

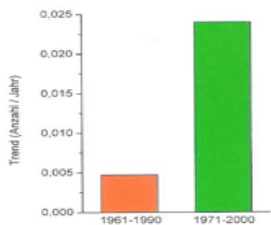
# Risk Management of Extreme Flash Floods

## Sources: Meteorological and Hydrological Aspects - a Post-/Pre-Event Perspective of the Müglitz Flood 2002 -

### Future Climate

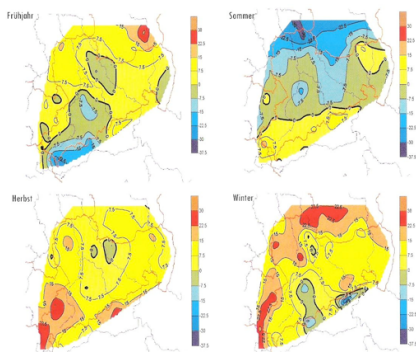
#### Can we expect more extreme events in future?

A temperature increase can be proved for the last 50 years. Consequently, the atmosphere is expected to contain more water vapour. Stronger differences in temperature between ocean and continental surface lead to an increase in rainfall intensities.



**Fig. 1:** Trend of Frequency of Heavy Rainfall Events with more than 20 mm per Day (Reference: Final Report of CLISAX Project, 2001)

An increase of summer rainfall in the Eastern Ore Mountains is proved (Fig. 2). Rain will increasing occur in short, very intensive events. Between these events dry periods will appear.



**Fig. 2:** Changes in Rainfall Amounts [%], A. Erler, „Wilde Weißeritz“, Tharandt 2002\*

The rainfall event in 2002 was characterized by long-lasting rainfall and extended distribution of the rainfall. For Central Europe literature estimates 272 mm in 24 h extreme rainfall events. 474 mm occurred on 12 to 13 August 2002 within 30 hrs., which is about 50% of the average annual precipitation normally observed in this region.

### Hydrology

The flood event in 2002 has a recurrence interval of 100 to 200 years for the Müglitz river. For downstream areas the calculated return period is higher than for the upstream river sections.



Quelle: dpa

#### Why is the Müglitz river especially affected by flash floods?

##### 1. Shape of the Müglitz basin



**Fig. 2:** Shape and Structure of the Müglitz River Basin

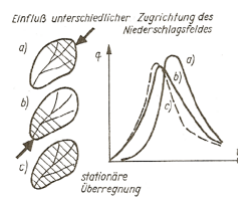
Combination of a circular part in the upper basin region and a narrow part down stream. In the circular upper part large areas drain at the same time: This leads to a high peak and an abrupt rise of water level and discharge.

In the lower part no water retention is possible: the wave is transmitted very fast so time delay before reaching the Elbe River is just about 6 to 8 hours.

##### 2. Land use

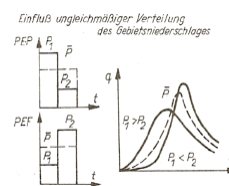
Small forested areas, agriculture, and grassland are the dominant land use (influence of afforestation or land use change to basin response see B-2)

##### 3. Areal precipitation



especially dramatic, if the rain clouds move into the same direction as the water flows, no stronger effect on flood event 2002

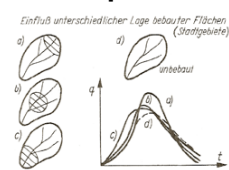
##### 4. Temporal distribution of rainfall



large intensities at the end of a rainfall event are most unfavourable, because all soil storage capacity is already filled up when the maximum rainfall intensity occurs

The runoff peak comes to flow without retention; in 2002 this was no problem, as the highest rainfall intensities occurred at the beginning, but the total amount of rain was too high.

##### 5. Less permeable areas



located near the mouth into the Elbe at Dohna/Heidenau. Only slight effects concerning the Flash Flood in the Müglitz basin

##### 6. Soil

Only medium permeability in the upper part of the Müglitz watershed, consequently large amount of surface runoff can occur. In downstream areas permeability is even lower and soil layers are relatively shallow so that infiltration is less effective for significant water retention capacity during a flash flood.



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