



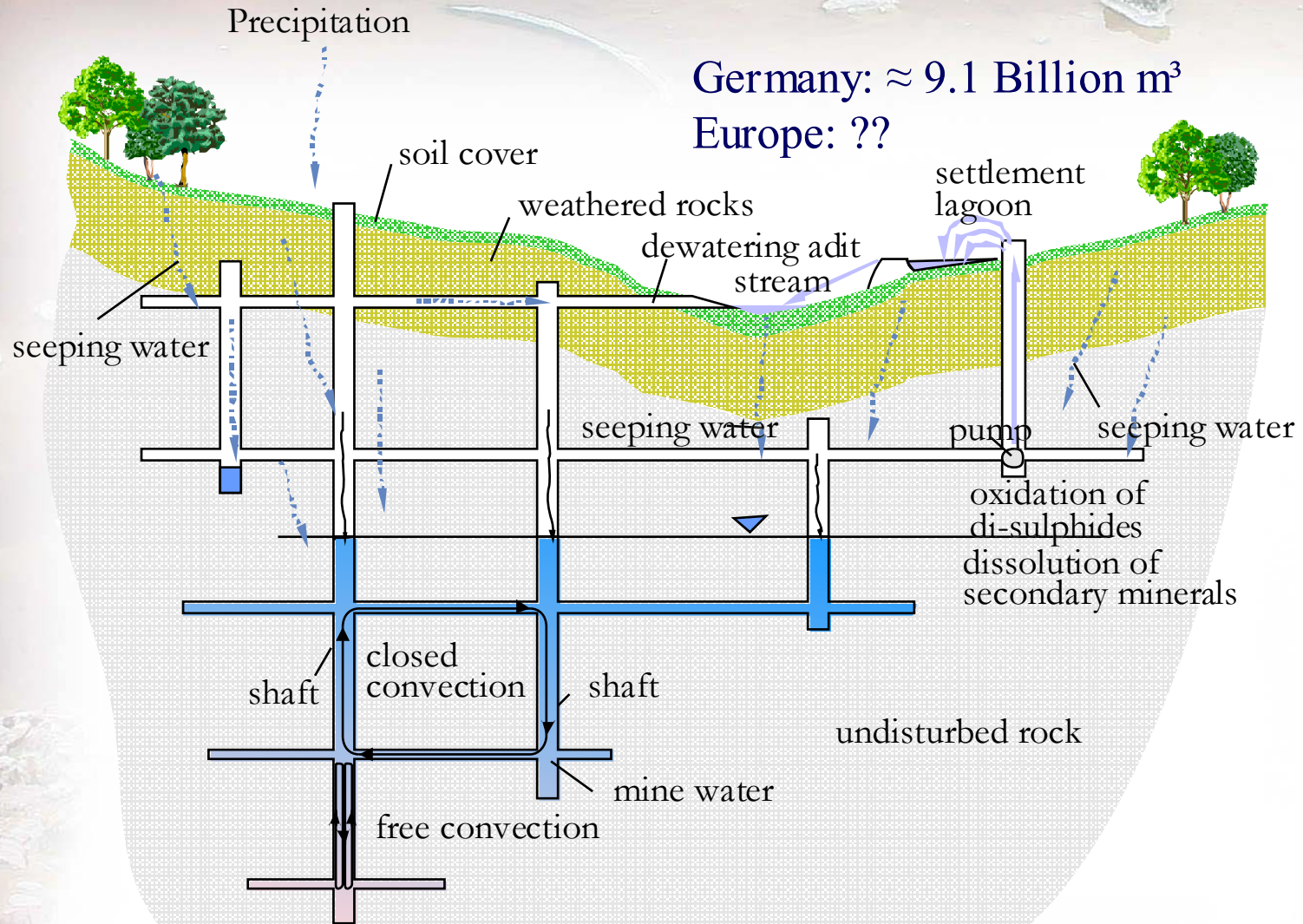
Mine Water Management and the Water Framework Directive

Dr. Christian Wolkersdorfer

IAH-Meeting Berlin September 2006

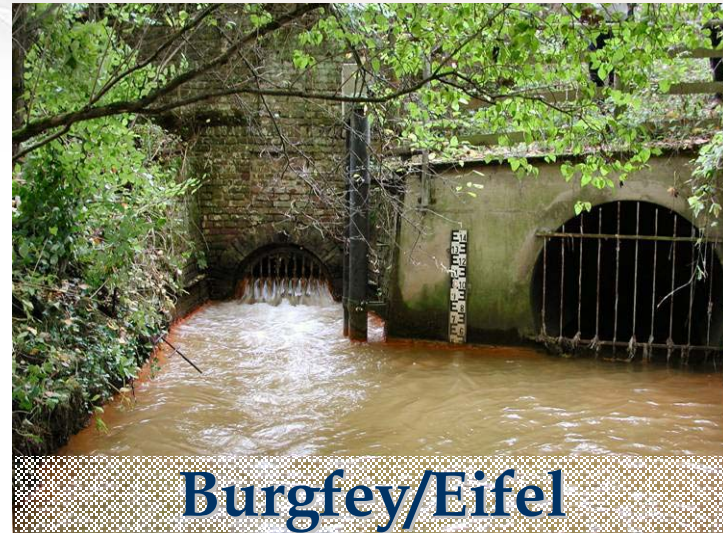
Institute for Geology – Department of Hydrogeology



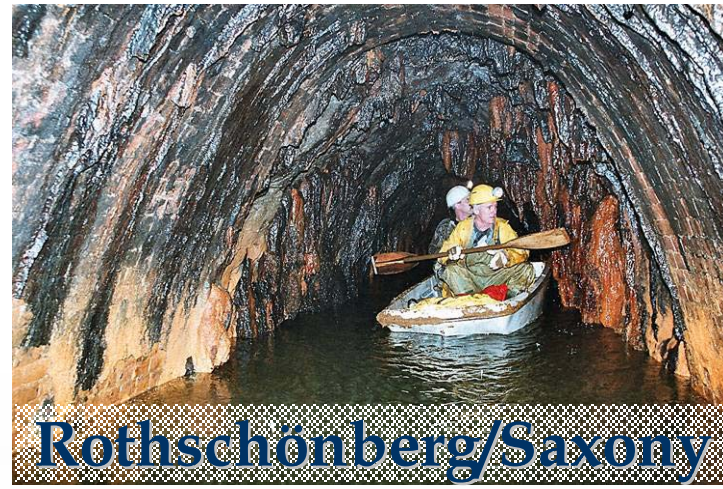


Germany: ≈ 9.1 Billion m^3
Europe: ??





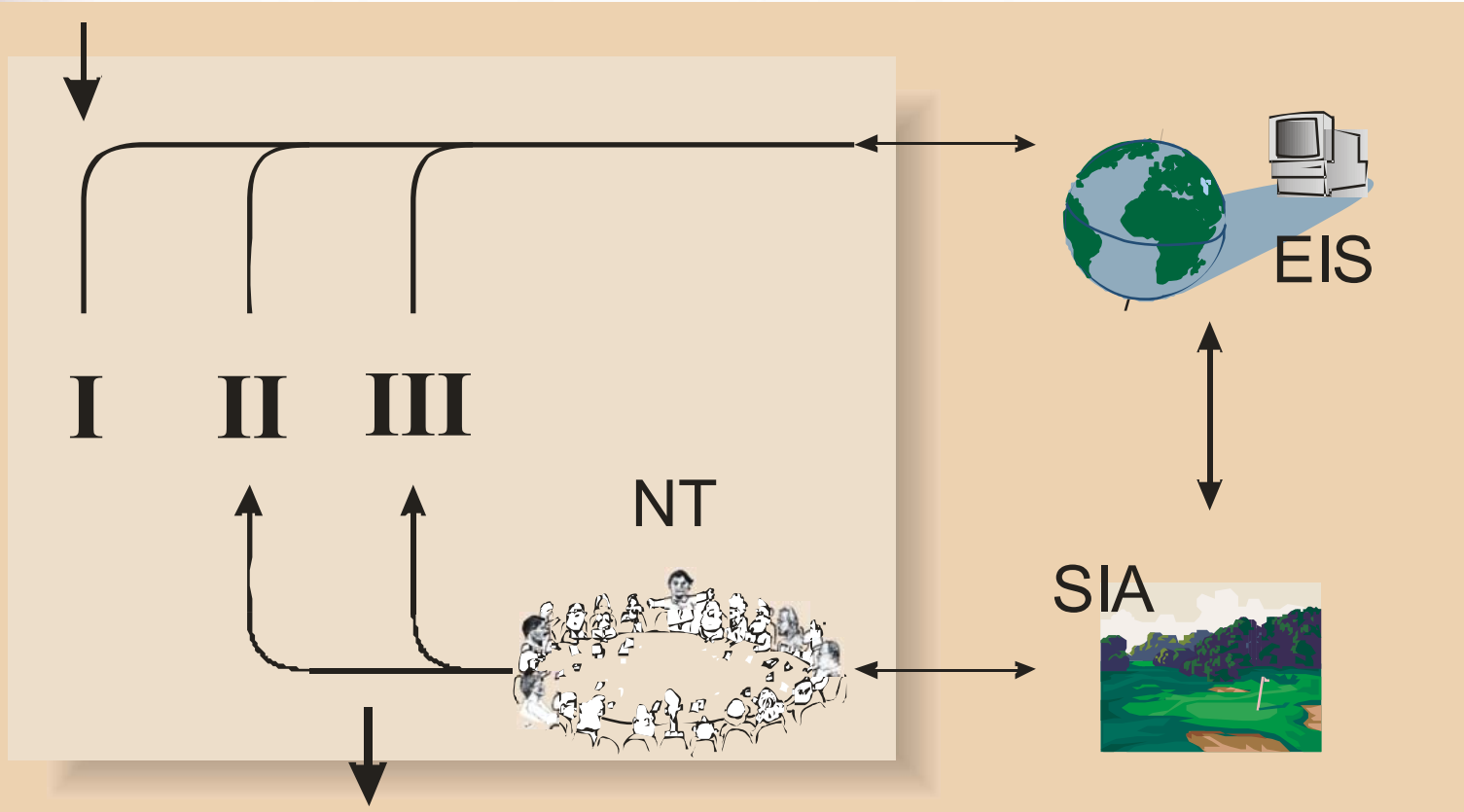
Burgfey/Eifel



Rothschönberg/Saxony

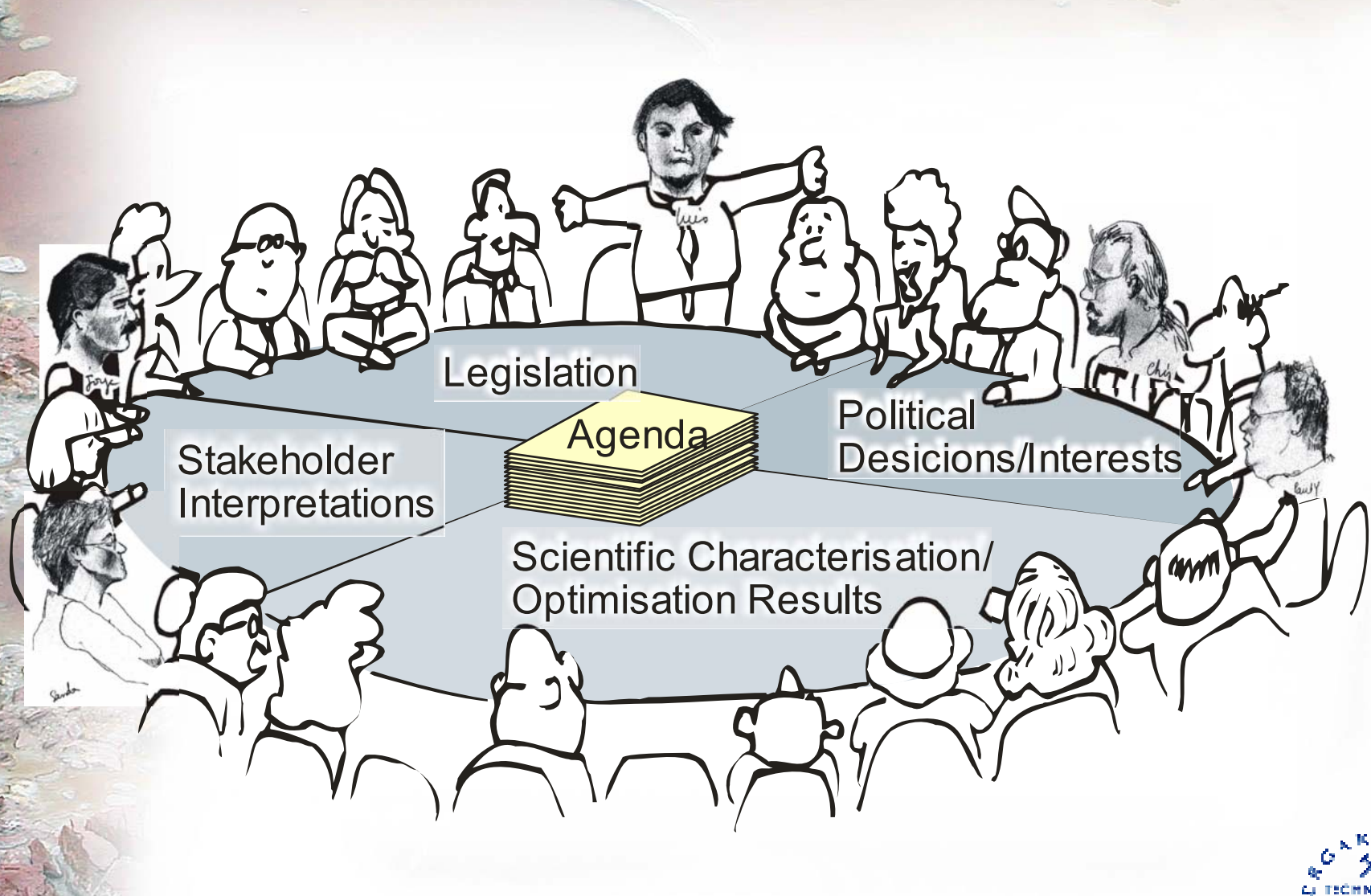
- **Drinking Water Supply**
 - Bayreuth
 - Kassel
 - Obernkirchen
- **Spa Water**
 - Bad Gastein/ Austria
 - Alexisbad/ Germany
- **Turbine/Cooling Water**
 - Biberwier/ Austria
 - Schwarze Pumpe/ Germany
- **Recreational Purposes**
 - Passagem de Mariana Gold mine/ Brazil
 - Banyan Tree Phuket/ Thailand

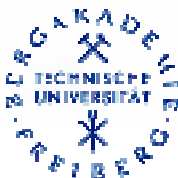
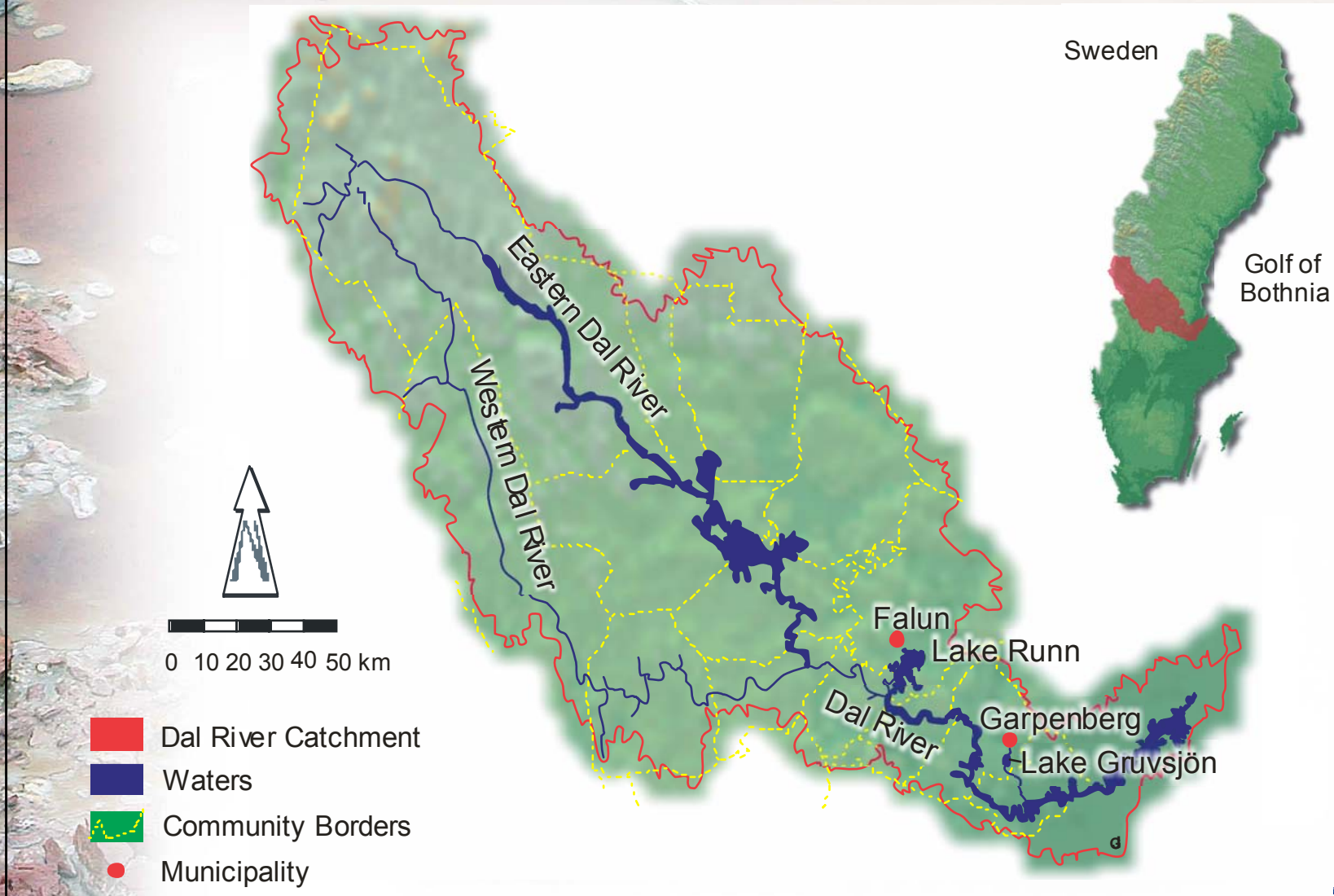
Task 1 or 2



- 1: Mine Water Management Plan and Action
- 2: Programme/Environmental Permit Evaluation







- general framework for the protection of all waters
 - rivers
 - lakes
 - coastal waters
 - groundwaters
- aims to prevent pollution at source
- sets out control mechanisms to ensure sustainable management of all pollution sources
- key requirement: **setting up of river basin management plans**

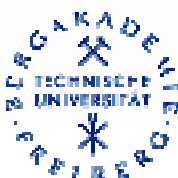
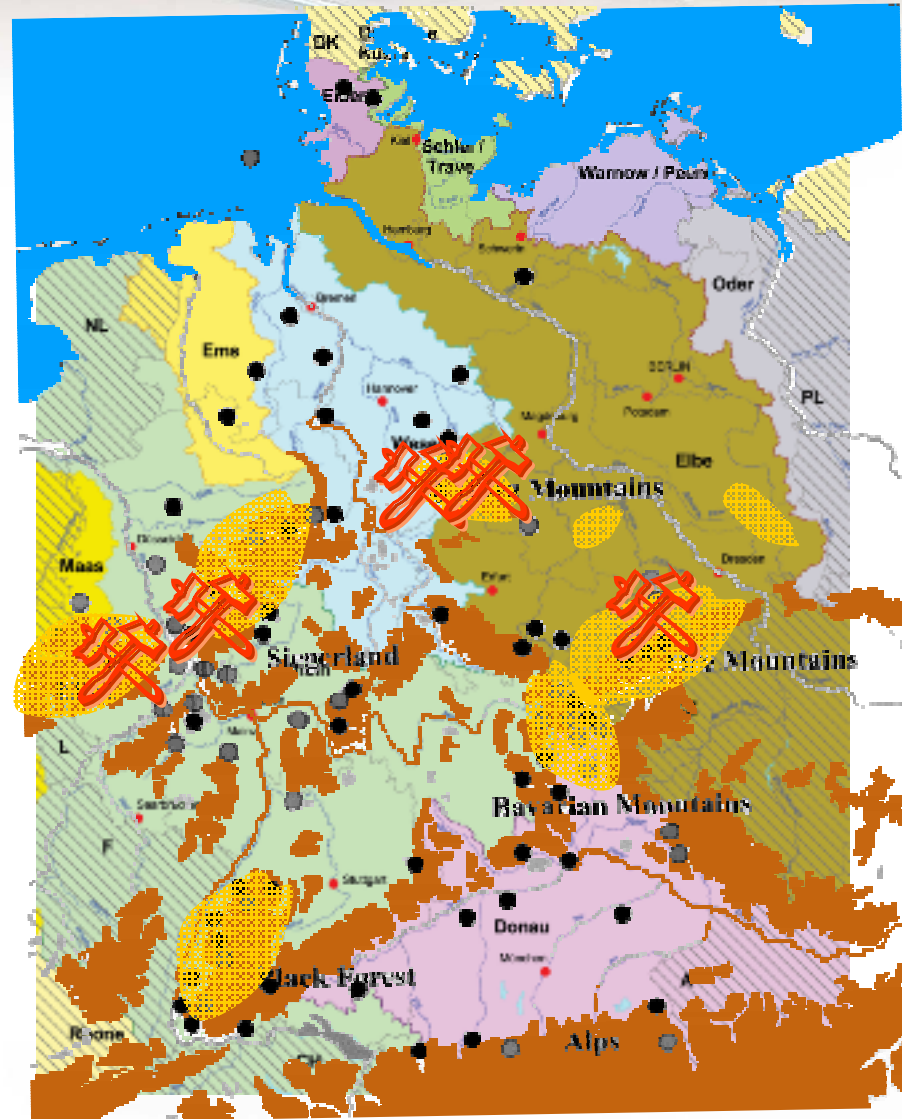
- specifies how the objectives set for the river basin are to be achieved within the timescale set
 - ecological status
 - quantitative status
 - chemical status
 - protected area objectives
- Article 5: characterization of pressures and impacts in a river basin by 2004
- Article 8: establishment of a monitoring network by 2006

- point sources of water pollution will have to be included in the characterization of pressures and impacts in a river basin
 - acid drainage generated by
 - tailings ponds
 - mine waste heaps
 - mine voids
- above mentioned requirements:
 - ensure that pollution originating from abandoned waste management facilities of the extractive industries is properly addressed
- important issue: monitoring

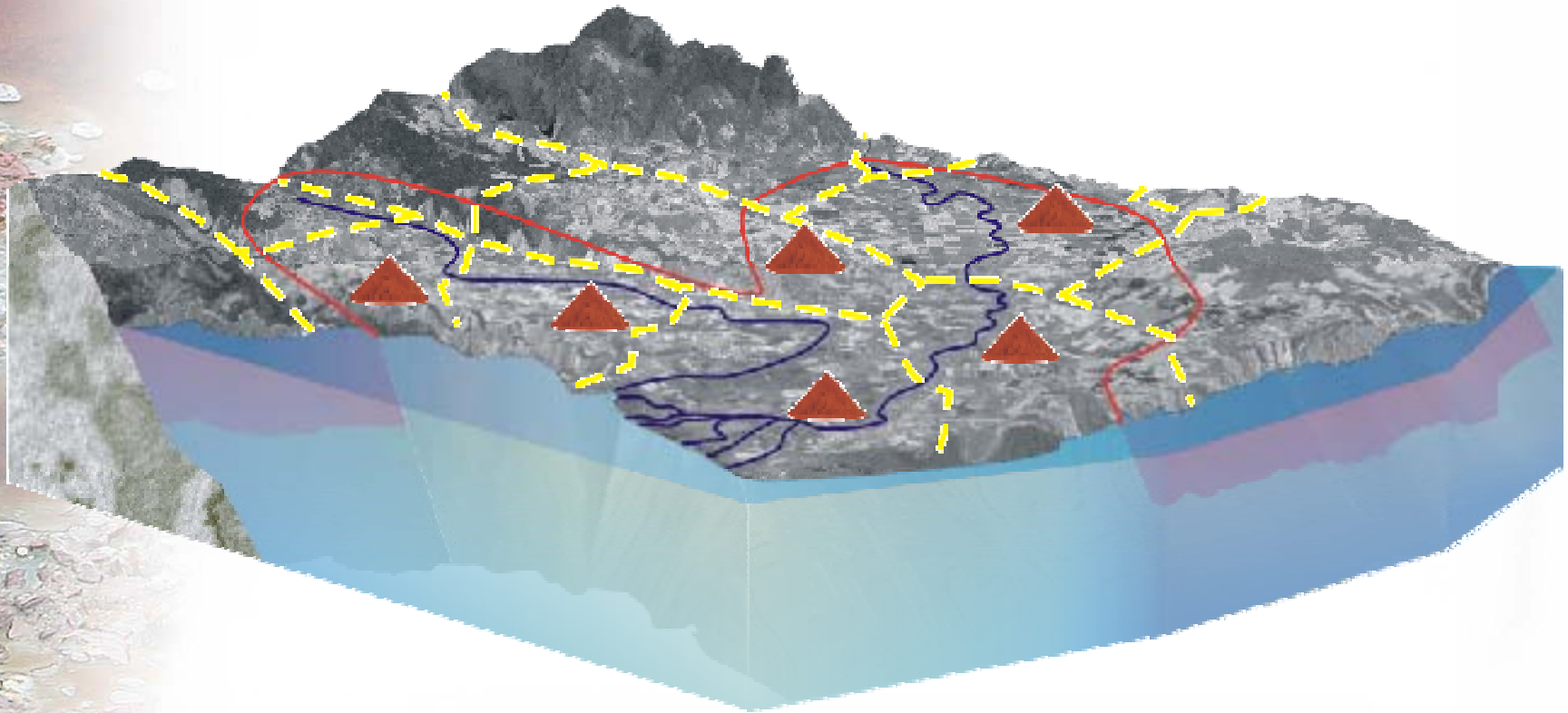
Year	Issue	Reference
2000	Directive entered into force	Art. 25
2003	Transposition in national legislation	Art. 23
	Identification of River Basin Districts and Authorities	Art. 3
2004	Characterisation of river basin: pressures, impacts and economic analysis	Art. 5
2006	Establishment of monitoring network	Art. 8
	Start public consultation (at the latest)	Art. 14
2008	Present draft river basin management plan	Art. 13
2009	Finalise river basin management plan including programme of measures	Art. 13 & 11
2010	Introduce pricing policies	Art. 9
2012	Make operational programmes of measures	Art. 11
2015	Meet environmental objectives	Art. 4
2021	First management cycle ends	Art. 4 & 13
2027	Second management cycle ends, final deadline for meeting objectives	Art. 4 & 13

Rhein

Elbe



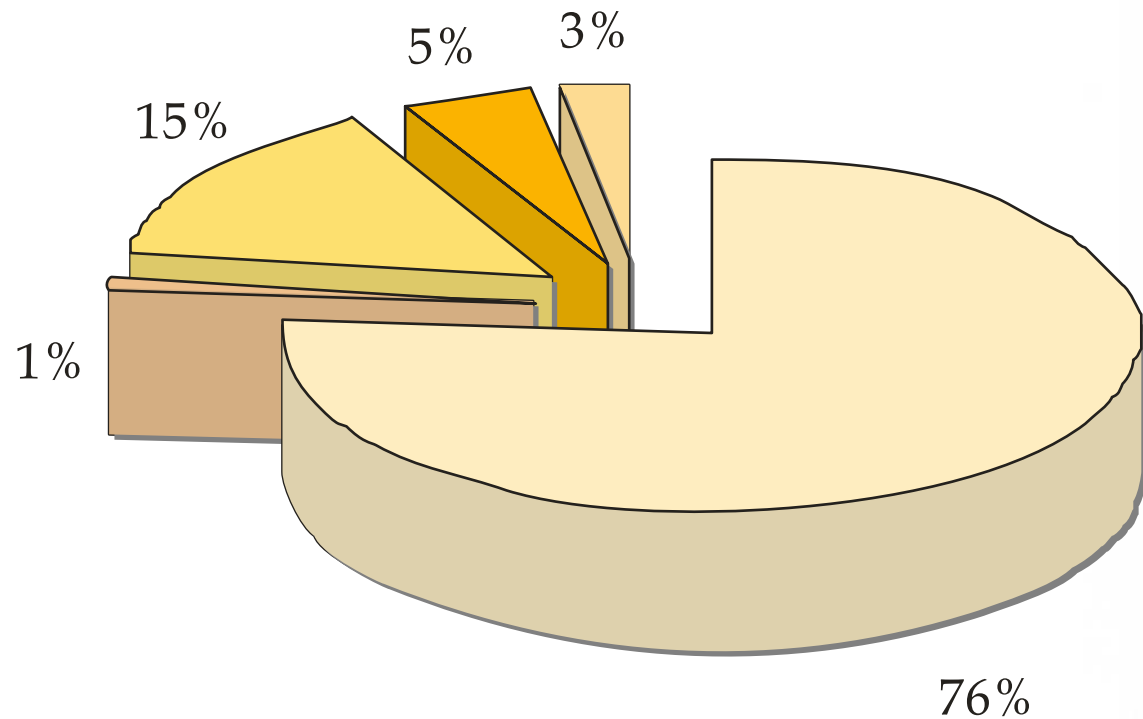
Requirements: co-operation between all the stakeholders and countries involved



- EEA (European Environment Agency):
 - Any residue which results from the extraction of raw materials from the earth
- EU Council Directive 75/442/EEC on waste, amended 91/156/EEC, Art. 1(a):
 - “Waste” shall mean any substance or object in the categories set out in Annex I which the holder discards or intends or is required to discard
 - Category Q16: “any materials, substances or products which are not contained in the above categories”

Available water: $182 \cdot 10^9 \text{ m}^3$

Mining: 9.1 Billion m^3

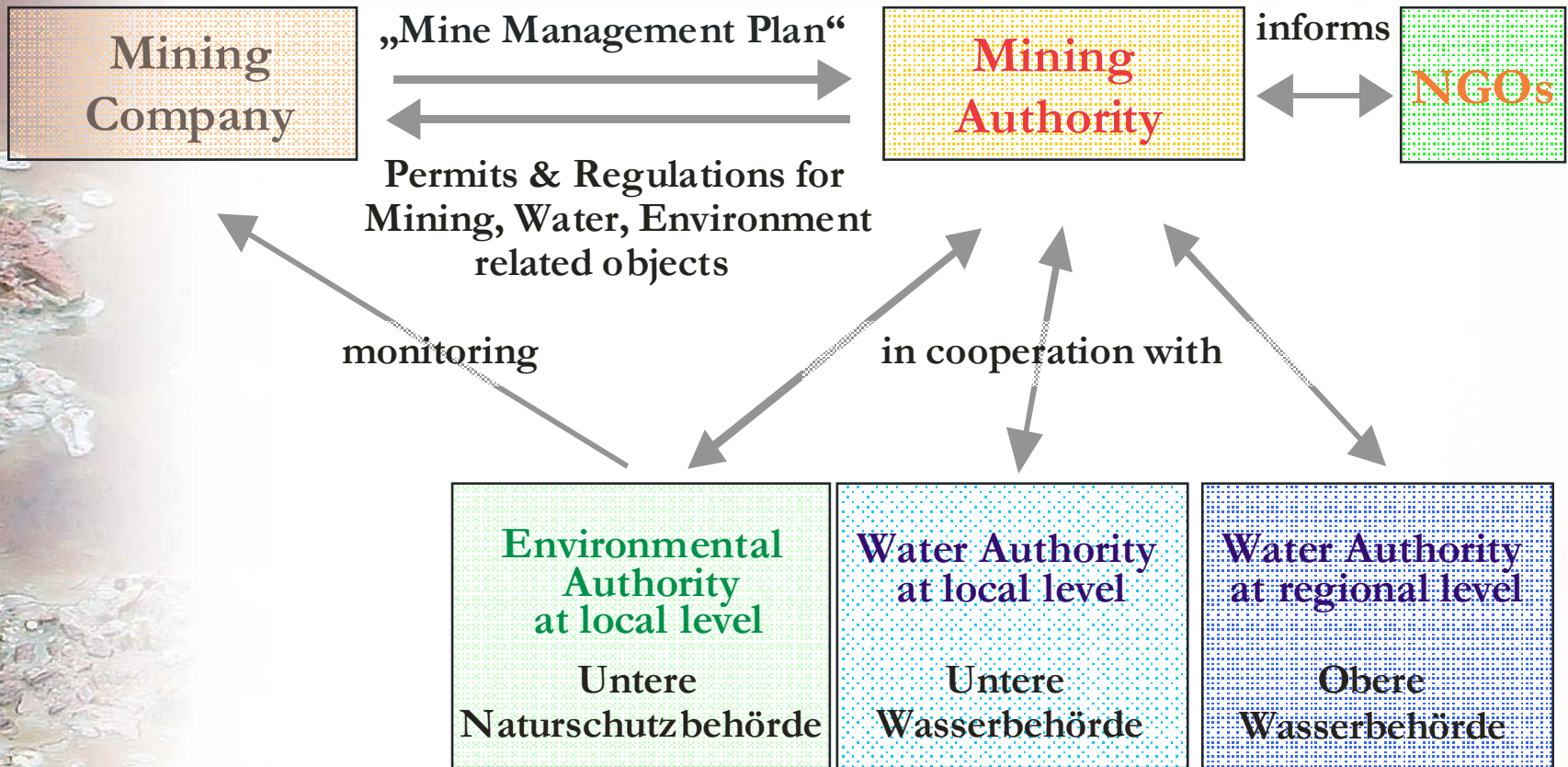


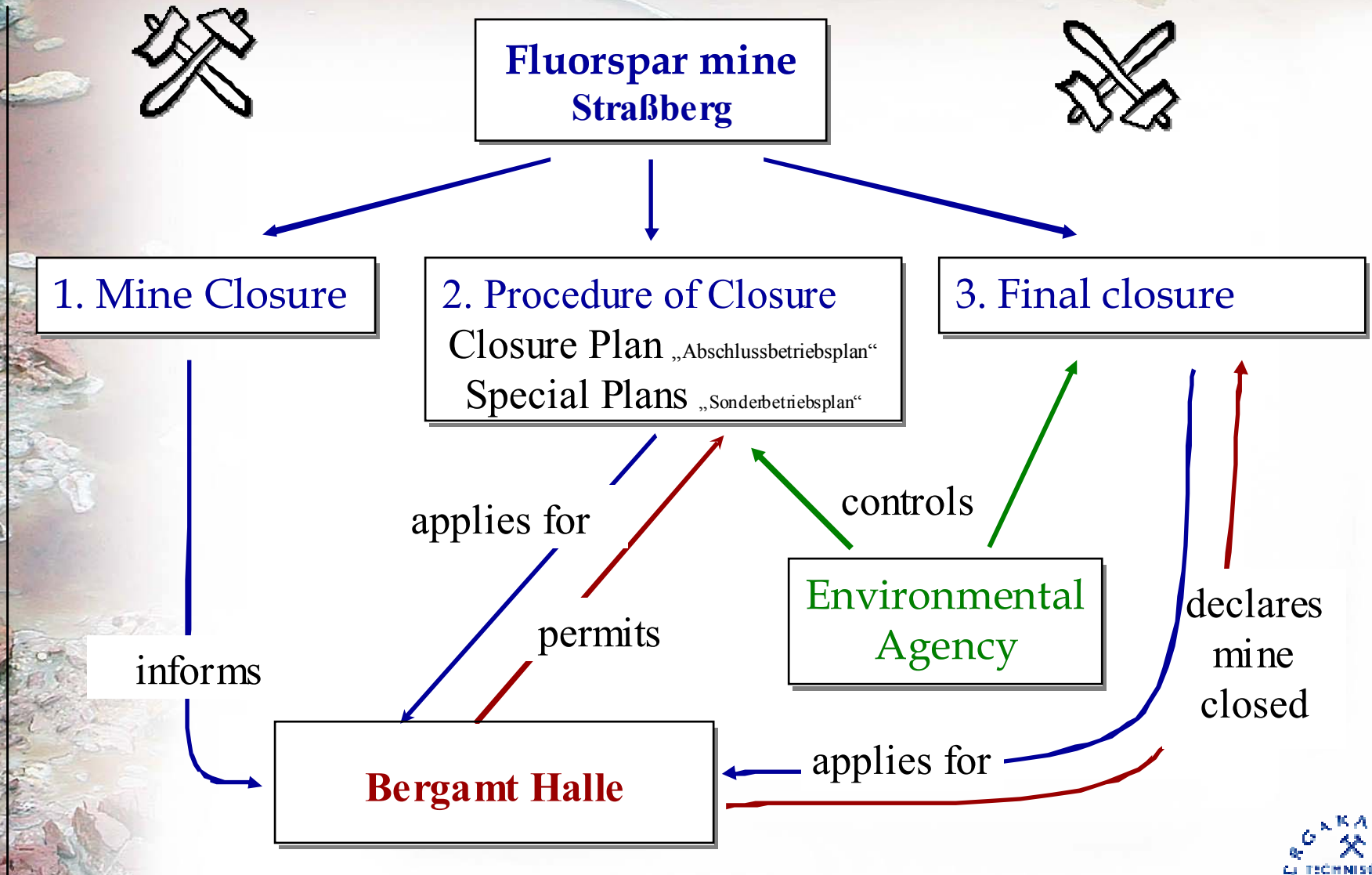
- unused
- Public water supply
- Mining**
- Power plants (cooling purposes)
- Farming



- “Mining Waste Directive”
 - Wastes from the extractive industries have ... to be properly managed in order to ensure in particular the long-term stability of disposal facilities and to prevent or minimise any water and soil pollution arising from **acid or alkaline drainage and leaching of heavy metals**.
- In Directive 2006/21/EC not included

**Bundesberggesetz (13th August 1980 last amended 21st August 2002)
(Federal Mining Law)**





- Impacts of mine water on the environment
 - potentially toxic ions in water paths
 - land use for treatment plants
- Mine water environment
 - circum neutral mine water
 - high contents of Fe $\approx 18...20$ mg/L,
 - Mn $\approx 1,2$ mg/L, $SO_4^{2-} \approx 400$ mg/L
- Future development
 - permanent HDS Treatment Plant
 - passive water treatment plant
 - mine water will be enriched in potentially toxic (semi-)metals for a long period

- Monitoring procedures
 - by mine itself
 - two samplings weekly at several points
 - analyses Fe, Mn, pH, flow rate
 - Staatliches Amt für Umwelt (Environmental Agency)
 - irregular sampling of Fe, Mn, pH, flow rate
 - irregular controls of mining/closure process by the Mining Authority
- Conventional water treatment (oxidation, liming, settlement)

- Responsible: mining authorities
 - Horizontal and vertical co-operation network with other authorities
- Comprehensive regulatory framework
 - mining activities
 - water
 - environmental issues

- No German Mine Water Law
- Standards for parameters of cleaned mine water are fixed by Water Authority based on each single case
- Wastewater: State Work Group for Water and Waste (LAWA)
- Straßberg, Gernrode: Financed by Federal Government through GVV (Association of Remediation and Use of Mines)
- Uranium: Financed by Federal Government through Wismut GmbH
- Lignite: Financed by Federal Government through LMBV
- Special case Meggen: European Fishing Water Regulation

- Problems

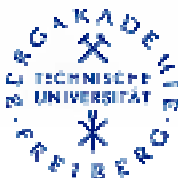
- Mine water discharges of abandoned mines not governed by the mining control authority
- though covered by the regulatory framework, some of them are not taken care of

- Solution

- EU framework also for abandoned mines (not all European stakeholders agree with that)
- education and advanced training sites
- projects for cheap remediation actions needed

- No Solution

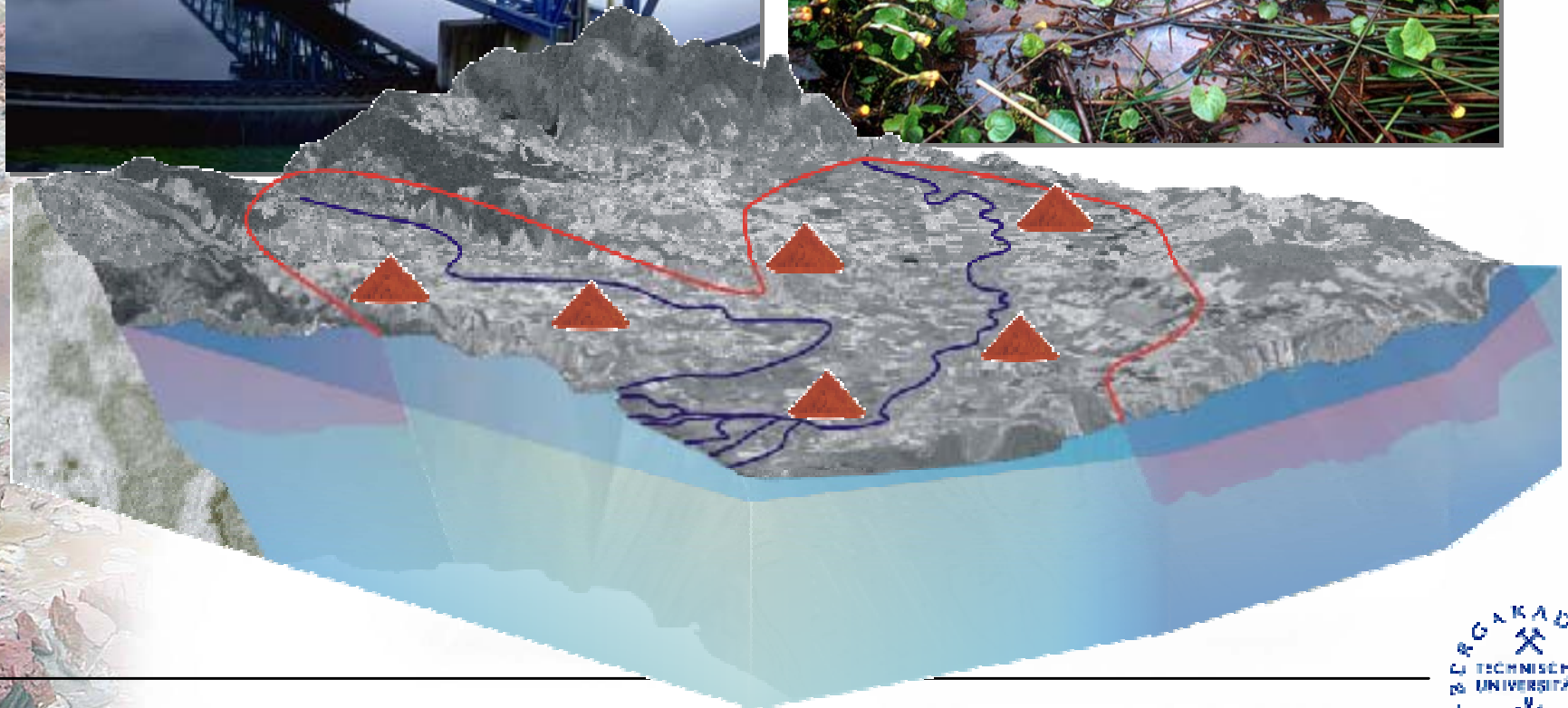
- Directive 2006/21/EC “The Management of Waste from the Extractive Industries”



single site



multiple sites





- **WHY PADRE - Partnership for Acid Drainage Remediation in Europe?**
- Acidic drainage is now recognised to be the single greatest environmental challenge facing the mining sector worldwide
- In Europe we have examples of acidic drainage in areas ranging from the high Arctic to circum-Mediterranean deserts
- Most European examples are associated with abandoned mines



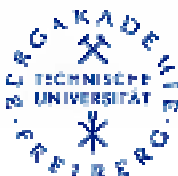
- The proposed EU “Mine Waste Directive” is bringing the issue to the attention of European policy makers
- Various acidic drainage investigations are underway in Europe including research building on recently-completed EU FP5 research projects (especially PIRAMID and ERMITE)
- A central ‘watching post’ is desirable in order to avoid unnecessary duplication of effort – must include an inter-continental perspective

- Global Alliance

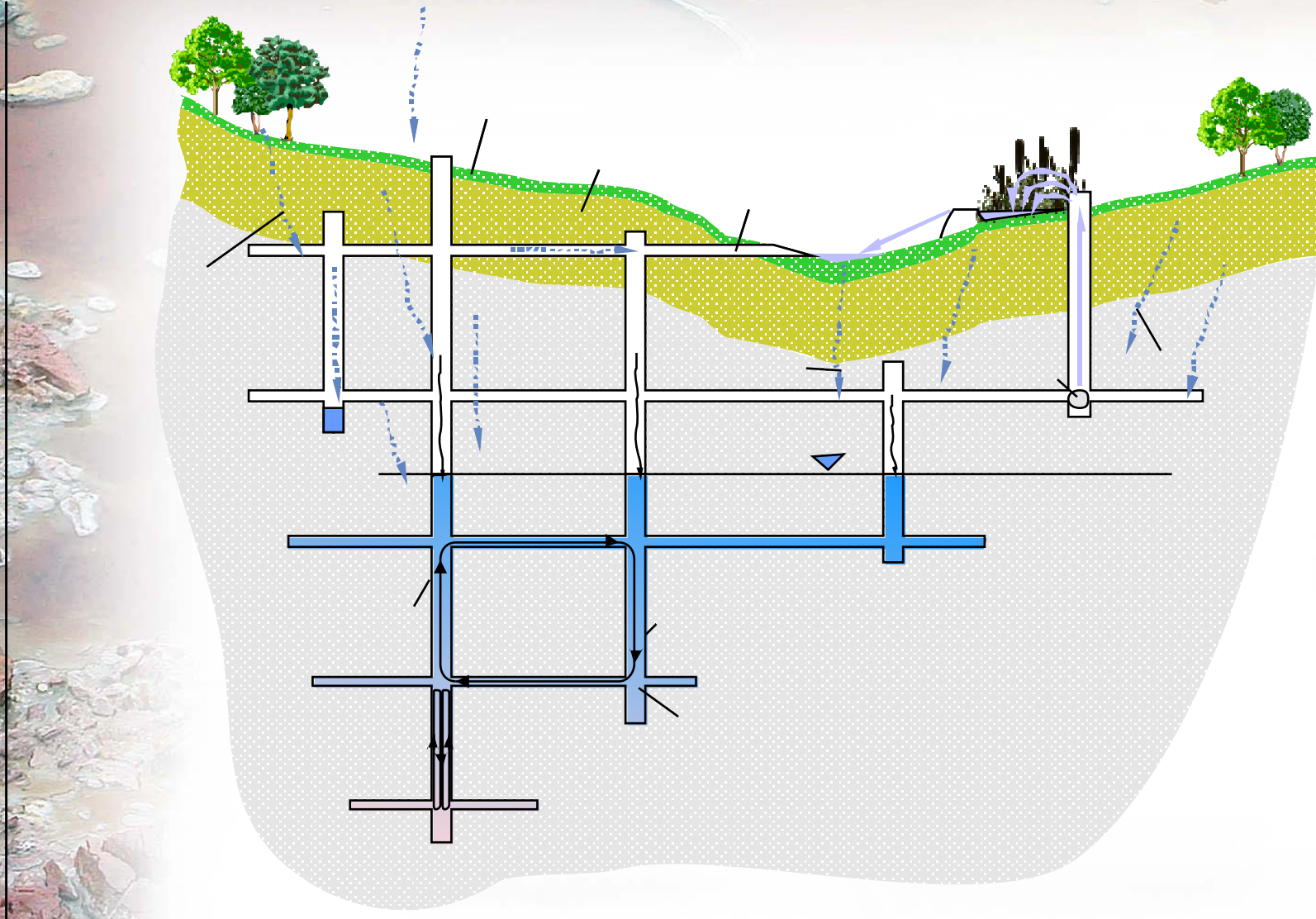
- PADRE – Partnership for Acid Drainage Remediation in Europe
- INAP – International Network for Acid Prevention
- ACMER – The Australian Centre for Mining Environmental Research
- MEND 2000 – Mine Environment Neutral Drainage
- ADTI – Metal Mining Sector and Coal Mining Sector



Acid Drainage Technology Initiative



- Decisions need a broad support by all regulators and stakeholders
- Abandoned mine sites are not properly covered by the legislation
- Today
 - site specific decisions
- Future
 - catchment specific decisions needed
- We need cheap(er) water treatment options
- PADRE: promote European mine water issues
- Global Alliance: promote world wide mine water issues



*Vielen Dank und
Glückauf!*

