

ERA-NET CRUE Funding Initiative

Effectiveness and Efficiency of Early Warning Systems for Flash Floods



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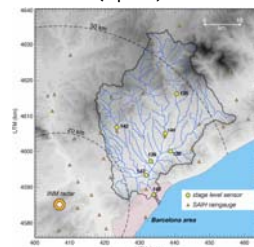
Objectives

- ◀ Evaluate the reliability of flood forecasts as a function of lead time for effective warning
- ◀ Assess the vulnerability and avoidable damages within the framework of a socio-economic analysis
- ◀ Compare the benefits and the costs of early warning systems in the context of flood risk management strategies

Study basins

- ◀ Besòs catchment, near Barcelona (Spain)

Elevation: 0 – 1350 m
 Mediterranean climate
 A_{EO} : 1024 km²
 hP: 660 mm/a
 MQ: 5 m³/s
 HHQ: 2500 m³/s



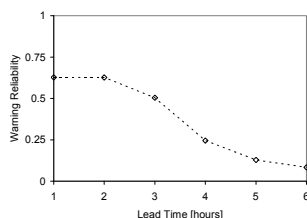
- ◀ Traisen catchment, north east Austria

Elevation: 200 – 1800 m
 Alpine/Pannonian climate
 A_{EO} : 920 km²
 hP: 700 – 1500 mm/a
 MQ: 13.5 m³/s
 HQ₁₀₀: 725 m³/s



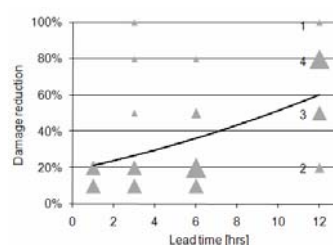
Flood Warning Reliability

- ◀ Evaluation of forecast reliability as a function of lead time
- ◀ Accounting for system immanent uncertainty sources
- ◀ A statistical Analysis of flood forecast errors is transformed into a measure of warning reliability



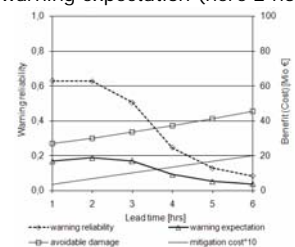
Socio-Economic Evaluation of Damage Reduction

- ◀ Vulnerability analysis in terms of exposure and susceptibility
- ◀ Evaluate the preparedness and avoidable damages
- ◀ "Supposed you receive an alert some time before a flash flood, by which percentage could you reduce flood damage?"



Warning expectation and optimal alert

- ◀ The expectation of an alert is calculated as the product of the warning reliability and the avoidable damage
- ◀ The optimal point of time for releasing an alert with respect to reliability and consequences is defined by the maximum of the warning expectation (here 2 hours)



Findings

- ◀ Flood forecasts reliability beyond the response time of the basin largely depends on the capability to anticipate future rainfall, the application of alternative simulation models provides complementary information
- ◀ Stakeholder awareness has a high impact on the efficiency of early warning systems
- ◀ The combination of early warning and local protection measures are the most efficient of flood protection strategies

