



Trigger Buffer zones for inundation Events

LAYMAN'S REPORT

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Universitat
de les Illes Balears



UNIVERSITY
OF ARCHITECTURE
CIVIL ENGINEERING
AND GEODESY



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Civil Protection and
Humanitarian Aid



TRIBUTE Overview

TRIBUTE (ECHO/SUB/2016/742480/PREV08) is a project co-funded by the Directorate-General for European Civil Protection and Humanitarian Aid Operations (DG-ECHO) of the European Commission.

TRIBUTE project combines observations from satellites together with meteorological and hydrological data in order to improve knowledge and understanding of inundation (flooding) risk, one of the most commonly occurring risks in the European territory.

Why?

The impacts of climate change – including increase in prolonged periods of heavy downpours, extreme precipitation rates and river overflows – are already affecting communities, economies and public health across Europe. Such impacts include.

Managing inundation risk requires **prevention measures** in close cooperation with Civil Protection Authorities.

TRIBUTE project, aims to help Europe-wide Civil Protection authorities manage inundation risk and take prevention measures by answering the vital questions:

“Should I initiate an evacuation?”

“How long do I have to evacuate safely?”

The answers to these questions are **unique** per selected area, as not all sites are equally prone to flooding.

Where?

TRIBUTE concept was tested in three different **pilot cases**; Greek-Bulgarian cross-border region, the island of Mallorca and Torino Province. The pilot cases have been selected in order to cover a wide range of conditions and different needs.

However, TRIBUTE services are developed for the **whole Europe** giving high priority to the applicability and transferability of TRIBUTE tools to any European country.





TRIBUTE's Objectives

TRIBUTE's main objectives are to:

- ❖ **Provide services** to Civil Protection authorities by a software tool that will ensure timely evacuation decisions.
- ❖ **Assess meteorological hazards** from satellites and generate a European 'reference dataset' for meteorological hazards that will provide consistent information for the whole Europe.
- ❖ **Examine climate trends**, changes in climate parameters and precipitation regime and identify regions that are likely to undergo large amounts of rainfall changes.

WEB & MOBILE



To develop and deploy TRIBUTE web service & mobile platform based on trigger buffer zones.

STAKEHOLDERS



To apply, evaluate and promote TRIBUTE. To interact and train the stakeholders.

EVACUATION



To develop a methodology to assist emergency managers in recommending evacuation.

HAZARD



To assess the present and future inundation hazard by means of satellite measurements and climatological models.

SATELLITES



To exploit the usage of satellites Earth Observation technologies for operational real time estimations of precipitation hazard

CLIMATE



To assess future trends in extreme precipitation in European scale.

TRIBUTE aims to improve knowledge and understanding of inundation risk, one of the most commonly occurring risks in the European territory, by developing tailored risk management tools.



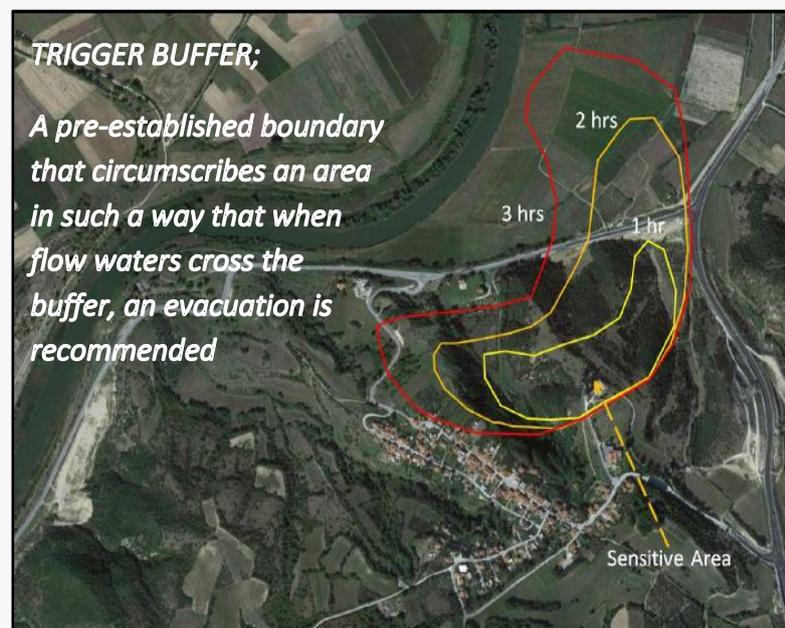
How?

The experience regarding floodplain inundation events in most European countries has revealed that when it comes to minimizing risk, it's better to be **proactive** than **reactive**. TRIBUTE developed a methodology to ensure the **controlled evacuation** of the population as a prevention measure through the **evacuation trigger buffers** based on a grid-based distributed hydrologic model.

Trigger buffer zones

The concept of trigger buffer zones aims at providing helpful information to national and regional Civil Protection authorities regarding the appropriate time and duration of **evacuation**.

Evacuation trigger buffer zones depend on **terrain anaglyph** and **land cover/land use** and **water flowrate conditions**. A trigger buffer zone also depends on the time period available for handling evacuation operations. Thus, different trigger buffer zones are defined for different evacuation time periods



DATA USED in TRIBUTE:

- Static satellite data;
Digital Elevation Models
Land Use, Land Cover maps
- Dynamic, meteorological satellite data;
Convective Rainfall Rate
Extreme Rainfall Detections
- Global weather Forecast System

DATA PRODUCED by TRIBUTE:

- Trigger buffer zones
- Reference Datasets from satellite data;
Convective Rainfall Rate
Extreme Rainfall Detections
- Climatological predictions and trends



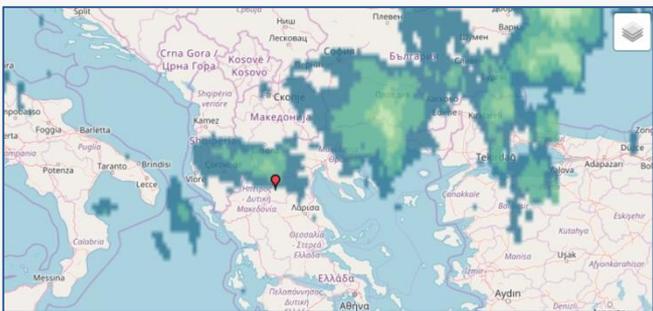
Satellite-derived data

Compared to existing practices, the geospatial data from satellites provide consistent information at a scale not available by in-situ station measurements. TRIBUTE employs satellite data in order to:

Nowcast the Convective Rainfall Rate (CRR) and populate a database with the CRR European products for the generation of a reference dataset.



Monitor exceptional rainfall events and provide complete and immediate information about current extreme rainfall events.

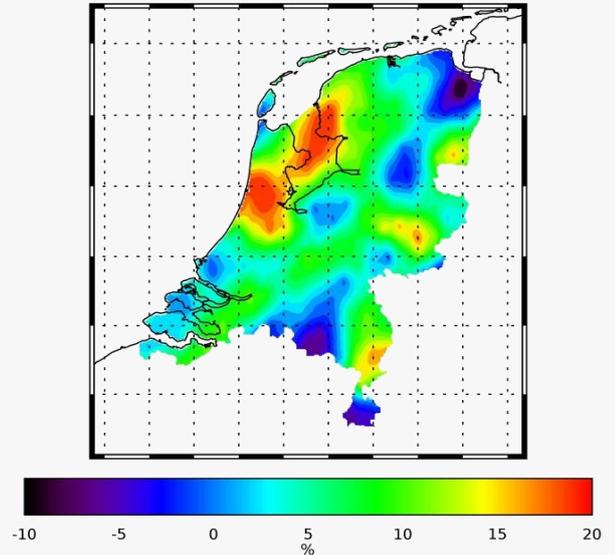


Climate Trends

TRIBUTE examines the **impact of climate change** on the **extreme precipitation** in five European countries; Greece, Bulgaria, Netherlands, Italy and Spain. TRIBUTE employed **Regional Climate Models** to identify regions that are likely to undergo large amounts of rainfall changes.

Analysis performed for three time slices: the 1971-2000, used as the reference period, and the 2021-2050 near future and 2071-2100 distant future periods and for two different future emission scenarios the RCP4.5 (low emissions) and RCP8.5 (high emissions).

Annual max total rainfall over 1 days Diff Per Cent



2021-2050 average minus 1971-2000 average

FUTURE PROJECTIONS for Europe

- Higher intensity of precipitation and longer dry periods in Europe.
- Increase in extreme daily precipitation in most parts of Europe in winter, by up to 35 % during the 21st century.
- Heavy precipitation in winter, with increases of up to 30 % in north-eastern Europe.
- In summer, an increase is projected in most parts of Europe. Decreases are projected for some regions in southern and south-western Europe.



TRIBUTE Software tool

TRIBUTE web service

TRIBUTE'S web service is based on satellite-derived data combined with meteorological data. It provides the accurate determination of the **trigger buffer zones** for **selected sensitive locations/areas**.

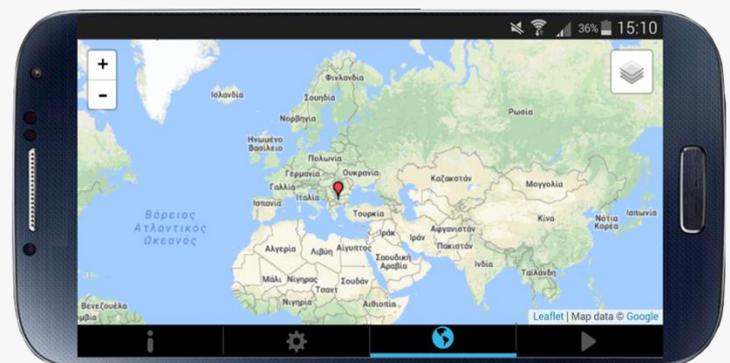
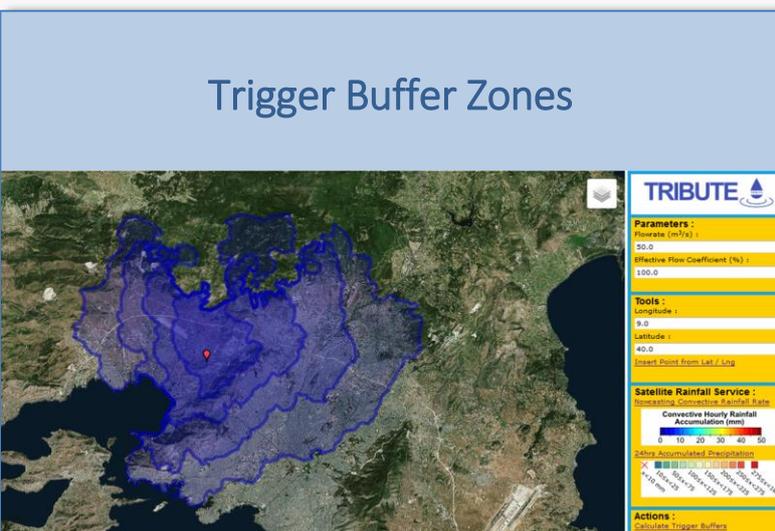
TRIBUTE web service also provides information on **convective, instantaneous rain rates** and **hourly accumulations**, and displays **accumulated rainfall observed** in the last 24 hours

TRIBUTE mobile application



TRIBUTE **mobile application** is developed to help Civil Protection decision makers while being in the field.

It calculates accurately the evacuation trigger buffer zones at users' current location or any other location entered.





TRIBUTE dissemination activities

TRIBUTE project was disseminated to Civil Protection/Emergency authorities via dedicated workshops near the pilot areas.

Workshop in Turin Province (September 26, 2018)



Workshop in Mallorca (June 14, 2018)





Workshop in Sofia (March 15, 2018)



Workshop in Zwolle (October 15, 2018)



TRIBUTE

European Commission

CONSORTIUM

ARABIS SYSTEMS

**TRIGGER
BUffer zones
for inundaTION
Events**

THE IMPACTS OF CLIMATE CHANGE
ALREADY AFFECT COMMUNITIES,
ECONOMIES, AND PUBLIC HEALTH
ACROSS EUROPE

<http://tribute.eu-project-sites.com>

TRIBUTE Factsheet

Duration: 2017-2018

Budget: EC contribution: €564,987 | Financing Rate: 75%

Funding: TRIBUTE (ECHO/SUB/2016/742480/PREV08) is a project co-funded by the Directorate-General for European Civil Protection and Humanitarian Aid Operations (DG-ECHO) of the European Commission.

Partners: National Technical University of Athens (EL - Coordinator)
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Information Technology for Humanitarian Assistance, Cooperation and Action (IT)
AnySolution S.L. (ES)
Universitat De Les IllesBalears
University of Architecture, Civil Engineering and Geodesy in Sofia (BG)

Pilot Cases:

1. Bulgaria-Greece Cross-border (Evros river)
2. Ivrea, Torino Province, Italy
3. Mallorca Island, Spain

Website: <http://tribute.eu-project-sites.com/>

Twitter page: @TRIBUTE_proj

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