

Evaluation concepts = policy/scientific paradigm

Security approach	Risk approach	Vulnerability approach
<ul style="list-style-type: none"> The state should guarantee a uniform security level for all citizens. Focus on the hazard <p>+ Enforced by law, e.g. German constitutional law</p> <p>- Ineffective money allocation because areas with high damage potential are not better protected than those with low damage potential</p>	<ul style="list-style-type: none"> State funds should be allocated in an optimal way to reduce the risk level of the state or a special region. Focus mainly on the hazard <p>+ Leading paradigm in flood hazard research</p> <p>+ Effective money allocation</p> <p>- Structural measures lead to an increase in damage potential which leads to bigger natural disasters (Safe Development Paradox; Levee Effect)</p>	<ul style="list-style-type: none"> Resilience of society should be increased to reduce the losses due to natural disasters. Focus on society <p>+ Avoidance of Safe Development Paradox</p> <p>- Needs long-standing commitment of local stakeholders</p>

Major trends in Bavarian flood protection policy

Increasing responsibility of the state for hazard protection

Law	Type of river	Responsibility for maintenance and upgrade expenses	Length
GBW 1852	Public rivers	District	Ca. 2300 km
BayWG 1907	Public rivers Private rivers with high flooding danger	State District	Ca. 2300 km Ca. 410 km
BayWG 1959	1 st order rivers 2 nd order rivers	State District	Ca. 4800 km Ca. 4200 km

Increasing safety standards

- 100-year flood standard obligatory for all big rivers and alpine torrents

Priority for structural mitigation measures

- E.g. Program 2020 (enacted after the Pentecost 1999 flood disaster)
 - annual costs: for **structural measures €115 million**; for flood zone mapping €2,7 million; for improvement of the warning system €1,7 million

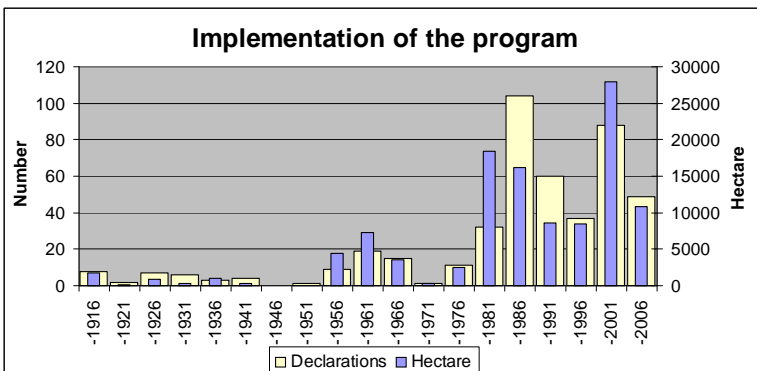
Initial actions inspired by the risk approach

- No structural measures for agricultural land.
- Higher security level at the Isar River due to construction and upgrades of the Sylvenstein dam (2005: inflow >200-year flood; outflow <100-year flood)

Example: Flood zone declaration

Legal basis	Program central objectives				Program subsidiary objectives			Program administration			
	Flood discharge	Retention area	Ecology	Damage potential	Return interval of discharge	Area Discharge area	Retention area	High Priority near existing development	Funding	Organization	Declaration process
GBW 1852					?				Normal budget of the responsible agencies	Flood Zone Mapping - Water Authority; Declaration - District Office.	No declaration
BayWG 1907; VwV 1908					>50 years			Stakeholder consultation with site inspection			
WHG 1957					?			Stakeholder consultation; until 1994 county council resolution also necessary			
BayWG 1959 VwV 1969					>100 years				Specially funded projects	Process since 1999 unclear; since 2003 stakeholder consultation with a formal hearing	Stakeholder hearing
WHG 1996					?						
BayWG 1994 VwV 1999					?						
WHG 2005					>100 year						

BayWG = Bayerisches Wassergesetz = Bavarian Water Law; GBW = Gesetz über die Benützung der Gewässer = Law On the Use of Water Bodies ; VwV = Verwaltungsvorschrift = Administrative Regulation; WHG = Wasserhaushaltsgesetz = German Federal Water Act



Conclusion

Current policy mainly follows the security approach. New projects, especially for Bavarian towns, try to implement higher security levels for high risk zones. There is no ranking of projects according to cost-benefit analyses. Although the negative effects of technical protection measures are recognized in literature, the Bavarian flood protection policy still emphasizes structural measures. In presentations and publications the Bavarian policy is described as favoring non-structural measures, however funding is still dominated by structural measures.

- Flood zone declaration changes from an exclusive water management issue to an instrument for spatial planning and environmental protection.
- Implementation of the program was delayed. Until 2006 only 40% of the bigger rivers flood zones had been declared.
- The delay in implementation was caused by a lack of finance until 1997 (start of the Bavarian flood zone mapping program), since then regular changes to the legal basis have caused conflicts with local people and uncertainty for the responsible agencies.

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