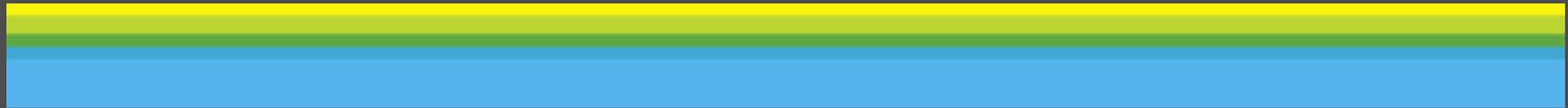


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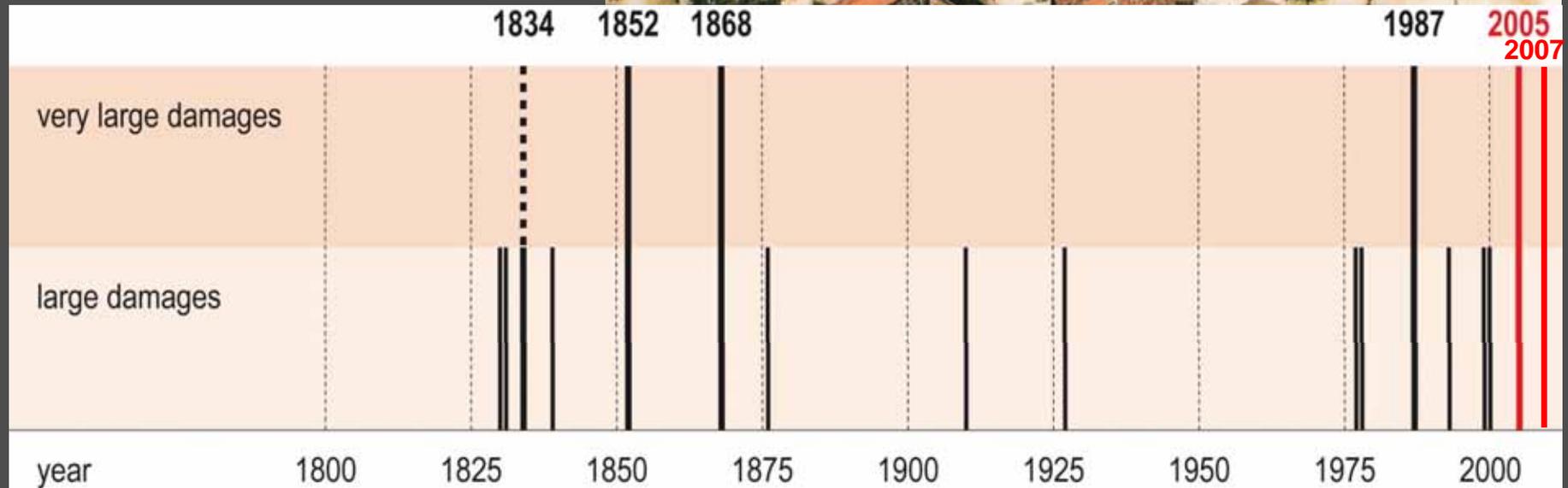
6th International Forum on Waterfront and Watershed Restoration
29 September 2009 (Asian River Restoration Network)



River Engineering and Management

Dr. M. Baumann, Section Water Resources OEN TG

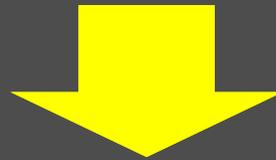
Introduction



 Large and very large supra-regional floods since 1800

Paradigm Shift After 1987

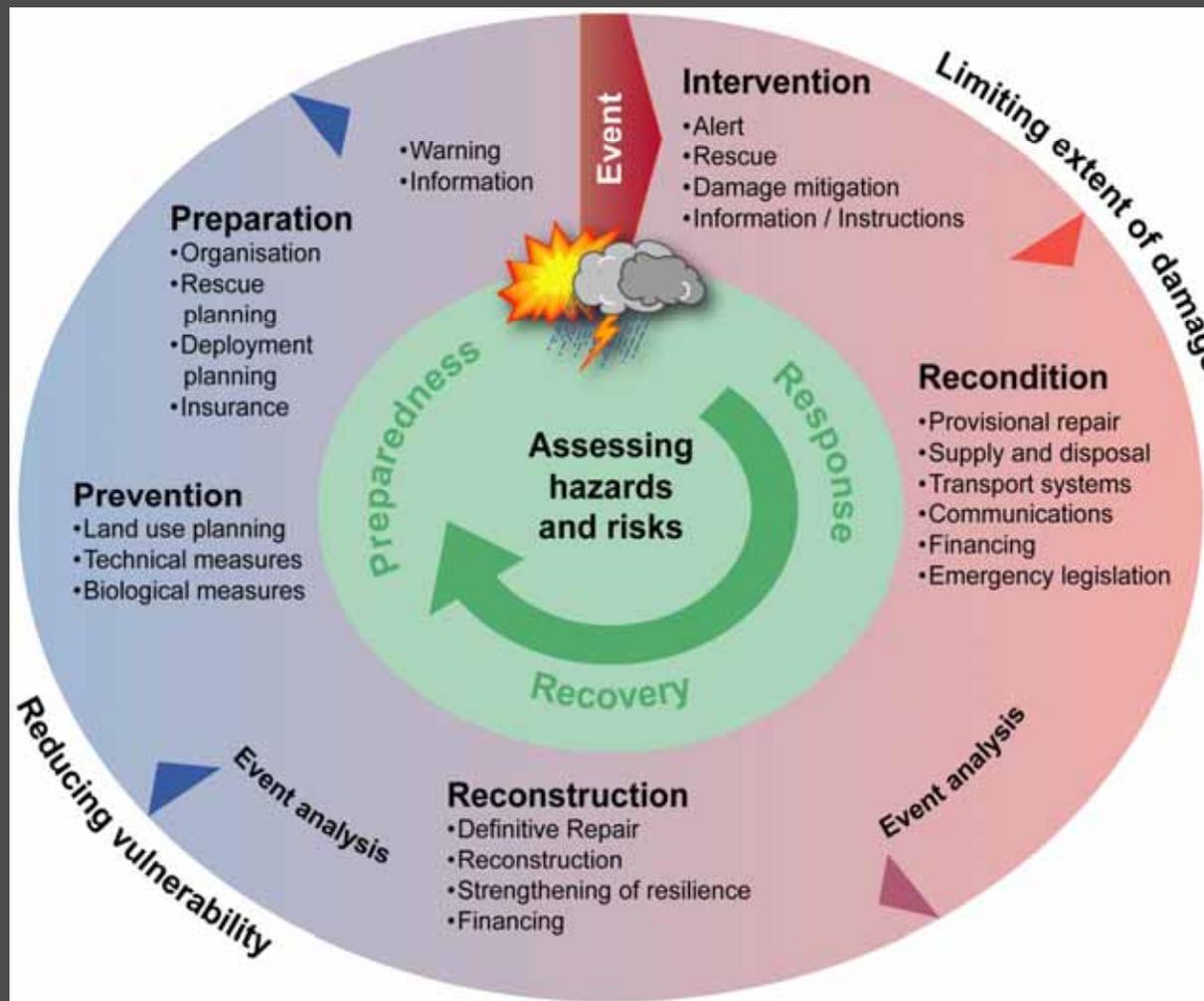
- **safety** for everyone and everything is **not possible**
- the **value** of goods at risks has **increased** enormously
- financial **resources** are **limited** due to budget constraints in the public sector
- **pure defense** against hazards is no longer the only issue



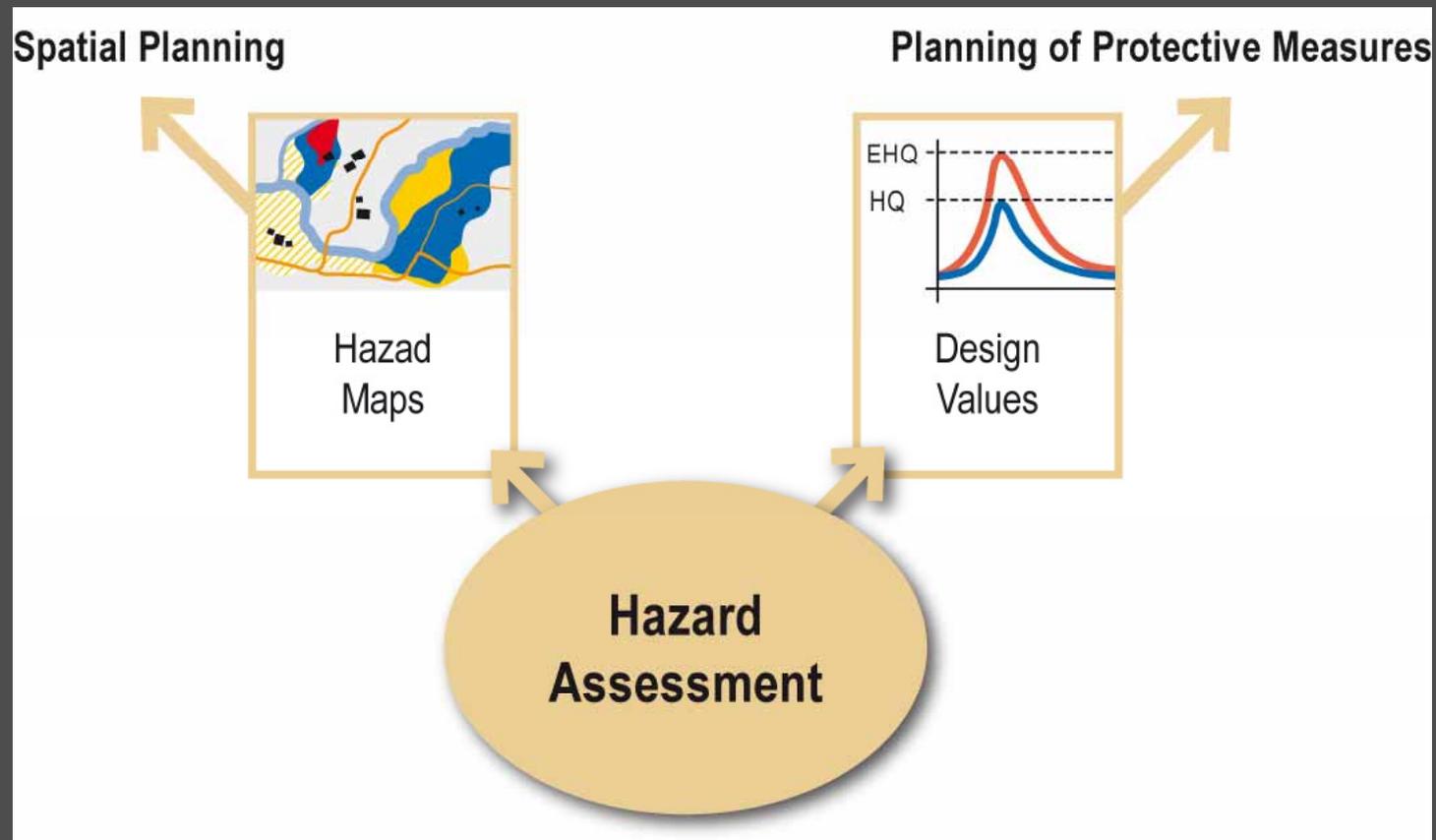
certain risks have to be accepted

what might happen / where may it happen ?

Swiss Flood Policy

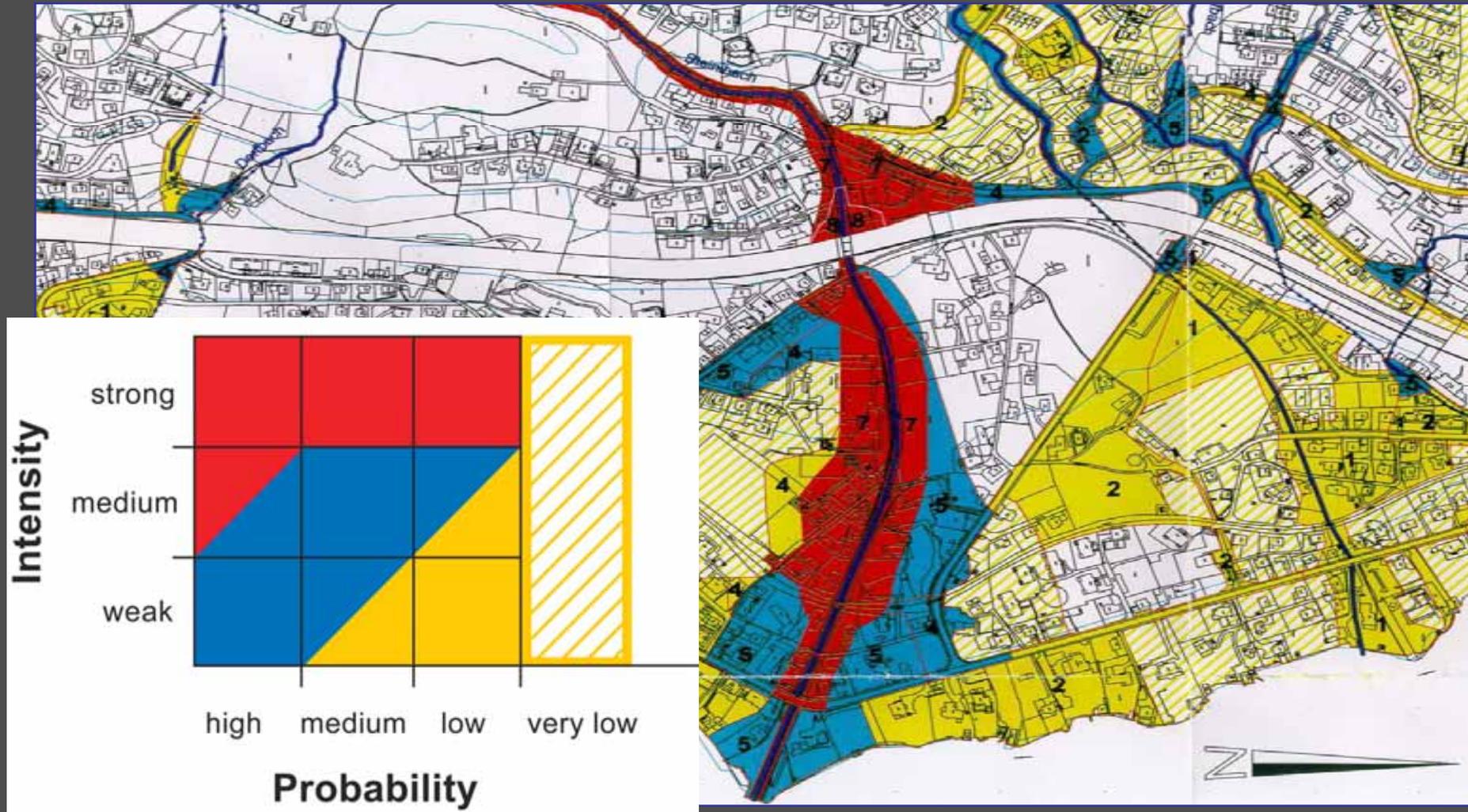


Hazard Assessment



 Present-day results of hazard assessment

Hazard Maps



Differentiated Protection Objectives

⇒ High protection only for high risks

Object categories	Probability of occurrence			
	high	medium	low	very low
Natural landscape	<i>no design discharge</i>			
Extensive agricultural areas	Full protection	Limited protection	No protection	No protection
Intensive agricultural areas	Full protection	Limited protection	No protection	No protection
Individual buildings and infrastructure	Full protection	Limited protection	No protection	No protection
Infrastructure of national importance	Full protection	Limited protection	No protection	No protection
Residential and industrial areas	Full protection	Limited protection	No protection	No protection
Special objects / special risks	<i>to be determined from case to case</i>			

Full protection

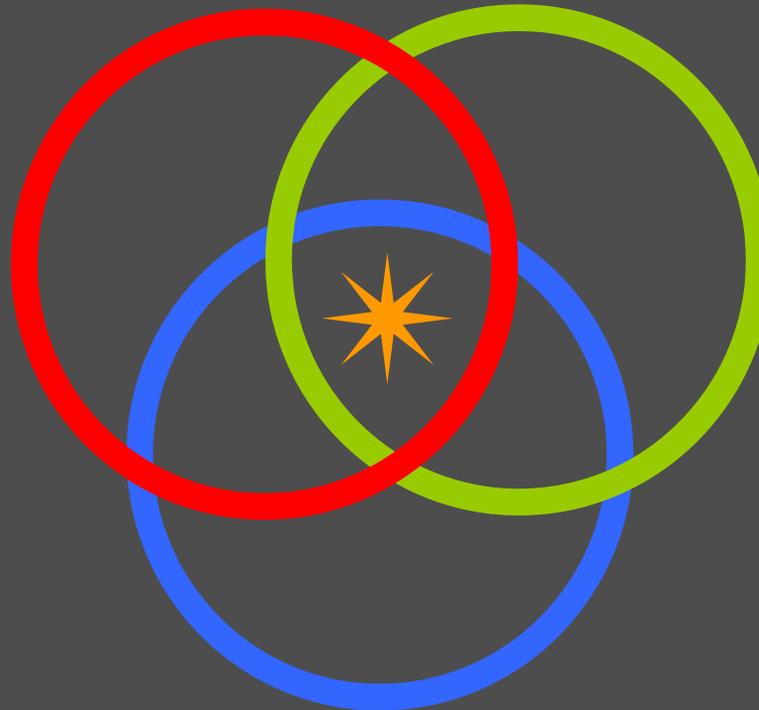
Limited protection

No protection

Swiss Flood Policy

↪ based on the principle of sustainability

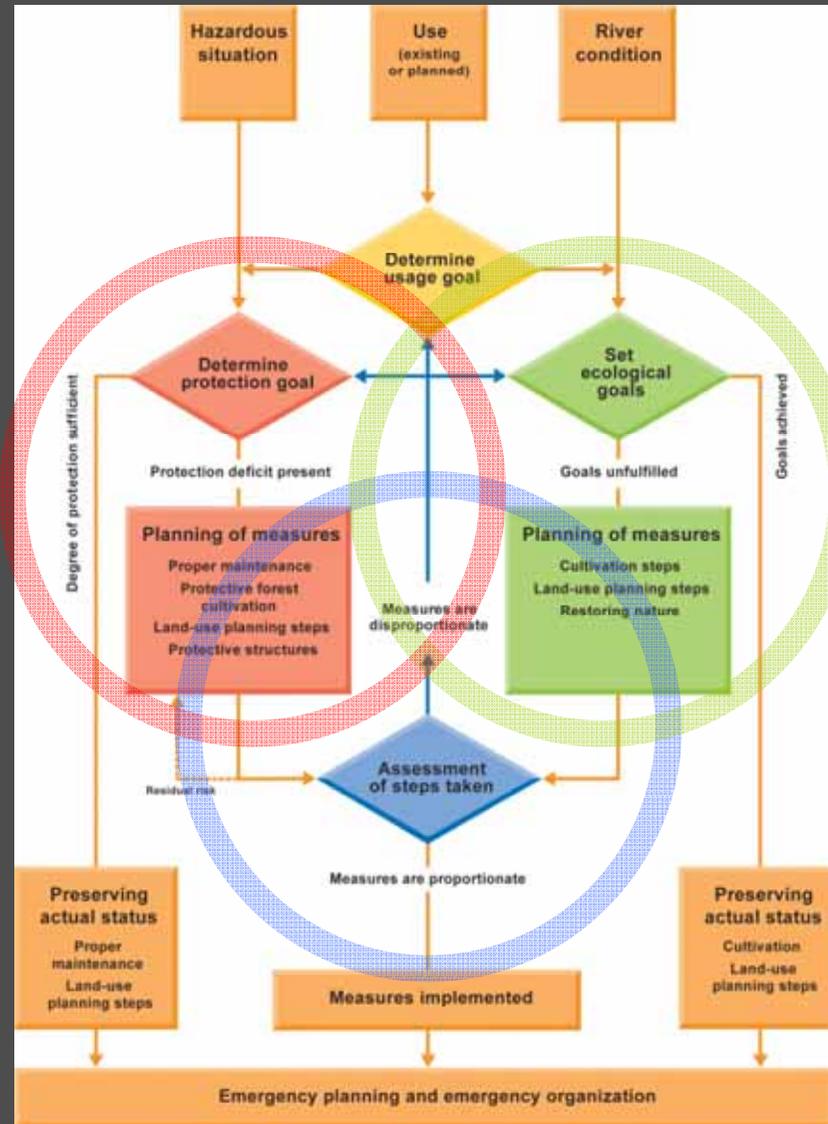
social aspects
protecting
the public



environmental aspects
protecting nature
and the
environment

economic aspects
ecological and economic proportionality

Holistic Planning



Providing the basics

- hazards
- land use (existing / planned)
- river condition

Definition of goals

Planning the measures

- clear priority for sustainable measures
- consideration of all types of measures

Assessment of balance

Implementation of measures

Management of residual risks

The Flood of August 2005



© Canton of Obwalden



© Swiss Air Force

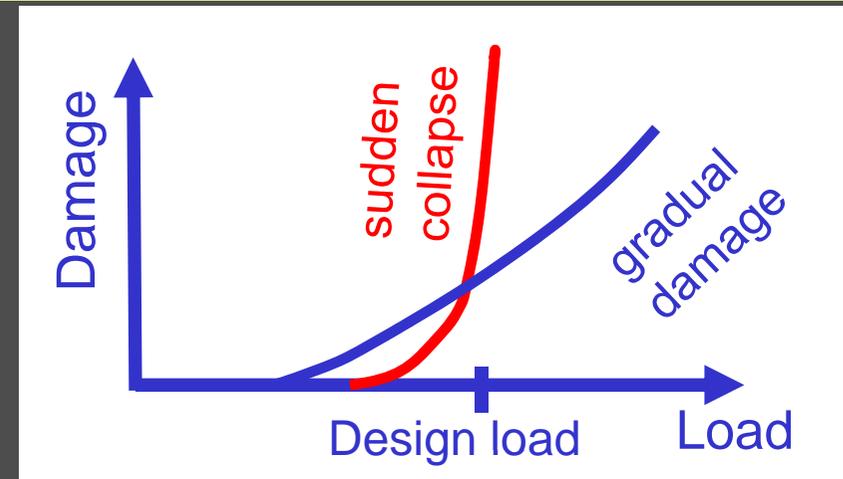
The Flood of August 2007





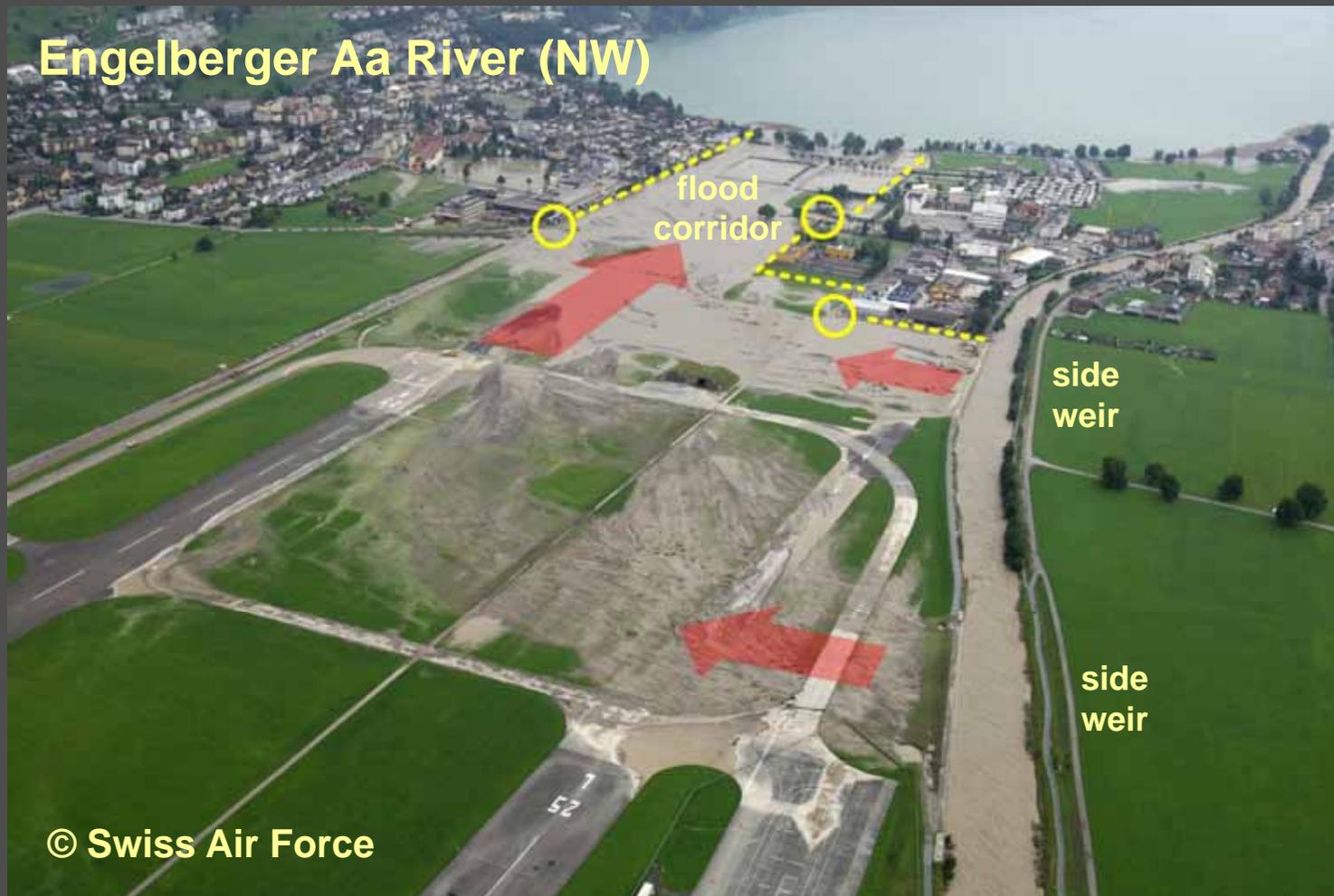
Lessons Learned

↪ Consideration of the overload case

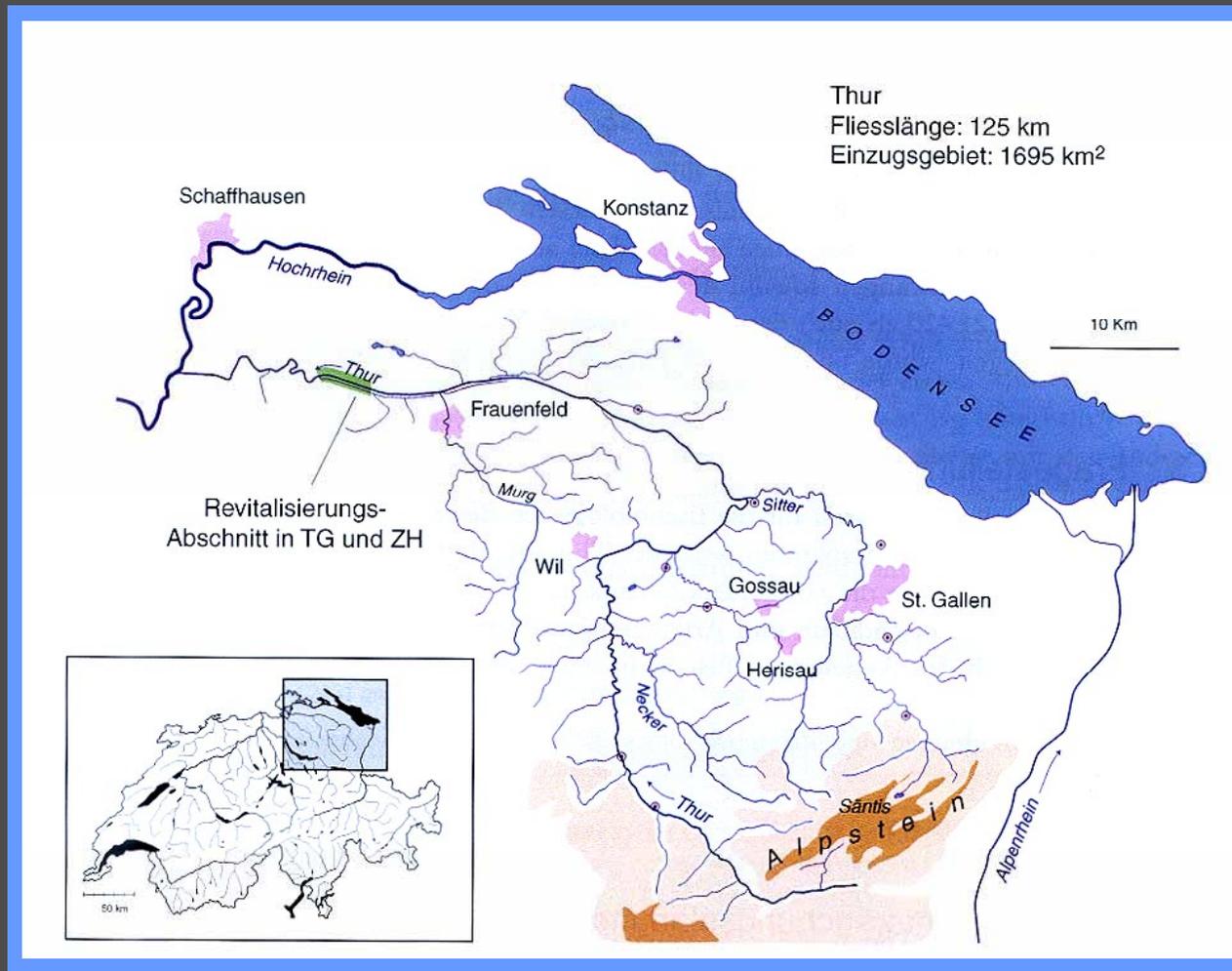


- The **overload case** (the excess of design values) has to be considered when designing and planning measures
- The conceptual design of protective structures must assure a **flexible** and **robust** behaviour in the case of an overload
- Resilience of structures must be **gradually** and not lead to a sudden increase of damage

Successful management of the overload case

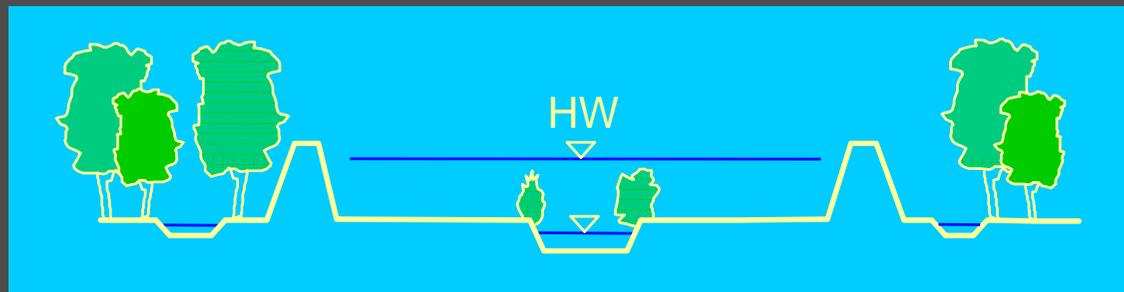


Characteristics of the Thur



Characteristics of the Thur

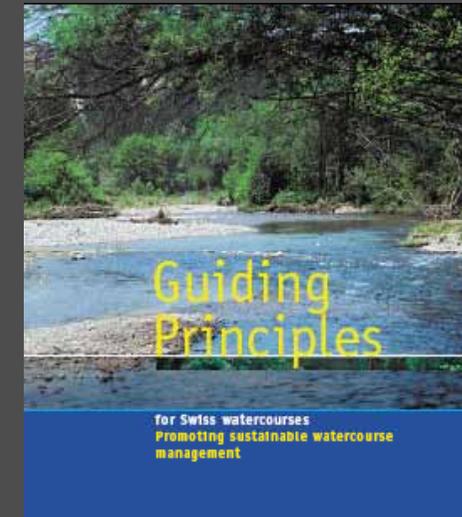
- „Wildbach“
- Thurflooding: 1849, 1852 und 1876 with large inundation



- extensive measurements („first correction“)
 - protection of the population
 - Reclaim of agricultural areas

Guiding principles for Swiss watercourses

- Space for the watercourses
- Water Quality
- Water Quantity



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 From the perspectives of flood protection and environmental protection space is the central limiting factor

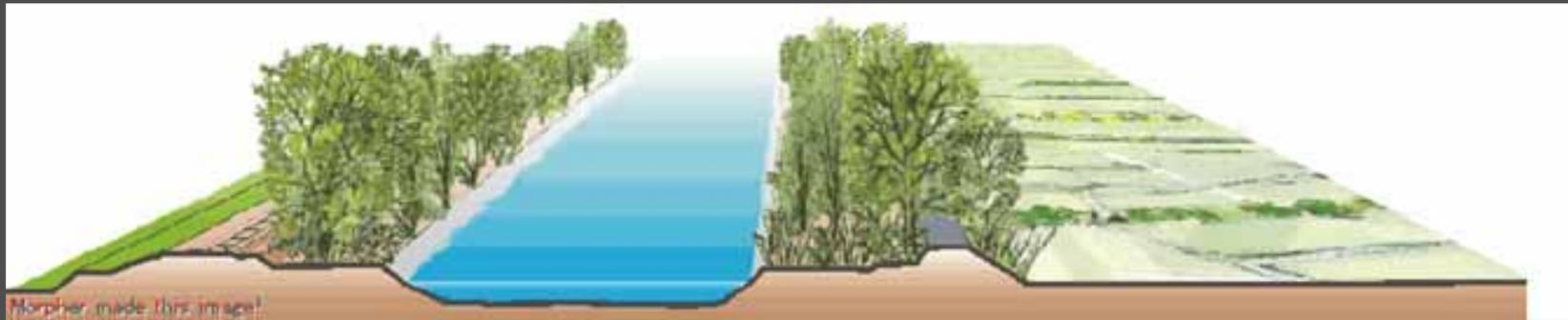
Rules for the „2nd correction“

 sufficient space for the water

- to guarantee normal flow
- to guarantee high flow
- to minimize peak flow

 consider the overload case

Involving Nature When Planning

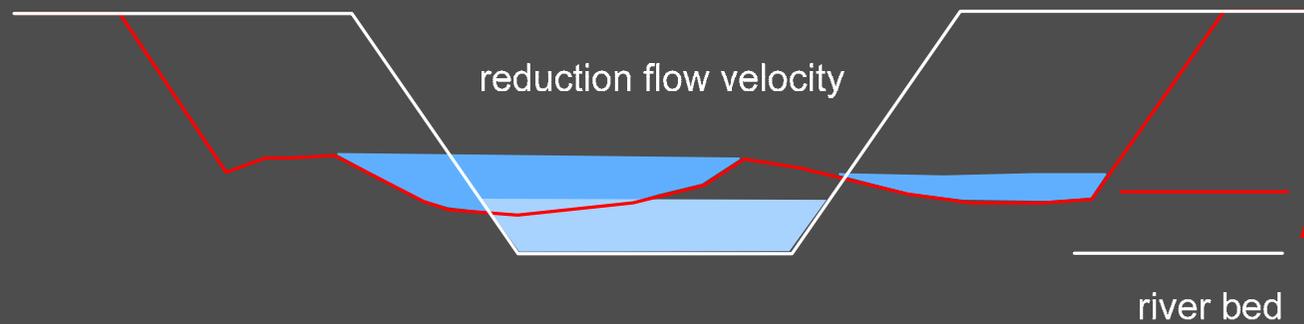


Present



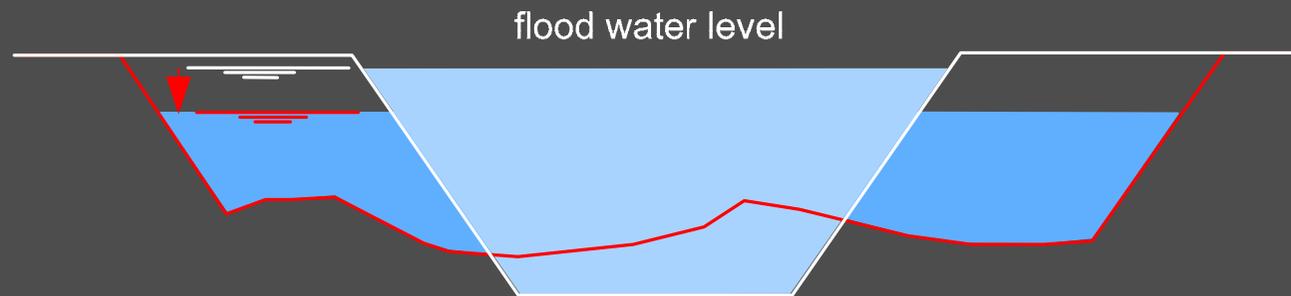
Future

River Bed widening



Prevention of further degradation

River Bed Widening 2



Increasing discharge capacity and lowering the water level

Overload Case

- **Emergency spillway:** into areas with low damage potential
- **Structures:** to limit the water volume of the outflow
- **Protection measures:** for areas with high damage potential

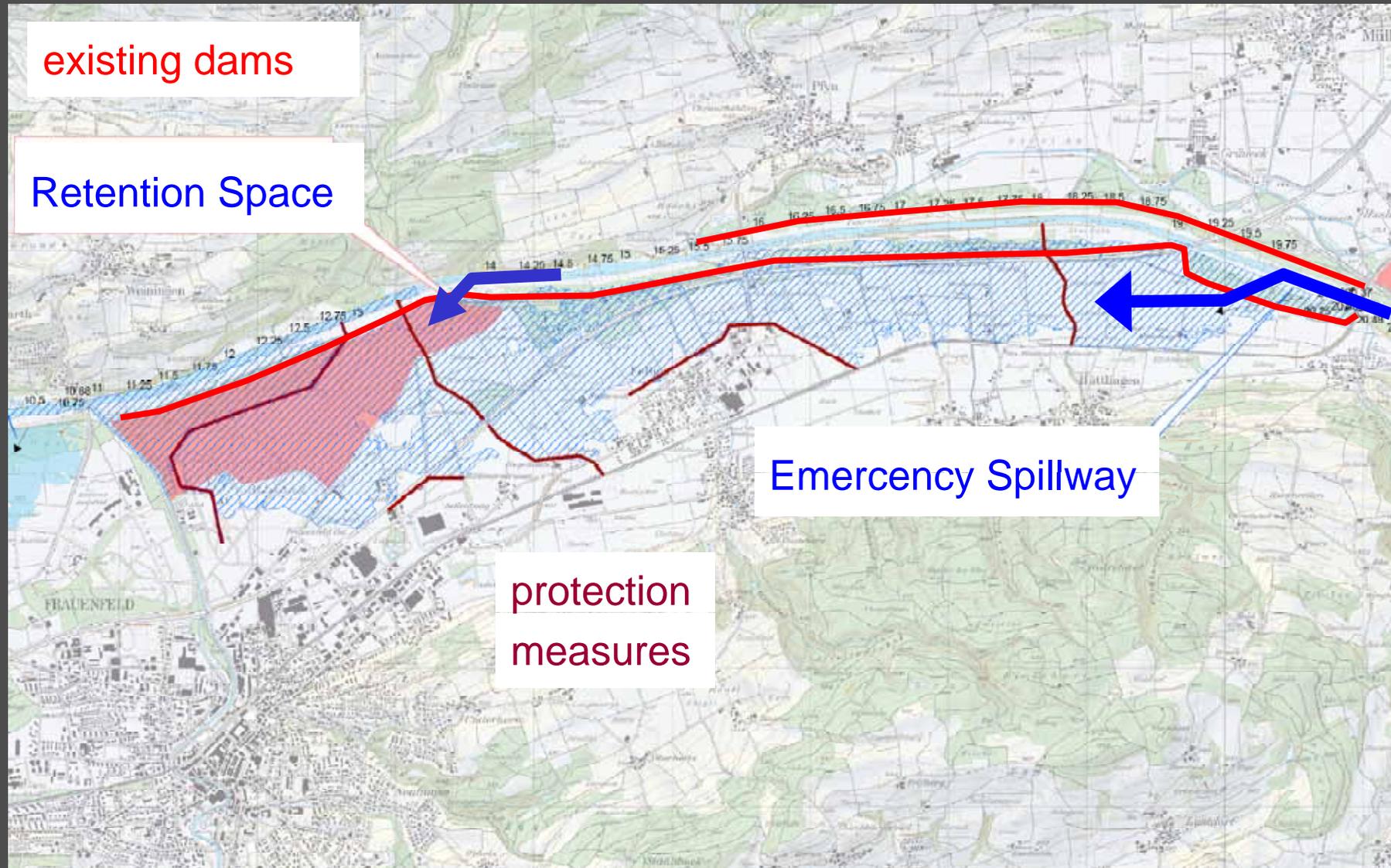


Overload Case 2



New river bed

Flood retention corridor:
for extreme floods



Conclusions

- A significant need for action exists from the perspective of flood protection and environmental protection
- Watercourses have to be respected as important parts of nature and landscape
- All functions of watercourses have to be ensured





Conclusions 2

- The problems have to be analyzed globally
- Conflicts should be resolved with a consequent balance of stakeholders interests, based on a scientific knowledge



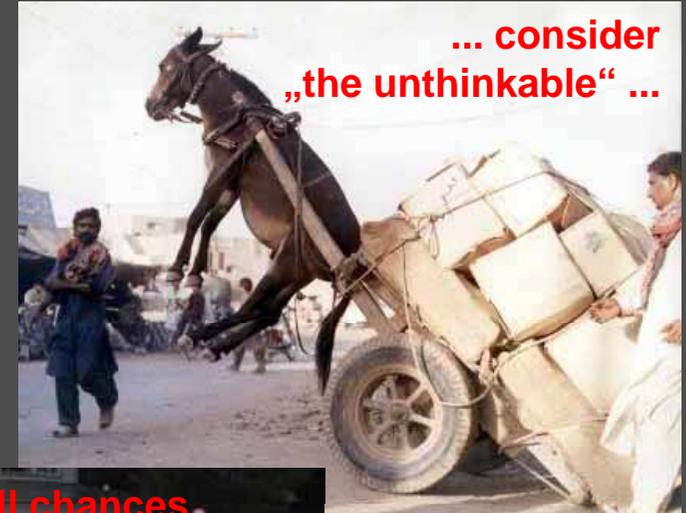
⇒ Sustainable flood protection leads to regenerated watercourses, that are close to their natural conditions

... because the next event is due to come ...

Work together ...



... consider
„the unthinkable“ ...

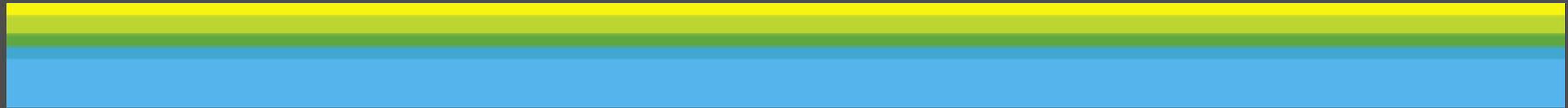


... and take all chances ...



Office for the Environment

Thurgau 



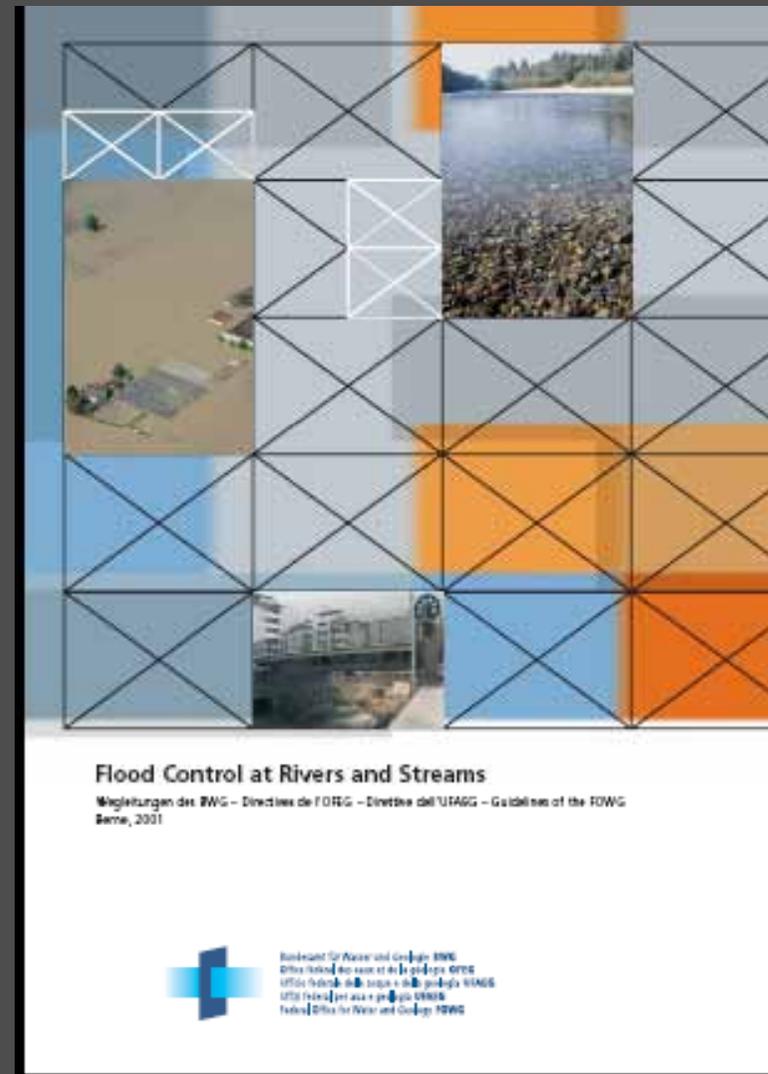
Thank You for your attention

Next slides are for discussion

Guidelines

Flood Control at Rivers and Streams, 2001

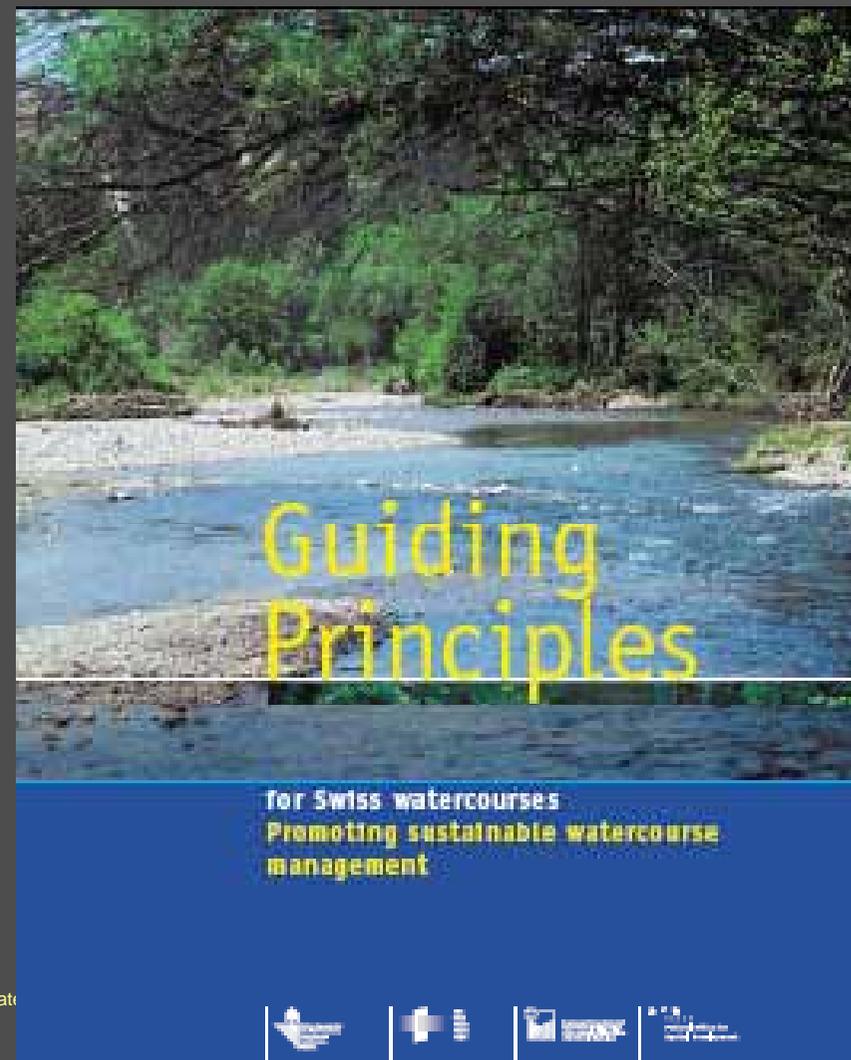
www.bafu.admin.ch



Guiding principles for Swiss Watercourses

... for a sustainable politic
for watercourses

www.bafu.admin.ch



Flooding of August 2005 and 2007



⇒ sufficient space for the water



It will not work without interdisciplinary cooperation !



Hazard Maps

major hazard

ban zone

no new building zones / no new constructions

moderate hazard

conditional zone

new building zones / new constructions only with restrictions

low hazard

index zone

information and recommendations for landowners

residual hazard

index zone

emergency planning measures



Consequences for building and zoning regulation