River Basin Directorates in more precise implementation of the Directive in all its phases – delineation of areas with significant potential flood risk, and especially in the development of flood risk management plans, where Copernicus will provide valuable sources of information for planning risk-reducing measures at catchment level.

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ABOUT COPERNICUS4REGIONS

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The model cases focus on local and regional authorities who successfully applied Copernicus data in 8 major public policy domains.

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